

ST.MARY'S UNIVERSITY
SCHOOL OF POSTGRADUATE
GENERAL BUSINESS ADMINISTRATION



An assessment of Pharmaceutical Inventory Management
In the case of Addis Ababa Health Bureau Hospitals

By Aseb Megbiyaneh

Addis Ababa, Ethiopia

May 2018

**AN ASSESSMENT OF PHARMACEUTICAL INVENTORY
MANAGEMENT IN THE CASE OF ADDIS ABABA HEALTH BUREAU
HOSPITALS**

BY ASEB MEGBIYANEH

ADVISOR, SIMON TAREKEGN (ASST. PROF)

**A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF
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APPROVED BY BOARD OF EXAMINERS

_____	_____
Dean, Graduate Studies	Signature
_____	_____
Advisor	Signature
_____	_____
External Examiner	Signature
_____	_____
Internal Examiner	Signature

DECLARATIONS

I declare that this thesis is my original work, prepared under the guidance of Simon Tarekegn (Asst. Prof). All sources of materials used for the thesis have been acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for earning any degree.

Aseb Megbiyaneh

Name

Signature

St.Mary's University, Addis Ababa

Date_____

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RECOMMENDATIONS

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ACRONYMS/ ABBREVIATIONS

APTS	Auditable Pharmaceutical Transaction System
AAHBH	Addis Ababa Health Bureau Hospitals
WHO	World Health Organization
VEN	Vital, Essential and Non-essential
FEFO	First Expired First Out
FIFO	First In First Out
EFMHACA	Ethiopian Food, Medicine and Health Care Administration and Control Authority
DTC	Drug Therapeutic Committee
EOQ	Economic Order Quantity
PFSA	Pharmaceutical Funding and Supply Agency
JIT	Just In Time
NEML	National Essential Medicine List

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ABSTRACT

The main objective of this study is to assess pharmaceutical inventory management in the case of AAHBH's. Descriptive research design was used and both qualitative and quantitative research approach were implied for this particular study. The sample size for this study were 105 employees working in AAHBH's. The study is made based on primary and secondary data which is collected through self-administered questionnaire and a self-observation using a checklist was used. To analyze the collected data a descriptive form of data analysis was used. Accordingly, lack of on job training, lack of computers and other electronics accessories in the stores, the existence of "KENEMA" pharmacy in the hospitals, the quantification techniques used, reporting and documentation techniques were some of the major tools for the assessment of pharmaceutical inventory management. The current storage area of the hospitals is below the standard of the EFMHACA. In most of the hospitals since there is no enough space for the medication or for the supply, medication and the equipment or the supply items are placed on the floor. This will shorten the shelf life of the medical supply or the equipment and medication will lose their effect because of improper storage. Based on the gap observed, it is better if the pharmaceutical inventory management in the hospital is improved, better storage conditions of the pharmaceuticals better if it is based on the standards.

Key words: Inventory management, Pharmaceutical, Pharmacy and Druggist.

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the study

As we entered the 21st century, there are many factors that influence the future practice of pharmacy and delivery of pharmaceutical care. The pharmaceutical care role takes substantial time for pharmacist. However, pharmacists have multiple responsibilities in the hospital. These include drug inventory management, dispensing, in hospital preparation, aseptic mixture and adjustment of injections, drug information service, many clinical services including therapeutic drug monitoring, clinical research coordination etc Toshio *et al* (2005).

Many studies have been done to document drug use patterns, and indicate that overprescribing, multi-drug prescribing, misuse of drugs, use of unnecessary expensive drugs and overuse of antibiotics and injections are the most common problems of irrational drug use by prescribers as well as consumers. Improving drug use would have important financial and public health benefits WHO (1999). A cross sectional study which is done on public hospitals of eastern Ethiopia find out the pharmaceutical expenditure is up to 70/75% of total healthcare expenditure in low and middle-income countries. However, irrational use of drugs has been primarily observed in healthcare systems of developing countries. WHO estimates that more than half of all drugs are irrationally prescribed or dispensed and more than half of the patients fail to adhere the prescribed regimen.

Common reasons for irrational use of medicines include, lack of adequate information about the prescribed drugs, faulty and inadequate training of medical graduates, poor communication between health care providers and patients, lack of diagnostic facilities, demand from the patient (assuming that ‘every ill has a pill’), and defective drug supply system Sisay *et al* (2017).

Aarti and Dhawa (2010) also stated inventory management system provides information to efficiently manage the flow of materials, effectively utilize people and equipment, coordinate internal activities and communicate with customers. Inventory Management does not make decisions or manage operations but provides the information to managers who make more accurate and timely decisions to manage their operations. When we come to pharmaceutical inventory it is a major component of any health system and just like other inventory it requires proper planning, managing and controlling in order to achieve the basic aims of minimizing costs at acceptable levels of investment and providing the desired levels of customer service.

According to the world health organization (WHO, 2007) effective supply management has the potential to make a powerful contribution to the reliable availability of essential medicines, which are a crucial part of the delivery of high quality health care services. According to *Managing medicines and health products, 2010* because medicines are costly and poor management soon results in waste; good supply management is also crucial to the cost-effectiveness of providing medicines.

Richard (2006) pharmaceutical companies and health care centers have been striving for increased supply chain efficiency through higher resource utilization and inventory reduction. Sameer *et al* (2008) Just in time (JIT) strategy is difficult to implement in the healthcare industry due to the importance of patient safety. However, there have been studies performed that show that some of the supply chain activities of hospital meet the criteria of potential JIT strategy. These criteria include operations that are repetitive, high volume, and deal with tangible items. Konstantinos *et al*(2002) also states that, JIT cannot be considered for the health-care industry, even though there are many examples of successful JIT applications in other industries with many benefits, but there are many circumstances that this benefit is proven true, such as the

emergency situations which hospitals face. According to the Deliver logistics handbook (2006) the patient deserves to have for the six right from the pharmaceutical service that is being given, and they are, the right goods, in the right quantities, in the right condition, delivered to, the right place, at the right time, for the right cost. These all rights have a direct relationship with the inventory itself and its management so improving the inventory management will have a direct impact on the six rights that the patient have to get. Zhi *et al* (2007) states that the hospitals' pharmaceutical inventory management is under the logistics activity of the hospital, and the logistics activities involve planning, designing, implementing and managing material flows in a supply chain to support functions such as procurement, distribution, inventory management, packaging and manufacturing. And this study investigated that how the current pharmaceutical inventory management of all the six Addis Ababa health bureaus' hospitals.

This research is conducted on the assessment of pharmaceutical inventory management practice in Addis Ababa health bureau hospitals. This research will provide academic knowledge and will identify the gap that is affecting the inventory management of the six AAHB hospitals and to recommend based on the gap identified. Inventory is the stock of any item or resource in the hospital pharmacy and pharmacy stores, inventory management is the process of reducing inventory cost, keeping inventory from under stoking or over stoking and determining order and reorder points in order to achieve the hospitals goals.

1.2 Statement of the problem

An effective pharmaceutical service promotes the safe, rational and cost-effective use of medicines thus maximizing health gain and minimizing risk to patients. And a well-organized pharmaceutical inventory service ensures the continuous availability of all pharmaceuticals that are required for patient care. Again an inventory control system is to inform personnel when and how much of a product to order and to maintain an appropriate stock level to meet the continuous needs of patients (APTS training manual 2017). At the same time, an effective pharmaceutical service should be able to respond to sudden increases in medicines demand, ensuring that adequate supplies are available to deal with any emergencies that may arise (APTS training manual for federal hospitals 2012).

Proper inventory management avoids overstocking, under stocking and stock out, minimizes wastage of product from damage and expiry of the pharmaceuticals, simplifies inventory control decision making and it aids forecasting when there is a consistency of stock levels.

The hospital pharmacy store has to be at least according the standard that is set by the regulatory body Food, Medicine and Health Care Administration and Control Authority (FMHACA). Even though there are standard criteria to establish hospital pharmaceutical storage, to the best knowledge of the researcher the physical setup of the pharmacy stores, and good storage practices in the hospitals, so this research will assess all the hospitals pharmacy stores using a standard check list that is developed by Management science for health (2012).

Refrigerators should be found in all of the hospital pharmacy stores, which will store some pharmaceuticals that needs to be stored in refrigerators, for this reason they require a closer follow up by the storekeeper and there is a standard operating procedure to follow it, so this study assess the current performance on cold chain management and storage in the hospitals.

According to Sefinew (2012) Analysis by VEN (Vital, Essential and less Essential) is useful to determine the relative expenditure by public health value, which reflects public health needs and morbidity patterns, in this study the researcher try to assess the professional's knowledge about the use of VEN and ABC analysis.

Also, this research assessed the professional's knowledge on how to use HMIS and based on the checklist. The researcher assessed the professionals' knowledge on information technology, the professional's skills on how to use computer and the availability of IT equipment's in the hospitals store.

In order to develop an appropriate inventory control, demand forecasting is highly needed. The major quantification technique in healthcare settings is a historical (consumption) data analysis and few health facilities might use morbidity-based quantification. So, this study also try to find out how the pharmacists quantify pharmaceuticals for their respective hospital to the future fiscal year and how the pharmacist manage inventory they have.

1.3 Research Questions

- What is the level of awareness of good pharmaceutical inventory management of AAHBH pharmacists?
- What is the interest of the pharmacy professionals to work in the pharmacy stores?
- What does the store documentation look like related to pharmaceutical inventory management?
- What is the current status of AAHBH store management?

1.4 Objectives of the study

1.4.1 General objective

- The general objective of this study is to assess inventory management in the case of AAHBH pharmaceutical.

1.4.2 Specific objectives

- To assess the awareness of the pharmacy professionals, on good pharmaceutical inventory management.
- To assess proper data documentation.
- To assess the current storage areas and practices of the pharmacy stores of each hospital.

1.5 Scope of the study

- The study includes all the AAHBH namely Yekatit 12 Hospital Medical College, Menelik II Hospital Medical College, Gandhi Memorial Hospital, Ras Desta Dametew hospital, Zewditu Memorial Hospital and Tirunesh Beijing Hospital. This study will be limited to study only the pharmaceutical inventory management, which is found in each of the hospital that is managed by pharmacy case team/ directorate, which is pharmacy professionals of the hospitals.
- The study assessed the problems in achieving inventory readiness for pharmaceuticals and assess alternative inventory management techniques to resolve existing problems. It also examines shelf-life extension, drug stability, and inventory actions to better track expiration dates. All of the measures will help reduce disposal costs. Alternatives was analyzed to optimize the distribution of pharmaceuticals, to increase accuracy of records, and eventually to minimize annual operating costs. The study is limited to pharmaceuticals of AAHBH. At the end of this research the result will be used to assess

the inventory management system of those selected AAHBH which, is beneficial to the hospitals regarding reduction of inventory costs and to improve the efficiency of inventory management.

1.6 Significance of the study

According to the APTS implementation guideline (2012) the lion share of the hospitals annual budget is occupied by the pharmaceutical items that are to be used for medical purpose, so managing pharmaceuticals of the hospital does mean managing the hospital for a better patient and staff satisfaction.

The findings from the study will be used as an input by the government officials to benefit the people who are being served by the hospitals and the policy makers shall consider the gaps to satisfy the patient and ultimately reduce cost of damaged and expired pharmaceuticals.

And the study will be used as a standing point to show where the hospitals pharmaceutical inventory management is. And finally the study will be use as base line information for future studies related to the specific topic.

1.7 Limitation of the study

The study was done only on the six hospitals of Addis Ababa and from that also some of the professionals, working in the pharmacy store, were not willing to share the information they have, this affect the validity of the data. And some of the professionals were not willing to respond to the questionnier. Secondly, the concept of inventory management is wide, the interpretations of the terms used may vary, perhaps leading to questionable results. A particular problem with qualitative methods is that answers obtained from open questions are unstructured. Perhaps open to subjective interpretation.

1.8 Organization of the Research

This research paper is organized in five different parts that is classified in chapters. Chapter one like it is mentioned above, Chapter two includes Theoretical and Empirical Literature Review. Chapter three, Research Methodology starting from Research Design, Research Data Source, Methods of Data Collection, Population and Methods of Sampling Technique and Methods of Data Analysis. Chapter Four contains Result and Discussion and the last chapter of the study paper includes Summary, Recommendation and Conclusion of the study.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 Theoretical literature

2.1.1 Background of Addis Ababa Health Bureau

The Addis Ababa regional Health Bureau was established in 1985 E.C pursuant to the proclamation number 311/95 Addis Ababa City proclamation of municipality service No.2/1995.

The Bureau is authorized to organize, coordinate and regulate public health activities in the city including regional hospitals and health centers <http://www.addisababacity.gov.et/index.php/en/social-sector/health/health-bureau>.

The bureau is currently administering six hospitals and other health centers, when the hospitals communicate directly with the bureau, the health centers will communicate through their respective sub city. And the six hospitals are in direct administration of the Addis Ababa Health Bureau, which is responsible to the Federal Ministry of Health of Ethiopia. Which mainly includes Gandhi Memorial Hospital, Menelik II Hospital Medical College, Ras Desta Dametew Hospital, Tirunesh Bejing Hospital, Yekatit 12 Hospital Medical College and Zewditu Memorial Hospital.

Including the other services all hospitals of the bureau give pharmacy service to patients, and most of the hospital budget is allocated to purchase pharmaceuticals. Most of the Hospital pharmacy service, including outpatients, Inpatients, Emergency and also ART and TB pharmacy. Which gives free medication and free services for patients who brought a supporting letter from their respective Keble or sub-city and also for those who is staff of health organization. Each hospital has a large amount of money expense for the treatment and management of acute and chronic diseases of the free patients who came from all over Ethiopia with a referral paper and

with a support letter from their respective Keble/sub-city. The World Health Organization (WHO) defines a drug or pharmaceutical preparation as: any substance or mixture of substances manufactured, sold, offered for sale or represented for use in the diagnosis, treatment, mitigation or prevention of disease, abnormal physical state or the symptoms in man or animal; restoring, correcting or modifying organic functions in man or animal. Based on this definition of WHO every patient has the right to get those things from the hospitals.

2.1.2 Definition of inventory

The word “inventory” has been defined in many ways, three definitions is chosen which seem to be more appropriate to this research. Chase and Jacobs (2004) defined inventory as, it is the stock of any item or resources used in an organization. And an inventory system is the set of policies and controls that monitor levels of inventory and determine what levels should be. Finally, Inventory management is the activity, which organizes the availability of items to the customers. It also coordinates the purchasing, manufacturing and distribution functions to meet the customer needs Wild (2002).

According to Render (2003) an inventory is any stored resources that are used to satisfy a current or a future need.

According to Hans et al (2006) related the pharmaceutical inventory management with the WHO human right constitution. WHO Constitution of 1946, says that “The enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.” For this fundamental right health facilities like hospitals and health centers are the key players in the fulfillment of this

right. And to full fill this fundamental human right health facilities need an input called Pharmaceutical supply in turn will be pharmaceutical inventory.

Hoque and Paul (2011) in their research stated pharmaceutical is one of the most sensitive and major industry that deals with human and animal life. Purity is highly deserved in this industry and there is no option of second chance so quality, security, identity is the most important to maintain. WHO the African region (2014) reported that the health challenges facing the African region include communicable and non-communicable diseases and high maternal and child mortality these are being aggravated by poverty, the global financial crisis, epidemics and other natural and manmade disasters. But effective public health interventions that could contribute to a reduction of the high disease burden exist, and weak health systems mean coverage of interventions remains low.

The FMOH (2007) in collaboration with the WHO stated that the goal of the pharmaceutical sector is to ensure the regular and adequate availability of safe, effective and of good quality drugs and medical supplies at affordable price and their rational use. And Ilma and Mursyid (2013) described hospitals as a complex organization providing a multitude of service to patients. These services include medical treatment, laboratory, surgery, pharmacy and others. And all these medical activities are addressed by the inputs by the hospitals pharmacy department. But the health care systems have, traditionally, paid little attention to the pharmaceutical inventory management Cristina et al (2012).

In their patient based research, Ana et al (2012) described, drug shortages have increased over the past decade, tripling since 2006 and pharmacy managers are challenged with developing inventory policies given changing demand, limited suppliers, and regulations affecting supply.

Noorfa and Andrew (2009) forecasting pharmaceuticals are difficult to predict the exact demand for medicines. One of the issues is the availability of accurate data on consumption. However, the lack of standard nomenclature for healthcare products, plus the preferences of clinicians creates further uncertainties and lack of supply chain education. Awareness of the concept of supply chain management, particularly within hospitals, is low. Therefore, managers are not properly equipped to control the supply of medication.

2.3 Inventory Control Techniques

Santhi and Karthikeya (2016) stated that the health managers use scientific methods to achieve efficient management and patient satisfaction and the scientific inventory control management to be applied for the efficient management of medical stores. Inventory control of drugs plays a pivotal role in hospital management of the drug inventory control of hospital pharmacy is very essential in order to provide continuous supportive services. Inventory management of drugs is very essential, as it is adversely affected to the consumption rate and purchasing cost of drugs by using ABC and VEN analysis.

In inventory management, ABC inventory control technique is based on the principle that a small portion of the items may typically represent the bulk of money value of the total inventory used in the production process, while a relatively large number of items may form a small part of the money value of stores. The money value is ascertained by multiplying the quantity of material of

each item by its unit price Mumbai (2006). According to this approach to inventory control, high value items are more closely controlled than low value items. Each item of inventory is given either A, B or C denomination depending upon the amount spent for that particular item. “A” or the highest value items should be under the tight control and under responsibility of the most experienced personnel, while “C” or the lowest value may be under simple physical control. It may also be clear with the help of the following examples. “A” Category 5% to 10% of the items represent 70% to 75% of the money value. “B” Category 15% to 20% of the items represent 15% to 20% of the money value “C” Category, the remaining number of the items represents 5% to

Class	Percentage of items	Percentage value of annual usage	
Class A items	About 20%	About 80%	Close day to day Controls
Class B items	About 30%	About 15%	Regular review
Class C items	About 50%	About 5%	Infrequent review

10% of the money value.

Table 1, A B & C class items, Susan and Michael (2000).

V is for vital items without which a hospital cannot function, E for essential items without which a hospital can function but may affect the quality of the services and “D” stands for desirable items, unavailability of which will not interfere with functioning and the combination of ABC and VED analysis (ABC-VED matrix) can be gainfully employed to evolve a meaningful control

over the material supplies. The ABC and VED analysis of the pharmacy store of Post Graduate Institute of Medical Education and Research, Chandigarh, India, was proposed to identify the categories of the items needing stringent management control. The annual consumption and expenditure incurred on each the item of pharmacy for the year 2007-08 was analyzed.

2.3.1 The Maximum Stock Level (MSL)

The maximum stock level, is the sum total of the minimum quantity, and Economy Cost Quantity (ECQ). The fixation of the maximum level depends upon a number of factors, such as the storage space available, the nature of the material, chances of deterioration and obsolescence, capital outlay, the time necessary to obtain fresh supplies, the ECQ, the cost of storage and government restriction *Tesha (1998)*. The minimum level of inventories of their reorder point may be determined on the bases such as consumption during lead-time, consumption during lead-time plus safety stock, stock out costs and customers irritation and loss of goodwill and production hold costs. According to *Tesha (1998)*, the upper limit beyond which the quantity of any item is not normally allowed to rise is known as the “Maximum Level”.

2.3.2 Economy Order Quantity (EOQ)

The model was first proposed by Harris in 1915 and further developed by Wilson in 1928. It is known as EOQ or Wilson's lot size formula. The dealing with stock items are how much to order and when to order. EOQ provides answer to how much to order and Reorder point answer when to order.

Economic Order Quantity (EOQ) is one of the most popular formulas used for calculating quantity of order placement. EOQ is formulated to get trade-off point on basis of regular relationship between ordering cost and carrying cost. Before employing this method to determine an order quantity *Jutamas (2010)*.

This model is known as economic order quantity (EOQ) model, because it established the most economic size of order to place dr. Rakesh (2016). According to Seema et al (2016) EOQ means the most economical quantity of material for which order is to be placed. The ordering cost and the inventory carrying costs are antagonistic to each other. EOQ model is related to carrying costs of inventory, ordering, and usage to determine the most economical size of inventory.

EOQ is determined when the ordering and carrying costs are equal.

Formula used to determine the EOQ is $\sqrt{2AO/C}$

Where A is Annual consumption O is Ordering cost

C is carrying cost EOQ tries to balance two variable cost to minimum level

According to Saleemi (2007) Economic Order Quantity is referred to as the size of the order that gives maximum economy in purchasing the materials. It is also known as Optimum or Standard order quantity. In fact, the Economic Order Quantity offers solution to inventory problems. It helps in finding appropriate levels for holding inventories. It facilitates the fixation of ordering sequence and the quantities so as to minimize the total materials cost. Before taking a decision on economic order quantity, the ordering cost, inventory carrying cost and inadequate inventory cost must be considered.

2.4 Objective of Inventory Management

According to Dobbler (1996), the main objective of inventory management and control is to provide services to the customers at a very minimum cost. The financial objective is the ability of funds to make the management's requirement of how much is needed in investing in inventory so that cash has not been tightened in a stock leaving other needs areas with no working capital.

Under property protection objective, inventory represents money. So, this objective gives the inventory controller the obligation to ensure that inventories are safeguarded and protected against all possible hazards, including theft, wastage, and misappropriation of inventory, therefore there should be proper inventory control of stock.

2.5 Types of inventory costs

In making any decision that affects inventory size, the following costs must be considered, Ana et al (2012) identified the three major costs that frequently occur in the pharmaceuticals and they are holding (or carrying) costs, ordering costs and shortage costs, and these costs will be discussed as followed.

2.5.1 Holding (or carrying) costs

This broad category includes the costs for storage facilities, handling, insurance, pilferage, breakage, obsolescence, depreciation, taxes, and the opportunity cost of capital. Obviously, high holding costs tend to favor low inventory levels and frequent replenishment (Ana *et al.*, 2012).

2.5.2 Ordering costs

These costs refer to the managerial and clerical costs to prepare the purchase or production order. Ordering costs include all the details, such as counting items and calculating order quantities. The costs associated with maintaining the system needed to track orders are also included in ordering costs (Yingdong and Jing 2003).

2.5.3 Shortage costs.

When the stock of an item is depleted, an order for that item must either wait until the stock is replenished or be canceled. When the demand is not met and the order is canceled, this is referred to as a stock out (Onawumi, *et al.*, 2011).

2.6 Just in time inventory

Just in Time (JIT) is a method of industrial organization aimed at producing only what is needed, when it is needed. The competitive benefits of JIT management are well implemented in both manufacturing and service industries. In JIT management systems, a process is capable of instant response to demand without the need for excess of inventories. The goal of JIT management is the total elimination of inventories at all stages of the process. Therefore, the major objective of JIT management philosophy is that the organization should aim zero inventory levels throughout the entire supply chain Jinglin (2015).

2.7 Empirical literature review

Ilmaand Mursyid (2013) The major aims of hospital inventory management and healthcare supply chains research is to reduce healthcare cost without sacrificing the quality of service to the patient by improving efficiency and productivity of healthcare system.

The primary focus of the healthcare sector is to provide patients with the best quality of care. Three major issues regarding inventory management practice has been identified such as overstock (due to poor quantification problem), unjustified forecasting technique and lack of computerized support in each hospital's not only at the store but also at the dispensing unit. For determining the optimal stock levels for hospital supplies considering storage space restrictions, item criticality, and delivery frequency and suggest the need for a link between inventory systems and the complex demand patterns.

To improve the purchasing and inventory management system to transparent and checkable manner, before and after the improved system were compared. The identified problems of purchasing and inventory management will solve by improving the purchasing, forecasting and

inventory management system. The specific problem addressed in this research is an assessment of pharmaceutical inventory management Imma and Mursyid (2013).

According to Mir et al (2017) find out all the activities related to medicines management and supply chain need to be carried out in accordance with standard guidelines and good practices involving only qualified and professional manpower. A structured and rigorous evaluation of supply chain interventions is of immense importance. Evaluation of supply chain should be carried out regularly to monitor its performance. Facility specific policies and procedures with SOPs should be developed and adhered to for better compliance with existing standards. This would help hospitals to carry out an in-depth assessment of their existing practices, which would further help them to make the best and efficient use of their available resources for making quality medicines available and affordable to their patients throughout the year without any breakups.

Complex situations of a changing new system from third-party managed to own managed inventory made further obstacles in managing its inventory. Historical data inventory showed that hospital still holds too large amount of inventory on hand. By managing inventory effectively savings could be achieved in total inventory cost Ilma et al (2013).

According to Surabhi et al (2012) conclude on the importance of inventory management on hospital pharmacy store management, it has been used to develop models to meet items assembling and requirement under conditions of uncertain demand. In this, ABC analysis is a feasible and efficient technique for inventory management. This will help in improved drug availability. This identifies drugs requiring stringent control for the optimal use of resources.

Analysis of medicine expenditures has an impact on the inventory management particularly on the type of medicines to be ordered and hence it has the direct impact on the quality of service provided. It also has an effect on the management of financial resources, especially on budget allocation Seema et al (2016).

Again, according to Seema et al (2016) suggested inventory management techniques, which also adds knowledge of categorization and identification of medicine items that consume large part of the budget hence requiring special inventory management as well as on how funds are being spent in procuring medicines so that the principles of good pharmaceuticals procurement strategic objectives are achieved. According to their findings will also be useful in proposing areas of improvement in procurement of medicines and its management. It also suggests measures to facilitate better performance of pharmacy regarding assessment of plan and priorities on purchasing medicines, increase efficiency in resource use at the hospital and enhance accountability and hence improve quality of health care.

Stock management is one of the main tasks of the pharmacy department of a hospital. It is a complex problem due to the uncertainty in the drug demand and the variety of constraints to be considered Jurado et.al (2015).

Information technology makes methods of inventory management and methods of evaluating inventory management more efficient, more precise, and more accurate. Thus, relevant software should be employed in pharmacies and pharmacists should be trained on utilizing such systems for managing inventory. Pharmacists cannot take the impacts of inventory mismanagement lightly. Improper management of pharmacy inventory has deleterious impacts on patient safety. Pharmacists should consider details pertaining to pharmacy inventory management when

assessing a potential medication error or other drug therapy problems Ali (2011).

The improved inventory management system, which has been developed by pharmacists, makes inventory functions faster and easier in real time. This system can search lot numbers and expirations of drugs in purchase and delivery records. These functions are powerful and useful in-patient safety and cost containment Toshio et al (2005).

A research that is done at the purchasing and inventory management by pharmacist of a private hospital in northeast of Thailand shows an improved purchasing and stock management system, which has been developed by pharmacists, was successful. All purchase documents and received products were 100% approved and inspected by the administrative team. Rate of correct received products was increased. Rate of destroyed or expired products and rate of product shortages were decreased Chaowalit et al (2014).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.1 Research design

Research designs are plans and procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis.

A mixed methods approach is one in which the researcher tends to base knowledge claims on pragmatic grounds (e.g., consequence-oriented, problem-centered, and pluralistic). It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problem. The data collection also involves gathering both numeric information (e.g., on instruments) as well as text information (e.g., on interviews) so that the final database represents both quantitative and qualitative information Jhon (N.A). This study uses mixed type of research approach and a descriptive research design.

3.2 Source of data

This study uses a primary data (from a primary sources), which was collected by using questioner and a secondary data by using a checklist, and by direct observation, by using different documents from concerned bodies and also other additional secondary sources like books was used and the storing procedures of the hospitals' pharmacy stores and the researcher fill based on the standard (checklist) which is developed by management science for health. The rest of the data was collected by direct observation, physical count in the store, visiting the store condition and reviewing the stock records of the pharmacy stores.

- The checklist that is used in this research is developed by Management science for health (2012) to assess the pharmaceutical inventory management activities at the facility level. The

questioner is also important to assess the awareness of good pharmaceutical storage practices among the hospitals pharmacy professionals. \

- This study uses a census because a census is the study that undertake at one point in time, which assesses all the hospital pharmacy professional's awareness on good pharmaceutical inventory management and their proper documentation on the stock recording cards. On the other side the study includes the assessment of the hospitals' pharmacy stores and the storing conditions by direct visit and comparing the store conditions against a standard checklist.

3.3 Methods of Data Collection

The study uses primary data, which is collected using questionnaires. These questionnaires were administered through a ‘drop-and-pick’ method to the respondents at their different working area and also via email to those respondents who could not be reached by hand delivery. After a week the questionnaires were collected. All the filled questionnaires were counter-checked to ensure completeness. And also, direct observation by the researcher to check the store status with the checklist that is prepared by the (MSH) and by having physical count to check with the bin card.

- **Observation-** Observational data collection is used by visiting the store, over-looking the bin cards, and looking the refrigerators conditions in the store.
- **Questioner** – Questioner is used to assess the awareness of good pharmaceutical inventory management among the hospitals pharmacy professionals and the current status of pharmacy store.
- **Checklist-** The checklist that is used, to assess the current status of the store conditions which is developed by Management science for health and it is widely used worldwide and the Ethiopian Ministry of Health uses this checklist to assess the pharmaceutical storage conditions at the facility level on its training manual for pharmacy professionals.

3.4 Study Population

All the pharmacy professionals (105) except the clinical pharmacist (34) of the hospitals the remaining are included in the study for the assessment of pharmaceutical inventory management. All the hospitals’ pharmacy stores were included in the study and currently all the hospitals pharmacy store is majorly classified in to two. That is a store that only contains medications, imaging items and laboratory reagents. And the other one is a store that only contains medical supplies, equipment and instruments which is managed by different pharmacist.

The clinical pharmacist was excluded from the study otherwise all the pharmacists and druggists working in the hospitals were included in the study but those professionals who are unwilling to respond questionnaires are also out of the study.

3.5 Methods of Data Analysis

The data that were collected from the different hospitals was visually inspected. And also for the descriptive information, from the questioners and from the unstructured interview, the researcher found out what exactly the respondents said for that particular issue. And the current status of the hospitals store was assessed based on the checklist by having direct observation of the store. And the quality of the data was analyzed by using different types of data analysis especially by frequency counts, and finally all the data was processed using SPSS version 20 and Microsoft Excel and the respective percentages, graphs, and rates is determined.

CHAPTER FOUR

4. RESULTS AND DISCUSSION

4.1 Introduction

As of the re-organization and decentralization process of the Addis Ababa City Administration in 1995 E.C a new structure is put in place for the Bureau having 4 line departments and 5 supporting services at the head quarter level. Each line department has two teams under it, which perform the day-to-day activities of their respective departments. The six hospitals which are Yekatit 12 Hospital medical college, Zewditu Memorial Hospital, Terunesh Bejining Hospital, Ras Desta Hospital, Gandhi Hospital and Minilik II Hospital medical college and the health

Science College are also accountable to the Bureau and 96 health center under the supervision of Addis Ababa health bureau. The 10 Sub-city Health offices that manage the city's Health Centers, clinics and Health Posts, are directly answerable to their respective Sub-City Administrations. Based on business process re-engineering in 2001 E.C the bureau has been re-structure in 3 core and 9 supportive processes Addis-Ababa-City-Administration-Health-Bureau, the health bureau works with the following vision and mission, Addis Ababa health bureau has a vision to see Addis Ababa being one of the best cities in health service delivery system in Africa where there is no disability and death from preventable and curable disease and also have a mission, To provide quality and equitable, promotive, preventive and curative health services to the inhabitants of Addis Ababa and thereby reduce morbidity and mortality due to communicable diseases and other health problems through active participation of the community and all partners Addis-Ababa-City-Administration-Health-Bureau.

4.1.1 Response Rate

A total of 105 questionnaires were distributed to the six AAHBH s professionals. Out of the 105 questionnaires that were distributed 89 were willing to respond for it. This represents a response rate of 84%. This percentage was considered sufficient for this study. The 16% who never responded to the questionnaires claimed to lack of time due to their busy life style and also said due to high work load due quantification. The table 1 shows the frequency and percentage of respondents.

Table 1 Response rate

Name of the Hospital	Frequency of pharmacy professionals(response)	Frequency of missed professionals (non responses)	Percentage of Non respondents

<i>Gandhi Hospital</i>	15	3	3%
<i>Menelik II Hospital</i>	20	2	2%
Ras Desta Hospital	17	2	2%
<i>Tirunesh Beijing</i>	19	3	3%
Yekatit 12 Hospital	24	3	3%
Zewditu Hospital	22	3	3%
Total	105	16	16%/84%

This study was done on the six health bureau Hospitals that are Gandi memorial Hospital, Minilik II Hospital medical college, Yekatit 12 Hospital medical college, Ras Desta Hospital, Zewditu Memorial Hospital, and Terunesh Bejining Hospital.

The numbers of respondent that are included in this study are all the hospitals professionals of pharmacy and druggist. Even though the research has no exclusive criteria but those who refuse to respond and refuse to feel the questioner were out of the research and there were also respondents who were on annual leave, which were also out of this research. The number of respondent, which were female and male will be analyzed according to the total number of the respondent in each health facility in the next table.

4.1.2 Gender and Age of the respondent

Table 2 Gender of the respondent

Name of the Hospital	Total number of respondent	Female respondent	Male respondent
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<i>Gandhi Hospital</i>	14	8	57%	6	43%
<i>Menelik II Hospital</i>	16	8	50%	8	50%
Ras Desta Hospital	15	7	47%	8	53%
<i>Tirunesh Beijing</i>	16	6	37.5%	10	62.5%
Yekatit 12 hospital	24	9	37.5%	15	62.5%
Zewditu Hospital	20	9	45%	11	55%
Total	105	47	44.7%	58	55.3%

Table 3 Age of respondent

Age group	19-24	25-35	36-45	46-55	56-65	65 and above
Percentage	0	76%	14%	8%	2%	0

As it is clearly stated in the above tables most of the respondents are found under the age category of 25-35, this shows most of the respondent of the bureau hospitals Pharmacy professionals are found at the most productive age group. And from this group 44.7 % of the respondent are female the remaining 55.3% of the respondent are male.

4.2 Level of awareness of good pharmaceutical inventory management of AAHBH pharmacists

4.2.1 Respondent Qualification

Table 4 Respondent qualification

Job title of the respondent	Total number of respondent	Respondent in percent
Senior druggist	46	43.8%
Senior pharmacist	59	56.2%

A total of 105 questioners were distributed to the six hospital professionals, which have been working in different positions. Like at the ART pharmacy (8%), IV fluid pharmacy (2%), in patient pharmacy (16%), emergency pharmacy (9.33%), head of the pharmacy case team (4%), storekeepers of both the supply (4.67%) and medical stores (4.67%), out-patient pharmacy (20%), compounding pharmacy (4%) and purchaser of the pharmacy department (4%). Out of the 105-total respondent which is mentioned on the above table, 46 (43.8%) of the respondent were senior druggist which have diploma in pharmacy and the other 59 (56.2%) of the respondent were senior pharmacist, who have degree in pharmacy. Practically what the researcher observe were senior druggist and senior pharmacist were the only one, which were allowed to work in the pharmacy store, that was the major reason to exclude clinical pharmacy professional from the research, clinical pharmacist which only work in the ward pharmacy or with the physicians around the patient side.

From the above results almost all of the pharmacist are Senior, those who have more than five (5) years of experiences.

4.2.2 Service year in the store

Table 5 Service years in the store

Service years	Less than a year	3-4 years	1-2 years	5 years and above	Never been in store

Percentage	30 (29%)	38 (36%)	20(19%)	13 (12%)	4(4%)
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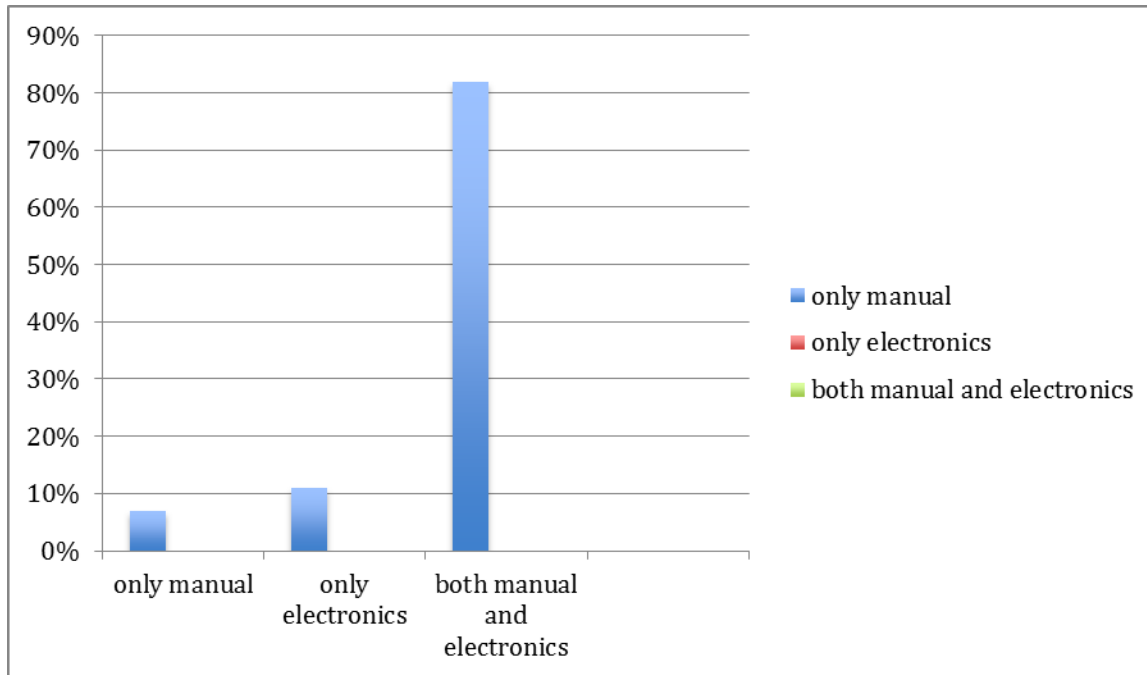
Even though they have different service years, most of the AAHBH's pharmacy professionals are less experienced regarding working in the store but out of the total respondent 96% of the respondent said they have worked in the store before.

4.2.3 Use of Electronic and Manual method of inventory management

Almost 82% of the store keeper responded that using both manual and the electronics inventory system is very important and this store keepers update their bin cards and the HMIS regularly but the rest 11% of the storekeeper said they do not update their bin cards regularly due to limited time in the store while updating the data on the computerized system. Which is the HMIS and they believe that only the electronics method of inventory control is enough and the bin card is time consuming in the respondent's perceptions and the last 7% of the respondent respond only the bin card methods of data recording is enough. Due to lack of computer access and lack of training on how to use the computerized system effectively.

Currently all of the six AAHBH is starting to implement auditable pharmaceutical transaction services (APTS) and these services starts from the store, the store before distributing the medications to the different dispensing unit it will give codes and price to each item. And it will distribute to dispensing unit by using internal facility recording and reporting format (IFRR) and at the dispensing unit medications will be shelved according to pharmacological order and the right client with the legal prescription will get the service, by writing every patients information on a free registrations books then the clients will put its signatures and take the ordered item/s. And these services force the hospital stores to a serious data recording habit, and most of the respondent respond using both a computerized data recording (HMIS) and using bin card is advantageous to the hospital store management.

Figure 1 Recording methods.



4.2.4 Implementation of APTS and HMIS

The HMIS give an alert for the near expiry so that the store keeper can communicate with the head of the department and with drug information center so that there will be a distribution of those supply or medication to different health facility. By doing this the store keeper will facilitate the six rights (the right medication, at the right time, at the right place, at the right dose and the right frequency to the right person) and HMIS is also a very important tool for forecasting medication or supply items to the future fiscal years.

If there is a slow-moving medication one can quantify in a very small amount and can use the money for a fast-moving medication which are under the category of vital to the specific hospital. Even though the respondent believe that the electronics method of data recording facilitates many things but due to lack of well-functioning computer, lack of continuous flow of

electricity and lack of training on IT, that almost account around (7%) of the respondent believe only the manual way of data recording is better than using the electronics.

Out of the total respondent 82% of the respondent who have said both electronics and manual documentation, the use of the electronics was explained by the current store keepers while responding to the questioner and also they mention the importance of having the manual documentations like updating the bin cards, the store of almost all of the hospitals are scattered and there is no connections of generator to the store so, by any means if there is disconnection of electricity, it will be hard to work accordingly.

The respondent which accounts 92% write about loss and adjustment which is found on the bin card, by saying “loss means damage and theft information of drugs, it shows a negative number but adjustment indicates the information about what number of items/ drugs issued or received from similar dispensing pharmacy units.”

And the other very important thing of the HMIS which is mentioned by most of the respondent was the electronics system gives an alert before an items gets expired, and this prevent wastage, which is a huge cost for one health facility, and to pick very easily the items which are at the emergency order point so that the hospital can order the very vital drugs on time from the responsible organization which is PFSA.

The respondent which account 4% of the population said they have never been in the store, their reason for not being in the store before is because of the risk and responsibility that is expected from them. The store is not easy to handle by their few years of experience. When it is compared to the other working area of the hospital this was their major reason for not working in the store. Due to lack of training on how to use computerized system in the medication and supply and

equipment store, this make the task to be very difficult to work properly in the store. Lack of special incentives for working in the store makes 4% of the professionals not to have the courage to work in the store.

In most of the AAHBH store, the store person rotates from the store to the other working area once in a year so, one person will work in the store with a minimum of one year but if the person agrees with the department head the professional might continue working in the store.

While assessing the respondent's awareness on how did they dispense very expensive and control medications for free patients in their respective hospitals? The respondent has different opinion, based on the different hospitals they are working but around 83% of the respondent out of the six hospitals respondent have one similar way of working environment. Which is by using special recording books, which is found in most of the AAHB hospitals for example in Gandhi Memorial Hospital and Yekatit 12 Hospital Medical College.

The researcher observes and tries to gather information from the inpatient pharmacy and it is observed that the Hospital uses a registration book for the medication. Especially expensive and control medication which are prone for addiction and dependency have a different registration books. Nurses and other health care professionals are expected to take expensive medications for free patients. And also control medications are only dispensed for the responsible head nurses, or the clients are expected to sign on the registration books.

There are two main goals for managing an inventory for a pharmacy. The products that are regularly kept in stock are based on the needs of the pharmacy and its customers. Efforts should be made to keep the medications used regularly in stock and available for use not outdated or

damaged, while some rarely used, extremely expensive or cumbersome products may be ordered in as needed. The second goal of inventory management is to keep medication costs at a minimum. Many pharmacies have preferred wholesalers to order from or contract pricing with specific drug companies to decrease the cost of purchasing medications. Preventing profit loss is also a contributing factor to controlling medication costs. Properly managing stock by using medications before they expire and processing returns regularly can help keep medication cost down Karthikeyan et al (2016).

In facts due to the expense of the drugs there might be medication that are prone to expiry. There has to be price consideration while purchasing medication, the hospitals should consider the affordability issue very carefully.

From the total respondent around 89% of them respond inventory management goal as, it will increase customer satisfaction and increase profitability. 11% of the respondent said inventory management have a goal in increasing customer satisfaction and will have maximum inventory.

40% of the respondent defines emergency order point as when stock on hand in the store is equal to minimum value. 35% of the respondent reply emergency order point is the part when there is shortage of pharmaceuticals to supply from the store. 15% of the respondent said emergency order point is when the time is within the review period. The remaining 10% of the respondent said emergency order point is the time when the stock level is less than the minimum.

4.3 Pharmacy Professionals interest to work in the pharmacy stores

4.3.1 Incentives

Those of the respondent who has been in the store and that contribute 77% of the respondent said they are interested to work in the store and they are working their daily duty with motivation.

Back in days each hospital used to have one storekeeper for both of the stores. Which they were expected to work in the supply, equipment store and medical store. But now each hospital of AAHB change their system of inventory management by having one storekeeper to each hospital store. Except Yekatit 12 Hospital Medical College, in this hospital there is two storekeepers in each of the stores, if something goes wrong with one of the storekeeper the second storekeeper will take the full responsibility. But in the rest of the five health bureau hospitals if something happens to the storekeeper, it will be difficult to assign other storekeeper by the mean time. The store keeper in this five hospitals can't even go out annual leave for long period of times. If the annual leave is a must the storekeeper is only allowed to have half day leave. And if the storekeeper is on sick leaves the department head will assign other responsible professionals on the place of the sick storekeepers.

4.3.2 Electronics methods of data recording

The respondent which accounts 96% from this only 13.33 % of the respondent knows how to use the electronics methods of data recording, which is using HMIS the respondent reply “because the training is only given for those who are at the store in 2010E.C fiscal year”. Which account for 13.33% of the hospital staff. 82.67% of the respondent who has been working at the store was only using manual methods of data recording; the researcher tries to ask how they were working while they were at the store? The respondent said “only by using the manual methods.” but now a days since all the hospital start implementing APTS in all of the hospitals and other health facility, for this reason all the current storekeepers take training on how to work on computer using HMIS.

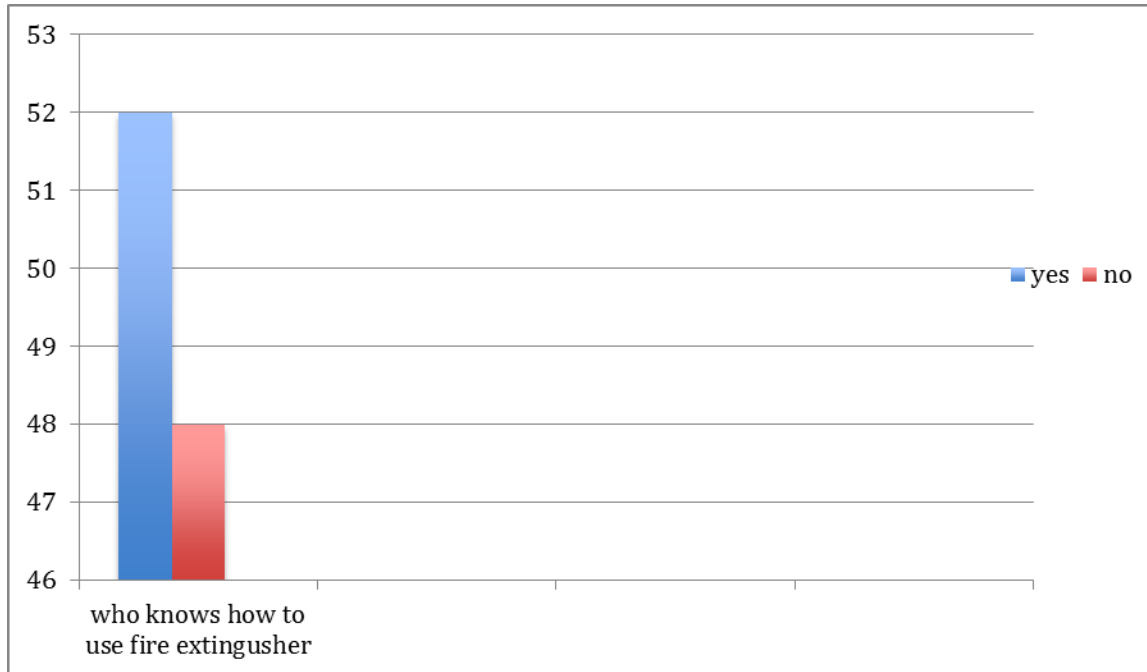
While the researcher was interviewing the storekeeper they clearly show the researchers were the gap was, back in days even there were lots of waste disposals. Which the hospitals were forced

to avoid their expired medication by the EFMHACA and have to pay lots of money for it. Beside that because of the large number of items, which was found in the store, it was very difficult to address the right medication to the right person. The storekeeper responds by saying back in days “it was very difficult even to memorize what we have in the store,” they said “knowing the expiry date was unthinkable” due to this and other reason the professionals were so unhappy to work in the store but now the electronics method minimizes waste disposal and they can easily communicate with the drug information center of the hospital if there is a slow moving and near expiry medications.

4.3.3 Fire Extinguisher

While accessing their knowledge on how to use fire extinguisher, even though the equipment is observed in every station of the hospital pharmacy store or every corridor of the hospital but only 52% of the respondent knows how to use fire extinguisher and the remaining 48% of the respondent don't know how to use it. From this figure, one can clearly see how narrow the gap is, lack of on job training was most of the respondent reason for not knowing how to use fire extinguisher.

Figure 2 Use of fire extinguisher



4.3.4 VEN and ABC analysis

Table 5, VEN and ABC analysis awareness

Awareness on ABC and VEN analysis	Percentage of the respondent
Who correctly respond about ABC	83%
Who correctly respond about VEN analysis?	79%

According to Seema et al (2016) research ABC analysis is an important tool used worldwide, identifying items that need greater attention for control. ABC analysis is a method of classifying items or activities according to their relative importance. According to Monton et al (2014) medicines and medical supplies consume are the major portion of the hospital expenses. The

rising of drugs and medical supplies cost directly affect the total expenses of the hospital. Based on the budget of the hospitals class (A) medications are those that account the most of the budget (expensive items) of the hospitals and that will be brought in a small amount to the hospital. Generally A” Category 5% to 10% of the items represents 70% to 75% of the money value. “B” Category 15% to 20% of the items represent 15% to 20% of the money value “C” Category, the remaining number of the items represents 5% to 10% of the money value Davnani et al (2010). And from the total respondent 83% of the respondent were correctly answer by saying ABC analysis is based on cost classification. The hospital product line consists of high cost and low cost items as well as perishable and durable goods that are consumed in large and small Ilma et al (2103).

These ABC analyses of this medications category have a limitation, which is based on monetary value and the rate of consumption of the item. In each hospital, an item of low monetary value and consumption may be very vital or even lifesaving. Their importance cannot be overlooked simply because they do not appear in category A Seema et al (2016).

Therefore, another parameter of the materials is their criticality. VEN 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 less essential.

While forecasting medications or that of supply items VEN analysis is the very important tools, and 79% of the respondent respond correctly by saying it’s based on potential to life saving. For example, this items under the category of vital needed for the survival of the patients and those that must be available at all times were included in the V category. The items with a lower criticality need and those that may be available in the hospital were included in the E group. The

remaining items with lowest criticality, the shortage of which would not be detrimental to the health of the patients, were included in the NE group. Karthikeyan et al (2016) stated in their research the primary focus of the healthcare sector is to provide patients with the best quality of care. Three major issues regarding inventory management practice have been identified such as over stock, unjustified forecasting technique and lack of IT support.

To prevent the above-mentioned major issues a group comprising of physician, surgeon, pediatrician and pharmacist discussed the VEN status of each item with justification. The inventory control techniques and the ABC and VEN 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 Karthikeyan et al (2016).

So, during quantification to the future fiscal year using VEN and ABC analysis is very crucial and these methods of analysis is used by all of the hospitals of AAHB.

4.3.5 Demand Forecasting

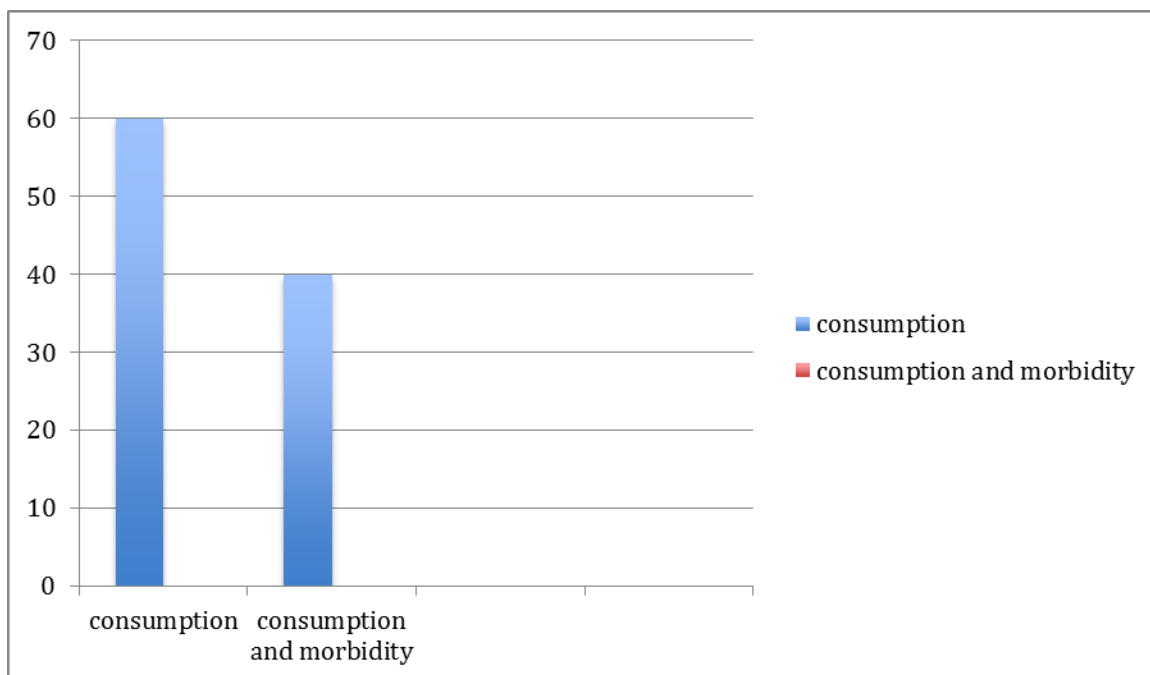


Figure 3 Use of consumption and morbidity

A research which is done at Tanzania by Kagashe et al (2012) stated that when quantifying the amount of medicines required two methods are recommended, the consumption method and the morbidity method. 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.

Quantification is the process used to calculate or estimate the quantities of medical supplies, drugs and equipment required. It is usually done once a year during planning for a new health program or project. Proper quantification ensures that there is enough stock to meet demands, and avoids both under stocking and overstocking. It is also a useful tool for preparing budget estimates, adjusting quantities to match a fixed budget, and monitoring use of supplies and equipment by health facility staff.

A research which is done by William and David, (1996), In order to develop an appropriate inventory control, demand forecasting is highly needed. The major forecasting techniques in healthcare settings such as historical data analysis, which employ analysis from previous data to determine future demand (consumption method).

The most common quantification methods used are consumption method-Which uses data about actual use or past consumption to calculate what quantities will be required in future. The USAID Deliver project success report (2011) in Hawassa Teaching Hospital. Although to do forecasting the accurate demand for drugs is difficult. One of the problems regarding this situation is difficultness to have a correct data for drugs consumption. Moreover, different drugs

brand preference of physicians creates additional uncertainties for predicting the demand (Ilma et al, 2013). The report that was done by UASID at Hawassa Teaching Hospital reports, there are no expired drugs in the store, and a high percentage of the hundreds of inventory items are available. Using the integrated pharmaceutical logistics system, the pharmacists calculate orders for hundreds of products from a hub warehouse, according to the changing needs of all the hospital wards. The pharmacists include a percentage to cover increased demand, but they avoid surpluses and overstocks.

Morbidity data method-Which uses data about prevalence and incidence of disease and health problems, and the standard treatments for these, to estimate future needs. Generally the consumption method is the preferred method for estimating requirements (procurement and management of supplies and equipment, section 2). And from the collected data, which is shown on the above chart, 50% of the respondent use consumption methods, that is three of the hospitals and the remaining 50% of the respondent said using both morbidity based and consumption methods.

Different study has shown the obstacle for accuracy of forecasting. Derek (2005), to do forecasting the accurate demand for drugs is difficult. One of the problems regarding this situation is difficult to have a correct data for drug consumption. Moreover, different drugs brand preference of physicians creates additional uncertainties for predicting the demand. To cope this thing, demand patterns analysis can be done firstly then the mathematical modeling for accurately describe and simulate those patterns. The above mentioned problems is also the major problems to having inaccurate quantification in the health bureau hospitals out of the six hospitals in Yekatit 12 Hospital Medical College, Zewditu Memorial Hospital and Minilik II

Hospital there is “kenema” pharmacy so, this make it difficult to use only consumption method only because it is difficult to get prescription from “kenema” pharmacy and to calculate the consumption of the hospital because almost half of the client get service from this pharmacy and this make it difficult to get concert data from “ kenema” pharmacy. So, those who feel the questioner, which are from the mentioned hospital, use both the consumption and morbidity methods but still there is gaps in this area due to lack of proper documentation.

4.4 Store Documentation

4.4.1 Use of Bin card and Electronics Documentation

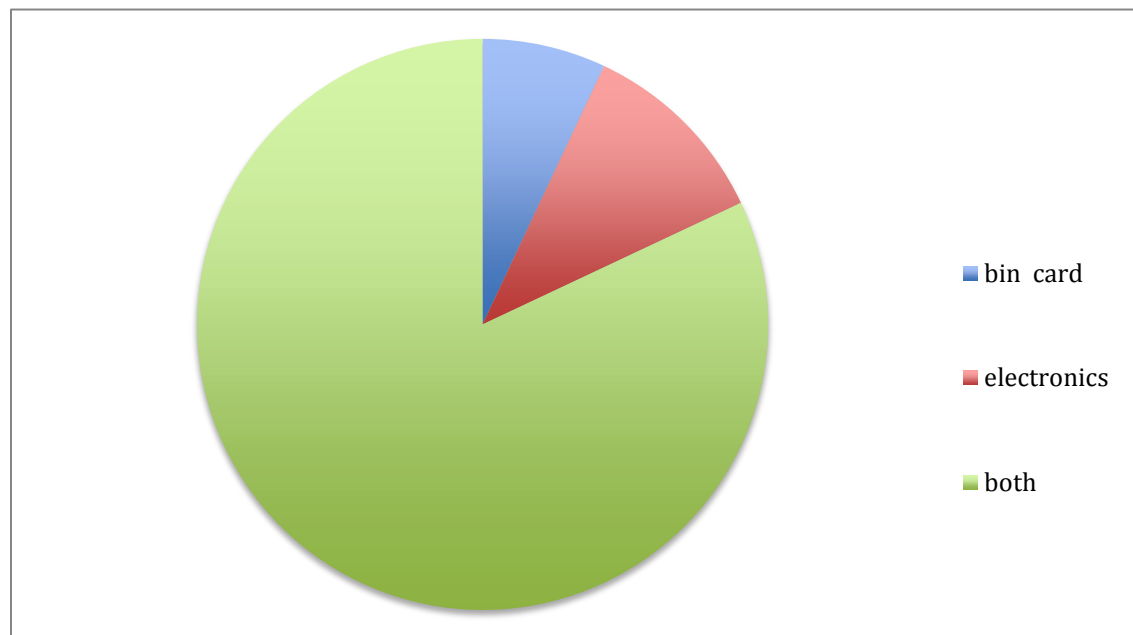


Figure 4 Use of Bin card and Electronics methods of data recording

The respondent which accounts about 82% reply the questioner by saying it is important to have both electronics and manual documentation techniques. Their major reason for having both the electronics and manual data documentation method is due to, if the electronics fail to work, having the manual documentation is important to prevent wastage. A research that is done in India, logistics management information system software used in the antiretroviral therapy program in Karnataka, states medicines is the most important commodity in the delivery of health services as they save lives. Medicines can also cause harm if not used properly. The right quantity of the right medicine of the right quality delivered at the right time to the right user are key to success of any health service, and are usually a major determinant of the utilization of health services Hare (2011).

Usually there is on and off kind of electric system in the hospitals, so during that time to control the inventory the storekeepers uses the manual documentation even though it needs time to adjust the bin card and stock card of the items but they believe it is important to do so. The researcher randomly tries to see whether the manual documents match with the electronics and it clearly shows most of the hospitals are applying both documentation techniques. From the respondent 7% of them replies the questioner by saying only hard copy of data recording method is enough; their reason was because of lack of computer in the hospital and lack of on job training on how to use computerized system. And the remaining 11% of the respondent said only electronics methods of data recording is enough to document the store inventory status, they think the bin card system is old and time consuming.

4.4.2 Use of FIFO and FEFO

From the total respondent 19% said using FIFO (First In First Out) is better both in dispensing and store, FIFO method of inventory valuation is a cost flow assumption that the first goods

purchased are also the first goods sold. This assumption may work in many other companies, which sells products with no expiry date on the items, an item that can be used as long as it's available (Accounting for inventory 2017). But for pharmaceutical items like medications it's very difficult to use first in first out methods because the last items that is purchased might have short expiry date and short shelf life. But in Supply and Equipment store, the store keeper can use these methods because there are lots of medical supply and equipment's with no expiry date, the earliest goods purchased are the first one removed from the store. Generally, in these methods the storekeeper uses First In First Out despite the date of the expiry. Emmanuel et.al (N.A) mentioned in their research about FIFO, this method is easy to operate and also ensure that, old stocks are issued out first, as a result, little or no determination of stock could be noticed. However, there are a few disadvantages associated with this system which must be noted. It is sometimes a burden to apply if there is no computer system and if materials purchased fluctuate considerably, it involves a number of tedious.

On the other side, almost 81% of the respondent said using First Expired First Out (FEFO) is better in different way. Because FEFO is a method of inventory management that involves issuing products with the earliest expiry date first, regardless of the order in which they are received. This method helps to prevent expiration of valuable pharmaceutical products and this will finally benefit the end user, the hospital and as a whole the country.

As management sciences for health discussed in chapter 7, all pharmaceuticals have labels that include an expiry date established by the manufacturer. This is a very important piece of information for the dispenser and patient, because if the medicines are used after this date, its quality and efficacy are not guaranteed and the patient cannot be sure it will have the desired

treatment effect Clark et al (2010).The researcher tries to interview some of the storekeeper and their reason for choosing FEFO was because, “newly arrived stock sometimes has an earlier expiry date than stock already in the store, especially when there is a multiple source of supply for an item, or stock is returned or transferred from another store.”

Generally, the Food, Medicine and Healthcare Administration and Control Authority of Ethiopia (2005) put clearly about the FEFO and FIFO methods on the manual for medicines good dispensing practice, when issuing products, it is important to follow the FEFO and FIFO procedures, which minimize wastage due to product expiry. Therefore:

- Always issue products that will expire first, ensuring they are not too close to or past their expiration date. The shelf life remaining should be sufficient for the product to be used before the expiry date.
- To facilitate FIFO and FEFO, place products that may expire first in front of products with latter expiry date.
- Write expiry dates on stock cards, so that stocks can be used before they expire.
- Supplies with no expiry or manufacture date (e.g. gauze, cotton, medical gases etc.) should be stored in the order received and dispensed accordingly.

In FEFO systems, the hospital drug information center will promote first expiring stock to make sure it is issued first. Such promotion is usually a combination of physical placement of the earliest expiry date, will be placed at the front of the shelf so that it will be picked first, will be dispensed and will promote good record control, which takes the expiry dates of all items in stock. In reality, sometimes there might be medications with longer expiry in the dispensing units but a short expiry of that specific medication in the store with different batch number and expiry

date, so during this time the drug information center will communicate with the store keeper and the dispensary unit to receive and dispense the short expiry one.

A research done by Molla et al (2014), all the study stores expired/ damaged/ obsolete products were isolated, vaccines sera, biological and blood products were kept in cold room and freezes temperature was maintained and recorded.

There are always exceptions, which happens especially in ART and TB clinic because those medications are the very expensive medications and which are received by donations, even with very short shelf life medications might come to the hospitals and might expire but until that there will be patients using this. There are times that the pharmacy professionals have to dispense the longer expiry because there are clients that have to take medications for six months and more so the professionals have to give the longer expiry date.

Even though most of the health bureau hospitals start the implementation of APTS but the respondent which are working in the store is having once a year of physical inventory. But according to the APTS manual (2012) to say there is full implementation of APTS physical inventory should be every three (3) months.

4.5 Current Status of AAHBH Store Management

4.5.1. Introduction

Medicines should be stored in a specially designed secure area or space of a building in order to avoid contamination or deterioration, avoid disfiguration of labels, maintain integrity of packaging and so guarantee quality and potency of drugs during shelf life, prevent or reduce pilferage, theft or losses, prevent infestation of pests and vermin. And the storage environment should possess adequate temperature, sufficient lighting, clean conditions, humidity control,

adequate shelving to ensure integrity of the stored drugs. Generally, poor storage conditions put the quality of drugs at risk and cause wastage and poor quality of care patients receive WHO (2001). The AAHBH current status of their store is gathered by using the checklist, which is prepared by the management of health institution, and the researcher tries to observe by having direct observation around the store of each hospital stores.

4.5.2 The Store Management of the Hospital based on the Checklist

The current store of all the Addis Ababa Health Bureau Hospitals have a separate store from the dispensary unit, which means medicines or other supply items will be distributed to the different dispensing unit which are mainly (emergency pharmacy, inpatient pharmacy, outpatient pharmacy, ART and TB pharmacy, chronic pharmacy and IV fluid production and compounding unit) by the responsible person who is assigned to facilitate in the dispensing unit.

Medication will be received from pharmaceutical fund and supply agency (PFSA) to the store by using model 19 and all the dispensing unit fill IFRR (Internal Facility Request and Report) format and send an issue form to the store by using model 22, other items will be requested by using model 20. The items will be available in each dispensing unit then the medications will be dispensed to the right clients of the hospitals.

The table below shows some of the checklist, which the hospitals fail to meet.

Infrastructure conditions: how does the store match up to the ideal store?
The store is large enough to keep all supplies
There is no rodents and pests in the store
Air moves freely in the store, fans and screens are in good condition
The windows are painted in white or have curtains and secured with grilles.
There are no signs of pest infestations in the store (e.g. cockroaches, rats)

The store is tidy; shelves are dusted, the floor is swept and walls are clean.
Supplies are stored neatly on shelves or boxes.
No supplies are in direct contact with the floor.
Is the store connected to Generator when the power goes off

Even though the hospitals have a number of stores but surprisingly all the AAHBH's have a small size store. Which is below the standard of EFMHACA mentioned in the stores standard criteria and also below the standard of (MSH) criteria, for example in Yekatit 12 Hospital Medical College. The medical store has eight different stores, which is very small in size and found in a scattered way. Which is very hard for the storekeepers to manage and its very tiresome for the store keeper. The researcher also observes that one of the hospital's medical stores is a container kind, the medications are at risk of early expiry due to poor storage conditions.

A research which is done West Hararghe Zone (2014) storage areas should be sufficient capacity to allow the orderly storage of the various categories of materials and products; starting and packaging materials, intermediates, bulk and finished products, products in quarantine and released, rejected, returned or recalled accumulated wastage and vermin.

There should be appropriate procedures for the clear up of any spillage to ensure complete removal of risk of contamination Gizat and Samson (2014).

This store issue also found in all of the Addis Ababa health bureau hospitals, the respondent reflects their reason, it is due to lack of attention by the hospital management, the management didn't give attention to the storage conditions of the pharmaceutical items. While constructing a new store there is no direct communication with the pharmacy department, rather than having so

many small stores in one hospital if there is a store that fulfills the standard, and contains number of palates it will make things easier.

The store of all the hospitals is kept locked all the times when it is not in use. All of the storekeepers of each hospital have office at one of the store but the store is open at working hours only and sometimes at weekends when it is needed.

The researcher has a direct observation of the bureau hospitals; relatively all of the stores that are observed have no cracks, holes or any signs of water damage, no rodents and pests in the store. Two out of the six hospitals store has a store that is well ventilated but there are no signs of fans in any of the hospital stores. The supply stores of the hospitals are way far from cleanness, there is no enough shelves but the very small one is not also dusted properly, from what is observed in the supply store it's very difficult to swept the floor and only few supplies are stored on shelves or boxes are raised off the floor by using different size of wood pallets.

There is no direct connection of the store with the hospital generator, even to the store that only contains refrigerator items. For the best quality and efficacy of drug during storage period, the temperature control and temperature monitoring equipment are very necessary. The temperature and humidity monitoring equipment were present and the temperature and humidity were recorded twice a day. In addition, the quality and efficacy of refrigerated medicines or thermo labile drugs, especially vaccines should be concerned. Sustaining the vaccine cold chain is a critical part of a successful immunization program. Generally, in the hospitals supply and medical stores the researcher observe the existence of computer and printer, which is functioning well and also there is enough stationery materials in the stores, the stock recording card in the store is enough from what the researcher heard from the storekeepers.

4.5.3. Organization of the Store

Storage procedures: How well the store is organized
Supplies are systematically classified in shelves (by dosage forms or by therapeutic class)
The shelves are labeled and stock cards are kept on the shelves
Tablets and other medicines are stored in airtight containers
Items are grouped in amounts that are easily to count
No expired medicine in the store
Medicines with short expiry dates are placed in front of those with later expiry dates (FEFO)
Supplies with no expiry or manufacture date are stored in the order received (FIFO)
Supplies with a manufacture date only, are stored in chronological order
No damaged containers or packages are on the shelves
No over stocked or obsolete items are on the shelves
The disposal of medicines is recorded in separate register and includes the date, time, witness, value, quantities and reasons
Narcotics and psychotropic drugs are in separate double locked storage space
Items are checked regularly for potential deterioration (bad odor or discolored tablets)
Products are stacked at least 10 cm off the floor.
Products are stacked at least 30 cm away from the walls and other stacks.
Products are stacked no more than 2.5 meters high.

The above-mentioned list in the table is the checklist that the hospitals failed to fulfill. The study that is done in health facilities of East Shewa Zone, Oromia Regional State identified 60% of the facilities did not have sufficient space for medicines storage. And also in our case out of the six hospitals only two (33.33%) of the hospitals have enough shelves for each item, each supplies and medication are putted on therapeutic order on the shelves but the remaining four (66.67%) of the hospitals store have insufficient shelves and there are items that were observed on the stores floor and items are neither putted in therapeutic way nor in alphabetical category. Which made picking, cleaning difficult and also enforced the store persons to stack medicines over one another without any space till it touched the roof which in turn limited air circulation within the store.

A research, which is done at east shewa zone, oromia regional state found out about 40% of the facilities were not updating their bin-cards even the bin-cards were not along with the respective medicines. This finding is almost similar with study conducted in health facilities of Addis Ababa where only 35% of the facilities had fulfilled the criteria of good pharmacy practice standards for the storage of medicines and most of them had storage space limitations and also the study done in six stores of Hararge health facilities also reported space limitations in 80% of the facilities. In AAHBH there is a lack of sufficient store space, which is around 66.67% of the health bureau hospitals still are complaining of store.

Two of the hospitals out of the six hospitals stores use their shelves effectively and wisely, lots of shelves were observed in two hospital stores and items are organized like it is stated in the health system in action book.

Top shelves: store dry medicines (tablets, capsules, oral rehydration packets) on the top shelves.

Use airtight containers. If the top shelf is near the ceiling or hard to reach, use that shelf to store items that are not sensitive to heat and not used regularly.

- Middle shelves: store liquids, including injectable and ointments, on the middle shelves. Do not put dry medicines below this shelf in case liquid leak, the dry medicines may spoil.
- Bottom shelves: store other supplies, such as surgical items, laboratory supplies, condoms, bandages and labels on the lower shelves. [www.msh.org/resource-center/health-systems-in action. cfm](http://www.msh.org/resource-center/health-systems-in-action.cfm) (2010). And almost all of the AAHBH's medical stores are based on the above-mentioned shelf organization. But there is a huge shortage of shelves and lack of storage area and in almost all of the health bureau hospitals, because items were everywhere during data collection period and which makes it hard to have physical inventory, hard to use FEFO and even it was hard to move freely in many of the hospital store.

4.5.4 Expired Pharmaceuticals and Waste Disposal

In the checklist of MSH it clearly stated that expired medications should be separated from unexpired medications. But in almost all of the hospital expired medication was observed in the main store. Even though it is not on the shelf but an expired medication was also available in almost all of the dispensing unit, due to insufficient space in the expired store, this might be due to lack of commitment to dispose expired items from the expired store, lack of incinerator in each hospital make the process longer and also there are medications and supplies that cannot be disposed in our country and this makes things worse than ever etc. Gizat and Samson (2014) a research, which is done at the east of Hararge, found in the study there was a good practice of isolation of expired/ damaged/ obsolete/ products in all the study areas but there were no expired drug disposal events.

In almost all of the bureau hospitals it's been more than 5 years since there were expiry items disposal and this force them to put it in the main store but they are extra careful while

distributing items to the dispensing unit. But still it is not advisable to have expired items and non-expired items together.

Sometimes poor-quality products might be suspected, during this unusual odor of tablets and capsules, damaged containers, injectable with small particles that reflect light and suspensions with broken glass are checked very carefully in all of the hospitals supply and medical stores during receiving from the supplier. The storekeepers of the hospitals in all of the six hospitals are very cautious while receiving those items, because during transporting those products there might have so many damage on the package of the items. Like liquid medications which are very easy to be broken down might be broken and others like tablets and capsules might go out of the container while transporting them from the main Hub, like PFSA or other suppliers.

4.5.5 Controlled Medication/ Substances

Narcotics (such as pethidine and morphine) and psychotropic medicines (such as diazepam) this and other drugs from this class are controlled substances, which are medicines handled under international control. These medicines need greater attention. There are specific procedures in place for the procurement, storage, dispensing and administration of controlled substances [www.msh.org/resource-center/health-systems-in action. cfm](http://www.msh.org/resource-center/health-systems-in-action.cfm)(2010). As it is stated under WHO access to controlled medications program, in most countries, access to many medicines which contain Narcotic drugs and Psychotropic substances controlled under the international drug control treaties, is much more difficult than to other prescription medicines. The need to apply additional control measures to those medicines is a result of their liability to abuse and to produce ill effects. This is not only in the case for opioid analgesics, but it is reported for other controlled medicines as well. The international drug control treaties not only emphasize the need to ensure that there is adequate provision of narcotic drugs for the relief of pain and suffering but

also state that the availability of psychotropic substances for medical purposes should not be unduly restricted.

The hospitals have a separate cabinet, though it is not locked and this medication also needs a different prescription to be dispensed from any dispensing area, the controlled medications are only written on these prescriptions. All of the six hospitals have a cabinet, which has no keys, which needs special precautions because of addictions and easy adaptability of the medication to the body, different research shows most health professionals have those medications addictions. Even when these medications are distributed to the different dispensing area at that specific dispensing unit there is also a cabinet again with no keys. And surprisingly even the prescriptions of these medications should also be putted in the locked cabinets in each ward, this will prevent abuse of those medications by using the prescription, one can order and get the drugs from outside the hospitals.

4.5.6 Use of Stock Cards and Bin Cards in the AAHBH

Stock card: how are stock cards are used in the facility
Does each item in the store have a stock card
Is the stock card kept on the same shelf as the item
Is all information on stock card up to date
Is information recorded on the stock card at the time of movement
Does the physical count much the balance column
Is the physical count made at regular intervals

Are all discrepancies documented?
Is there a computerized stock recording and updated on each movement

Like the MSH mentioned it in the checklist in the above table each item in the store that the researcher randomly picks match with the bin card but stoke card is at the hand of the head of the pharmacy department but the bin card for all of the medications and supplies were observed, it was putted at the bottom of each items especially in the medical store of the hospital. And relatively the information on the bin card is updated every time the store receives some items. But nowadays almost the entire hospital store is having a computerized system of data recording, and the computer has better-updated information compared to the bin card. The information on most of the bin cards match with the physical inventory the researcher randomly picked a vital item and try to much with the physical inventory and it was perfectly the same specially in Yekatit 12 Hospital Medical College, which is a role model in store management from the AAHBH's. But since almost all of the hospitals have a store which is below the standard and the storekeepers are forced to move from there office to different store place and this makes their job difficult to put every medications bin card at the side of the items, whenever there is a need they have to go to the scattered store so, they put the bin card at their office which is also half store. Almost every transaction is written on their bin card and on their computer, excel.

4.5.7 Receiving Pharmaceuticals and Supplies

Receiving supplies
Are deliveries received by the pharmacy professional (store keeper) in person
Are deliveries inspected by the store keeper before acceptance
Are there received supplies checked against the items listed in packaging delivery

form?
Are the deliveries acknowledged and recorded on the respective receiving voucher
Does the delivery person sign the form before he/she leaves the facility?
Have you ever returned an item, because of damage, expiry, too much etc. to the supplier before receiving?
Are the expiry dates of all items checked before acceptance?
Does the store keeper check for poor quality of items, such as
✓ Poor packaged refrigerated items?
✓ Discoloration of medicines and vaccines?
✓ Broken containers and supplies spoiled by leakage?
✓ Unsealed and unlabeled items
✓ As soon as supplies are checked, all receipts recorded on the stock cards?

The purchaser of the AAHBH which is a pharmacy professional explains the detail of the purchasing process to the researcher, when the items came to the hospital and the store keepers and finance professional will receive the items by checking the items name which is written on the package of the item and on the voucher, checking the quantity, Expiry date, any damage and the storekeepers will write the received items on model and the purchaser will sign on it beside the store keeper and one of the leaflet will be given to the supplier. If during inspection if damaged or expired, discoloration, unusual smell, opened container of tablets and capsules, broken glass of syrup or suspension or ampule and vials, this and other will be checked and if the storekeeper found anything it will send the items back to the supplier.

According to national good pharmacy practice guidelines (2005), all medicines should be stored at stipulated temperature areas, protected from excessive light, dust, and humidity. Temperatures

at the various areas should be recorded at predetermined periodicity and records should be preserved for a period of two (2) year. They may be correlated with the subsequent years corresponding data to improve arrangements for maintenance of temperatures. In all of the hospitals cold chain store, the store that contains a refrigerator and items that needs cold temperature have a thermometer and the storekeepers measure and record the temperature twice a day. And the researcher observes a recorded temperature, which is posted on the refrigerator.

Concerning storage condition this study revealed that 75% of the study facilities did not fulfill the criteria of good storage condition (≥ 80 positive response). About 40% of the facilities were not updating their bin-cards even the bin-cards were not along with the respective medicines. This finding is almost similar with study conducted in health facilities of Addis Ababa where only 35% of the facilities had fulfilled the criteria of good pharmacy practice standards for the storage of medicines and most of them had storage space limitations.

And also the study done in six stores of Hararge health facilities also reported space limitations in 80% of the facilities was observed. Medicines should be stored in a specially designed secure area or space of a building in order to avoid contamination or deterioration, avoid disfiguration of labels, maintain integrity of packaging and so guarantee quality and potency of drugs during shelf life, prevent or reduce pilferage, theft or losses, prevent infestation of pests and vermin and the storage environment should possess adequate temperature, sufficient lighting, clean conditions, humidity control, adequate shelving to ensure integrity of the stored drugs. Generally, poor storage conditions put the quality of drugs at risk and cause wastage and the quality of care patients receive.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1 SUMMARY

The study was intended to assess the pharmaceutical inventory management in the case of Addis Ababa Health Bureau Hospitals. By using a primary data collection methods, the researcher found a response rate of 84%. Based on the study question that is planned to be answered, the study begins to answer four major questions, by assessing the level of awareness of good pharmaceutical inventory management of AAHBH pharmacists, to assess the interest of the pharmacy professionals to work in the pharmacy stores. To assess their store documentation related to pharmaceutical inventory management and the last one is to see the current status of AAHBH store management. Inventory management helps to meet the rising challenges in most of the hospitals. Through a well-built policy organization is able to handle its idle stock without incurring unnecessary costs. Hospitals pharmacy management system is very much needed for patient compliance.

Patient counseling, proper dispensing of drugs and other patient oriented issues can be managed properly if the hospital pharmacy is developed. While assessing the store documentation quantification methods only 50% of the AAHB hospitals use only the consumption methods and the rest 50% of the respondent of the hospitals use both consumption and morbidity methods for quantification. From the respondent 19% prefer to use FIFO methods, and the remaining 81% of the respondent use the FEFO which is based on the expiry date of the items. Based on the check list which is prepared by the management of health institution the current store management of the six hospitals which is under AAHB were observed.

5.2 CONCLUSIONS

The study aims to assess the inventory management in the case of Addis Ababa Health Bureau Hospitals.

As shown in the result most of the pharmacy professionals do not like to work in the pharmacy store, and majority of them reported that its because there is hard labor work and the storekeeper has to carry the items by himself or herself when issuing, receiving and arranging of the stores, not only that it is the most rated reason by the professionals why the store keepers do not update bin cards of the items found in the store. And also most of the pharmacy store keepers do not have porters and laborers who help them. The second highest reason not to work in the pharmacy sores is the fear of discrepancy of the inventory at the end of the physical inventory and due to lack of incentives.

Regarding the awareness of the pharmaceutical inventory management, the professionals paid least attention to materials management skills and knowledge and it results in lower level of awareness and competence in related to the good pharmaceutical inventory management point of view. And also most of the professionals do not know proper management of pharmaceuticals which results in damage of the items and ultimately results in treatment failure and even may cost the lives of the patients, for example most of the stores are not directly connected to the generator, when power goes off, the cold chain items found in the refrigerators will be exposed to a higher temperature.

The stores and the storing conditions of the pharmacy stores of the hospitals have given little attention with regard to renovation, modernization and in creating well ventilated stores which is easy to manage the contents inside the stores. And due to this even the store keepers are unable

to manage the pharmaceuticals found in the store and to arrange in such a way that promotes good stock rotation of the pharmaceuticals. And most of the stores do have fire extinguishers but the professionals are not trained well.

The accuracy of inventory recording in the bin cards was found to be more encouraging relative to the previous trend and more has to be done to the highest accuracy. However some portions of the storekeepers reported that there is no enough stationary materials and enough bin cards for all the items in the store.

5.3 Recommendations

Even though there are many motivational factors that motivates professionals to work hard, the interests of the pharmacy professionals to work in relation to the pharmaceutical inventory management, specifically in the pharmacy store, can be increased by firstly by empowering them in relation to the good pharmaceutical inventory management by on job trainings and, the other place to acquire pharmaceutical inventory management related knowledge, skills and trainings is in higher educational institutes, so even though pharmaceutical study is in a health science study, the health colleges are recommended to add the inventory management related courses to their curriculum to the students so that when the students come to the real professional life, they will apply the knowledge they have and will add on the skill and the experience in the health facilities where they work.

Most of hospitals' pharmacy stores are old and not purposely built for the storage of the pharmaceuticals, so the hospitals have to give attention to the store's physical setup or to the renovation of the stores that allows the implementation of ideal and good pharmaceutical storage practices and if renovation don't solve it, the researcher recommends at the hospitals to construct new pharmacy stores which can accommodate all the items of the hospitals' pharmaceutical need in such a way the pharmaceuticals' safety and efficacy can be maintained.

The other major reason why the store keepers do not update bin cards and stock cards is due to its hard labor work, so to solve this problem some of the hospitals hired porters to assist the pharmacy store keepers and the store keepers will have get a time to manage the items in the store, so this trend will be good if it can be implemented in other hospitals. And the store keepers will focus on proper management of the pharmaceuticals. And also the store keeper will have

time to update the bin cards for each movement immediately when there is movement and then the rate of discrepancy will be lower.

Some of the pharmacy stores do not have computers and printers and there is no proper electronic stock controlling mechanism to access information of the old consumption data so the hospitals are recommended to install a new system to control their stock electronically.

As stated earlier most of the pharmacy stores have expired drugs, over stocked pharmaceutical and obsolete medical instruments, holding the spaces of the stores, so the researcher recommend the hospitals to dispose the expired pharmaceuticals at least yearly by having a regular program and fulfilling all the regulatory requirements. And regarding the over stocked items, the researcher recommends donating it to other governmental health institutions or exchange to other health facility by what they want, and following this the hospitals may find what they need in the other hospitals by creating a good communication to other governmental and nongovernmental health institutions.

As shown in the result, drugs' store is better and well managed relatively to the supply store; even the efficiency of the total average is pulled down by the supply store. Since both are used to treat human, equal attention has to be given to both management and storage of supply stores. And the current status of the hospitals management can be made better by further training and hard work.

Managing the pharmaceutical inventory especially in the health institutions requires all the scientific models and inventory controlling systems, so all the above discussed information can be fully applicable and implemented for the best outcome of the pharmaceutical inventory

management. In doing this the health organizations can save large amount of money and can make sure the availability of all essential drugs for the health institutions.

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