

**Drug Inventory Management at Hospitals in the Greater Accra
Region and its effect on Patient Care**

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DECLARATION

I hereby declare that this submission is my own work towards the CEMBA and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where the due acknowledgement has been made in the text.

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DEDICATION

I wholeheartedly dedicate this research work to the Lord Almighty through whose guidance and protection I have been able to reach this far in my education.

I dedicate this work to my Daughter; Princess Yaa Akomah Sarpong and my Lovely wife; Mrs. Georgina Sarpong for their love, support and encouragement.

This work is also dedicated to my CEMBA Study Group Members; Annor, Tony, Cynthia, Ike, Augustina, Amos and Eric.



ABSTRACT

The purpose of the study was to analyze the effect of drug inventory management in hospitals in the Greater Accra Region and its effect on patient care. The study looked at how the pharmacy departments at the various hospitals in Greater Accra Region were managed. Another objective was to determine how inventories are controlled at the pharmacies in the hospitals. Data was collected at two levels; one with the pharmacists and the other with the patients using a combined sample size of 158 from thirty hospitals in the Greater Accra region. Descriptive statistics were used to present the data to establish the relationship between drug inventory management and its effect on patient care. The research findings showed that although all the sampled hospitals in the region have well experienced and professional pharmacist manning the units, majority have not computerized their inventory systems. It was revealed that almost all the drug stock are purchased from the district or regional medical stores and in some cases from the open market through vendor selection process that follows the procurement Act, hence, cases of frequent drug stock-out. The result is that Patients are not always given all their prescription when they go to the pharmacies in the hospital. Finally, the situation of unavailability of drug stock at the pharmacies in the hospitals has led to patients becoming anxious about their medical condition hence leading to health deteriorations and worsening their medical conditions. It is recommended that all the stakeholders in the health industry should help to address the issue of properly managing drug stock in the hospital pharmacies in Ghana since this has an effect on patients care.

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CHAPTER ONE

Introduction

1.1 Background of Study

Drug inventory management is a key management function in hospital administration in Ghana. The purchasing, storing, distributing and controlling of drugs are activities in drug management process which have the ultimate aim of improving patient care in the various hospitals. Hospital pharmacies throughout Ghana are experiencing inventory problems that have resulted in wastage and shortage of drugs. The obvious outcome of this problem is a retrogressive effect on patient care due to delayed procedures and drug substitutions (Fox and Tyler 2003).

While some drug shortages are uncontrollable (e.g. due to a natural disaster), others can be controlled. Inventory, which is a result of the purchasing process, must be well controlled. However, based on daily activities performed in the hospital pharmacy, the main concerns regarding managing inventory occur during purchasing process. It is problematic and time consuming to decide when and how much to order. Improper inventory management can also result from the procurement expertise of those managing the inventory (Alverson, 2003). Although pharmacists in hospitals have expertise in the efficacy and treatment protocols of drugs that are administered to patients, they are also tasked with managing, ordering, and producing the drugs that are ultimately dispensed to patients.

The pharmacists serve as the gate keepers of drug distribution by ensuring the accuracy and appropriateness of prescribed medications. Pharmacists must make decisions regarding their inventory levels on how and when to produce or purchase drugs

in response to, or in anticipation of, patient demand. Frequently, these decisions are made by measuring drug utilization from historical data and devising a common inventory level (measured in days of inventory) which makes the process easy to manage but not efficient (Baumer et al. 2004).

However, there is additional information available that pharmacists are currently not using to make inventory decisions. Drug demand is a function of the patient's condition and the prescribing protocols of the physician. The patient's condition provides a forecast of their drug need during their length of stay. The consumption of a particular drug on a given day is conditional on the mix of patients in the hospital that require this drug and may be for more than one unit of drug. Since drug usage changes over time and is not known with certainty, the daily demand is dynamic and stochastic.

Therefore patient care could be compromised if the pharmacy department of the hospital fails to execute proper inventory management practices, so that drugs when needed may be readily available. This is because there is a direct linkage between the patient-care and the efficiencies of the various units in the hospital; Gillerman and Browning (2000) found that there was an interrelationship between the patient's condition and his/her drug utilization which could mean that drug unavailability may result in worsening patient condition in the hospital, translating into increased patient stay at hospital.

There are five hundred and thirty (530) health facilities in the Greater Accra region including one hundred and nine (109) hospitals that provide a total of four thousand, three hundred and eighteen (4,318) beds for patients (CHMI/PPME-GHS, 2007). The hospitals in the Region are from all the four different types of hospital operations currently in Ghana namely: Government Hospital, Mission Hospital, Quasi

Government hospital and Private Hospital. This study therefore seeks to unravel how drug inventory management at hospitals in the Greater Accra region affect patient care.

1.2 Problem Statement

Even though all hospitals in the Greater Accra Region have pharmacy department to ensure proper inventory management in the hospitals, not much is known about the effectiveness of drug inventory management practices at play in the various pharmacy departments and its onward effects on patient care in the hospitals in the region. It is a known fact that patient care cannot be effective without an efficient drug inventory management practice. Nevertheless, what is unknown is how drug inventory is managed in hospitals in Greater Accra Region and how patient care in the region is affected by it. The sort of drug inventory management in various pharmacy departments in the region leaves much to be desired. It is this noticeable gap in the literature that this research seeks to fill. Thus, this study seeks to unravel how drug inventory management in hospitals in the Greater Accra Region affects patient care.

1.3 Objectives

The objectives of this research work are as follows:

1. To find how the pharmacy departments at the various hospitals in Greater Accra region were managed.
2. To determine how drugs are purchased, stored and distributed in the Pharmacy Units at the various hospitals.

3. To determine how inventories are controlled at the pharmacies in the hospitals
4. To determine whether drug inventory management at the hospitals affects patients' accessibility to essential drugs in the hospitals.
5. To determine whether drug inventory management at the pharmacy units of the hospitals has any effect on patients' recovery process.

1.4 Research Questions

This study aim at addressing the following research questions:

1. How are the pharmacy departments at the various hospitals in Greater Accra region managed?
2. How are drugs purchased, stored and distributed in the Pharmacy Units at the various hospitals?
3. How are inventories controlled at the pharmacies in the hospitals in the Greater Accra region?
4. How do drug inventory management at the hospitals affect patients' accessibility to essential drugs in the hospitals?
5. Is inventory management at the pharmacy units of the hospitals having any effect on patients' recovery process?

1.5 Relevance of the Research

Purchasing includes the selection of right quality products and knowing the right quantity, when to order, at what price and from which source. Deciding the time to make an order, from now on is referred to as the reorder point (ROP), takes two major factors into consideration – the length of lead time and demand during lead time. Nevertheless, determining ROP for the hospital pharmacy is not simple, as the demand is difficult to accurately forecast and lead time is fluctuated, depending on suppliers.

The regular ordering routine reveals that ROP is determined somewhat based on past usage. Yet, there is no specific policy to facilitate the determination, but it is done based on the staff's familiarity of the process. If ROP is not carefully handled, unexpected situations of stock out and overstock might occur. Shortage of vital medicines used for severe illness is a great cost for the hospital since some medicines are scarce and they are not always available in the markets. In response to stock out situation, local emergency purchase must be made which is costly to the pharmacy department.

Another difficulty the staffs have to encounter when performing purchasing process is how much to order. Based on the basic knowledge of inventory management, ordering too much will bring up carrying cost and ordering too little will lead to higher ordering cost. A lesson has been learned from too large orders in the past - some overstocked items have been found after the acquisition of the hospital.

There are currently major concerns regarding drug inventory management in the pharmacy department – when an order should be placed, and at what quantity. It is challenging to achieve drug procurement objectives with regards to costs, quantity, quality, and delivery. However, considering the hospitals' personnel and technology unavailability, the implementation of a successful patient care through an efficient

inventory management could be problematic in the Greater Accra Region. Hence, this research will provide the needed empirical evidence for or otherwise of the above statement.

1.6 Organisation of Thesis

This work is presented in five chapters. Following the general introduction in chapter one, chapter two explores the literature review which relates to the study of the previous secondary data available on this topic. This chapter also focuses on what supply chain management is all about; inventory control, the cost of inventory, the push and pull systems of inventory, and the general overview of the pharmacy department. Chapter three establishes the method to be adopted to carry out this study and thus it talks about the appropriateness of quantitative research as compared to the usage of qualitative approach for this particular research.

Also the use of questionnaire survey has been reasoned in this chapter. Apart from this, the criterion for the selection of the sample size is disclosed. The analysis and interpretation of the responses which were collected during the interviews are captured in chapter four. The summary, conclusions and recommendations are presented in chapter five. This chapter includes the limitations that were faced while conducting this research and also states an extensive area appropriate for future research and finally divulges the managerial implication which would facilitate in a better management of the subject area.

CHAPTER TWO

Literature Review

2.1 Introduction

Chapter one focused on the introduction to the research. This chapter reviews the meaning of supply chain management, inventory and controls, as well as the pharmacy department. The health facilities in Ghana especially in the Greater Accra region are also captured.

2.2 Supply Chain Management

Many theorists have given the definitions for the term supply chain management. One of them that can describe the term supply chain management really well and it seems to cover all related activities is that; (Basu and Wright, 2008). Supply chain management is a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses and stores, so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimize system-wide costs while satisfying service level requirements.

As the definition implies, supply chain management has been developed for customers who play the most important role in businesses. Especially in this globalization era, customers, ever more demanding and powerful than before, are seeking for products and services with higher criteria. In order to meet customers' requirements and satisfactions, companies have to be proactive against globalized markets which can be changed and influenced by several factors. With an increase in the use of technology like internet, some claim that there is no more geography in business nowadays. Offshore

production, collaboration between international companies, and openness of the global market are the significance of the global environment.

Supply chain management can therefore be labelled as global supply chain management in today's environment (Coyle, Bardi and Langley 2003). The concept of supply chain management requires the integration of many business components. In 1985, Michael Porter introduced and described his new concept for business management, the value chain. The concept of value chain has developed as a tool for competitive analysis and strategy. It is comprised of inbound and outbound logistics which are the primary components of this business model. Integrated marketing, sales and production are the important jigsaws that contribute value to firm's customers.

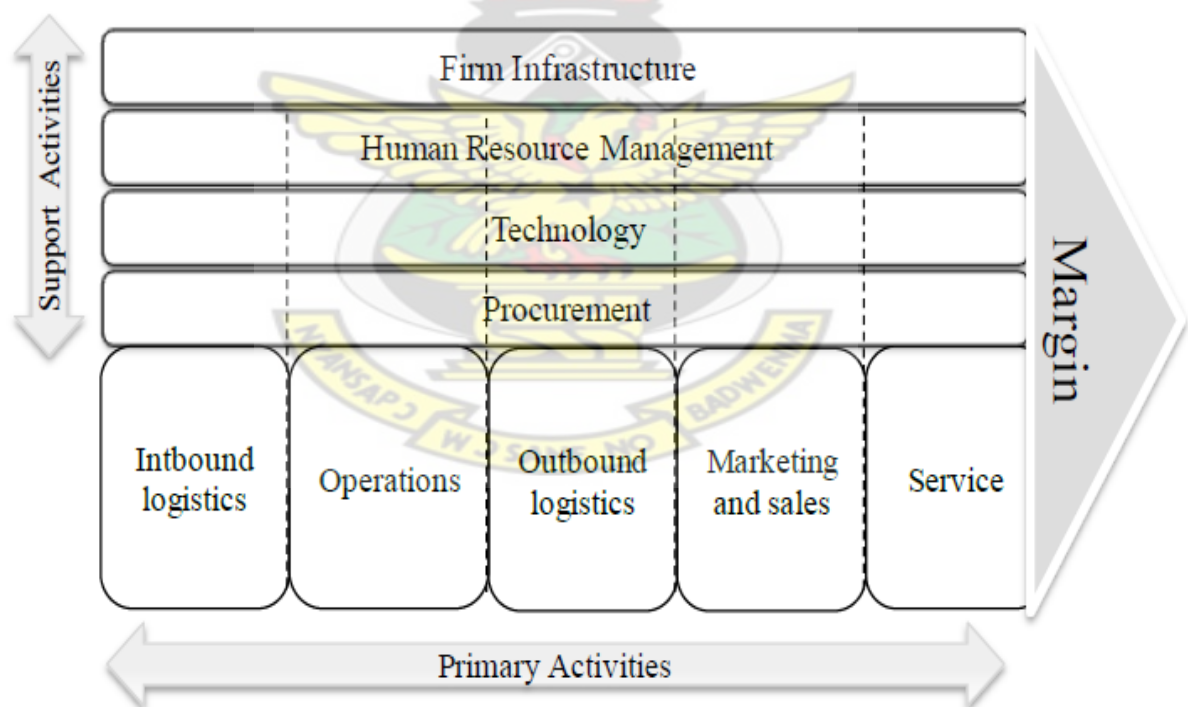


Figure 2.1 :The Value Chain (Coyle al et. 2003)

With regards to the movement of product and information, there are two approaches in supply chain management that have been widely used namely, push and pull business models.

2.2.1 Push System

Push system is referred when raw materials are stored before production and products are produced to stock before orders are placed. The action is stimulated by demand estimation or demand forecast. Products and information flow the same way, from seller to buyer. Communication carried out in the supply chain of this approach can be either interactive or non-interactive since customers or buyers do not always response to messages sent by producer or sellers. For example, there is no direct feedback from customers after message in advertisement was sent by vendors through media channels. Push system, typical and traditional, is still widely utilized by many firms in different industries (Porter, 1985).

2.2.2 Pull System

Pull system, on the other hand, is used in response to confirmed orders. Products are produced after or at production planning stage. Therefore, stock does not contain finished goods, but semi-finished materials. Customers send their requirements and place orders to producers or sellers. The requested product is pulled through the delivery channel. Communication carried out in pull system is usually interactive. Pull model is also widely used inside the same firm, for instance, a department sends an internal order to the other department to manufacturer an item that is needed in their work process. Pull

system includes just-in-time (JIT) which is an inventory strategy to improve business inventory turnover by bringing inventory to a minimum. JIT strategy considers inventory as waste, its emphasis is on delivering supplies at when and to where they are needed.

2.3 Inventory Control

Inventory control is challenging in business. Managing inventory control can directly affect business performance. The reason for having inventories or stocks is to buffer against demand and supply. Having too much inventory on hand means high holding cost, and having too little leads to a rise in ordering cost. Therefore, inventory management should be well planned in order to achieve the lowest possible total cost. Even though inventory is considered as a negative impact in business since large proportion of total expenses is generated here, having inventory is still a must for many kinds of business. The goals for controlling inventory are minimizing the total cost and maximizing service level by balancing demand and supply. There are several approaches involved in managing inventory. Businesses are characterized by two distinguished systems, push and pull. JIT is a pull system while EOQ (Economic Order Quantity) includes elements of push strategies in proactive manner.

When it comes to hospital pharmacy, being proactive is the most crucial quality. Generally, order or demand is not confirmed beforehand since number of patients is really difficult to predict. However, it is predictable in some cases, for instance, diabetic and HIV patients who must regularly get treatments and constantly require particular medicines. Hence, push system is mostly used in hospital pharmacy and in some other healthcare facilities since drugs must be available when they are needed. Inventory management in hospital is handled differently compared to some other organizations in

healthcare industry since hospitals do not seek for a big margin from drug sales. Service level should be the first priority, then minimizing costs and losses (Baumer et al. 2004).

2.4 Rationale for Having Inventory

Economies of scale can be obtained by purchasing large volumes which allows cost reduction of per unit fixed cost. Balancing supply and demand is another important reason for having inventory. If supply is seasonal, inventory can help meet demand when materials or products are not available. Vice versa, if there is an occurrence of seasonal demand, firms must accumulate inventory in advance to meet demand in the future.

Specialization can bring economies of scale to manufacturers by long production run. Instead of producing a variety of products, each plant can produce a product and ship to customers or other warehouse. Protection from uncertainties is also a primary reason for holding inventory. Having stock on hand can reduce risk of shortage or stock out situation which might lead to lost sales and lack of reliability. Customer can possibly buy products from competitors instead.

2.4.1 Inventory Costs

Inventory is associated with three major costs namely ordering cost, holding cost and stock-out cost (Weigner, 2001). Ordering cost covers all costs occurring during the ordering processes of one order regardless of volume or quantity ordered. It includes costs and time spent on requesting for quotations, entering purchase order, approving order, checking received order, invoicing, making payment and reviewing order report.

Ordering cost might not be a big component of the total cost for firms but considering time spent on one order and management efforts, ordering cost should be therefore properly reduced.

Holding Cost is divided into three categories namely risk costs, storage costs and finance costs. Risk costs include deterioration, obsolescence, damage and theft. Storage costs are associated with renting, building, racking, special storage such refrigeration, and handling costs. Finally, finance costs include interest on money invested in inventories and insurance.

Stock-out Cost is the cost of not having products available or enough when they are demanded by customers. It might be difficult to calculate this cost. For example, stock-out cost constitutes a loss in sales both current and future since customers might turn to competitors. Stock-out cost in some organization such as hospital might be greater than the other types of organization.

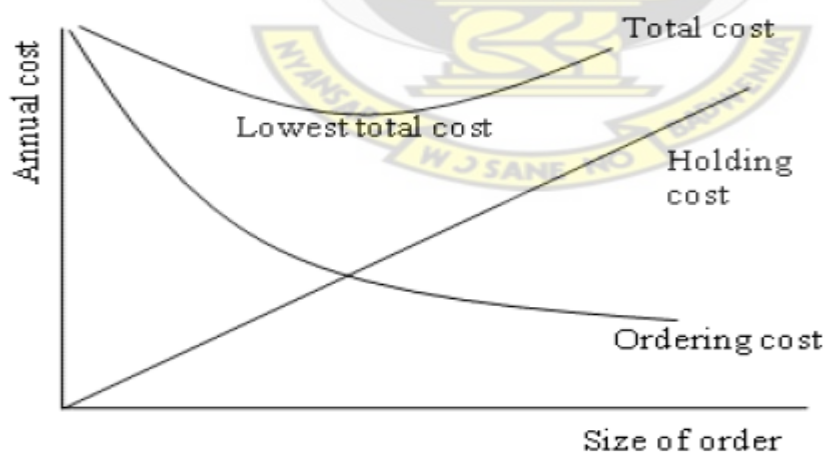


Figure 2.2: Cost Trade-offs

Figure 2.2 illustrates the general relationship of holding cost and ordering cost. The tendency of holding and ordering costs are generally opposed to each other. Different

sizes of order have a significant impact to the total cost. The lowest total cost can be obtained at the most suitable order quantity which can be determined by balancing holding and ordering costs.

2.5 Classifying Inventory

Different inventory procedures have been developed to enhance inventory management in different purposes. With multiple product lines a firm has, inventory needs to be classified before making decision about inventory methods. When it comes to pharmaceutical products, there are several procedures used to classify the inventory with regards to different basis, for example, value of consumption, criticality, consumption pattern and source or supply (Baumer et al. 2004 and Weigner 2001). Two types of classification that can be utilized for drug inventory are ABC and Ven Classification which are described below.

2.5.1 ABC Classification

ABC analysis is one of the most widely used tools for materials management. It is also known as Pareto's Law or "80 – 20 Rule" (Coyle et al. 2003, 208). This classification has been conducted and developed by Vilfredo Pareto, an Italian Philosopher and Economist. He observed that a very large percentage of total national income and wealth was concentrated on a small percentage of population. This rule of thumb expresses that 80 % of total value is accounted by 20 % of items. This analysis is considered a universal principle. It is therefore widely used in many situations of businesses. Class A represents 20 % of materials in inventory and 75 % of the inventory

value; Class B represents 30 % of materials in inventory and 15 % of the inventory value; and Class C represents 50 % of material in inventory and only 10 % of inventory value.

According to ABC classification, it suggests that more analysis should be applied to materials with high inventory value. Class A should be most extensively handled and Class C is analyzed little (Gaither and Grazier 1999). Advantage of ABC classification is that controlling small numbers of items amounting to 10-20% will result in the control of 75-80% of the monetary value of the inventory held. If items in the inventory are not classified, managing and handling materials would be very expensive since equal attention is given to all items. Having classified the inventory, different levels of control can be assigned to items in the different classes.

Venkat Reddy (2008) has explained the selective control procedures for ABC classification used in hospital pharmacy as follows: (i) very strict control procedures should be used with items and the controller should have great authority; (ii) inventory held in safety stock should be very low or none compensated with more frequent order placements; (iii) consumption control and product movement should be reviewed regularly – weekly or daily; (iv) number of sources for high valued items should be increased in order to ensure good supplier performance and reduction in lead time ; and (v) purchases of items should be centralized.

Class B can be controlled by middle management. Low safety stock policy is applied to this class with quarterly or monthly orders. Past consumption can be used a basis for calculating order quantity. There should be two or four reliable suppliers to ensure that lead time is reduced. Power can be delegated to user department to determine stock level.

Class C items do not need to be highly controlled. Since the items have the lowest value compared to the Class A and B, orders can be placed at a greater volume to take

advantage of quantity discount. Rough estimates are sufficient to manage Class C materials. Although ABC analysis suggests putting great clerical effort on Class A items, importance of Class B and C however should not be overlooked. Most importantly in hospital pharmacy, there might be medicines from A, B and C in one prescription. Short of Class C drug can lead to a failure in medical treatment if it is vital for the illness.

2.5.2 VEN Classification

VEN classification is a method that pays attention to criticality of drugs. Drugs are categorized into three groups based on basis of priority and importance to patients' health. This method is explained as follows: (i) V – Vital drugs potentially involve lifesaving. They have significant withdrawal side effects. Drugs that are crucial to providing basic health services are included in this group as well; (ii) E – Essential drugs: An effectiveness of this group is less severe when compared to vital drugs but they are significant for illnesses; and (iii) N – Nonessential drugs: They are used for minor or self – limited illness. Drugs with questionable efficacy also belong to this class. High cost drugs for marginal therapeutic advantage are also an addition.

To identify drugs by using this approach, a panel of pharmacists, doctors with different specializations should be set up since opinions can differ. Drugs which appear in all categories are identified as vital. Items which fall into vital and essential are marked as vital and ones which appear in essential and nonessential are classified as essential. This technique allows staff to be able to manage different degree of management to control inventory. The degree of importance of procurement and control procedures reduces from vital to nonessential drugs.

2.6 Methods of Inventory Control

Many approaches are used in order to control inventory. Choosing a method to use in business must be carefully considered and analysed based on its comprehensiveness. In healthcare facilities, there are several methods employed to control inventory and to facilitate procurement's policy. Each method has different objectives and procedures. Selecting and utilizing methods of inventory control depends on feasibility and suitability. Several factors are involved in making decision regarding utilization of inventory methods such as, budget, technology and personnel. In a hospital pharmacy, a combination of different methods is recommended because of numerous drugs in the inventory. Methods of inventory control are summarized as follows:

2.6.1 Open-to-Buy (OTB) Budget

Open-to-Buy (OTB) Budget Method is an inventory control method with regards to purchasing policy. It limits purchases to a specific amount of fund available at a specific period. The emphasis of OTB method is financial control of pharmacy inventory. The monthly amount of fund provided for expenditure is approximately equal to the best estimate of previous month's use. Although, it is useful in monitoring and adjusting the financial value of the inventory, it is recommended to combine other methods for a total inventory management system.

2.6.2 Short-List Method

Short-List Method emphasizes on the provision of accurate and timely inventory information to the person who is responsible for order placement. Items with short supply

are identified and added to the list when the inventory level reaches the reorder point. This method works well when there is a duplicate of stock maintained and monitored by other inventory control methods.

2.6.3 Stock Record Card

Stock Record Card Method is used to record information about movement of products in the storage area. It is also used to monitor inventory level and facilitate order initiation. Stock record card usually contains essential information with regards to receiving and issuing drugs.

2.6.4 Fixed Order Quantity Approach (Under the Condition of Certainty)

Under the condition of certainty when lead time and demand are certain, fixed order quantity approach can be applied to determine order quantity. As the name implies, order is placed at a fixed quantity which is calculated based on product cost and its demand characteristics. Inventory carrying and ordering costs are the main components of this equation. The two bin system is used to determine fixed order quantity. The two bin system, one of fixed order quantity approach, allows firms to develop minimum stock level and determine reorder point. It works so that products are placed into two bins, when one is empty a new order should be placed. The amount of product in the second bin is the fixed quantity that should be ordered. Volume in each bin can be determined by knowing an average usage per day and lead time of a particular product.

2.6.5 Simple Economic Order Quantity Model

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, there are several assumptions that should be taken into account and these are as follows: (i) there is a continuous, constant, and known demand rate; (ii) the lead time cycle is known and constant; (iii) the constant purchase price is independent of the amount ordered; (iv) transportation costs are constant no matter the amount moved or the distance travelled; (v) there is no inventory in transit; (vi) all inventory parts are independent of each other; (vii) the planning horizon is infinite; and (viii) there is no limit of the amount of capital available (Bloomberg, LeMay and Hanna, 2002). It is as follows:

$$Q = \sqrt{\frac{2RA}{VW}}$$

Where:

Q order quantity

A ordering cost/one order

R annual demand for the product

W annual inventory carrying cost expressed as a percentage of the product's cost

V average cost or value of one unit of inventory

According to Coyle, Bari and Langley (2003, 229), some may feel that simple EOQ model is too simplistic and it might lead to consequent inaccurate result. However, they

have mentioned that the simple EOQ method is preferable to the complex one for several reasons as it being suitable for products with constant price or where discounts are not offered and also changes in input variables will not significantly affect simple EOQ's result.

2.6.6 Fixed Order Quantity Approach (Under the Condition of Uncertainty)

An existence of uncertainty seems to be a very common and regular situation in business. Uncertainty includes change in demand, damage during transportation and delay delivery. If there is an uncertainty associated with demand, EOQ therefore has to be adjusted to buffer against uncertain business atmosphere. Reorder point (ROP) also needs to be taken into account when both demand and lead time vary. ROP calculation is not any more straightforward when there is an occurrence of delay in delivery and fluctuation in demand.

2.6.7 Adjusted Economic Order Quantity

In a business environment, fluctuation in demand is a common situation. Especially in healthcare industry where demand cannot be accurately forecasted since it depends on several external factors. Regarding hospital pharmacy, there are several key factors, both internal and external, that affect inventory level in the pharmacy store (Baumer et al. 2004). During the observation at a premise, factors affecting demand and usage of medicines are illustrated in figure 2.3 below.

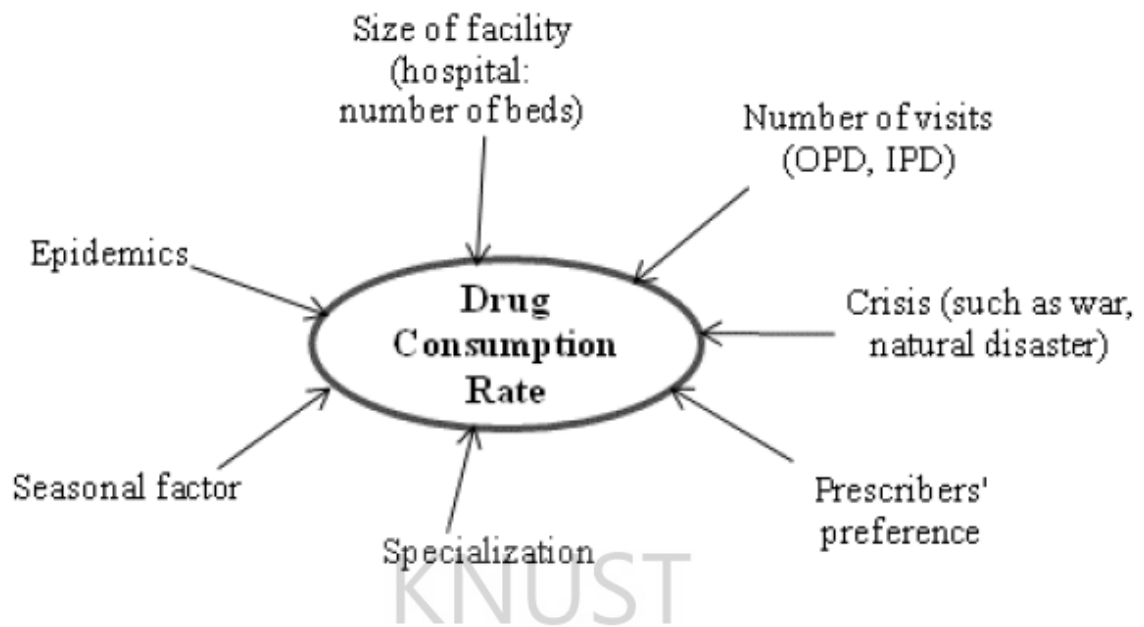


Figure 2.3: Factors that Influence Pharmaceutical Consumption Rate in Hospital Pharmacy

As previously noted the restrictive assumptions of simple EOQ model, makes the situation an ideal one. Since uncertainty in demand seems to be the situation encountered the most, EOQ model should be fixed to cope with this uncertainty. As the emphasis of this adjusted formula is demand, the other assumptions applied to simple EOQ therefore still exist. It is as follows:

$$Q = \sqrt{\frac{2R(A+G)}{VW}}$$

Where: Q order quantity,

A ordering cost/one order

G expected stock-out cost per cycle (expected shorts in units' × stock-out cost per unit)

R annual demand for the product

W annual inventory carrying cost expressed as a percentage of the product's cost

V average cost or value of one unit of inventory

2.7 Relevant Research Works

Thawani et al. (2003) have studied about economic analysis of drug expenditure in Government Medical College hospital, Nagpur, India. The research was conducted for a public hospital whose allocated budget is quite limited. ABC and VEN classifications have been successfully implemented in the studied hospital. They derived the matrix of drugs prioritization by coupling ABC and VEN classifications. Different management procedures are used with the different categories. After these methods have been introduced to the hospital, there were noticeable improvements in many ways such as financial management, drug availability and reduction in expenditures and emergency local purchases.

Chungsiwapornpong (2007) has conducted her master thesis regarding drug inventory control process and performance among hospital pharmacy departments in Thailand. The survey has been responded by 309 respondents which accounted for 42.92 % of the total of 720 hospitals. The survey results were presented based on 9 important indicators with regards to drug inventory process and drug inventory performance. Based on her findings, ABC and VEN systems were the powerful and effective tools for hospital pharmacies. The survey results showed that hospitals that adopted ABC and VEN approaches have better performance than the ones without.

The percentage of stock-out situations at private hospitals using VEN analysis (0, 99 %) was less than private hospitals without this inventory classification (3, 94 %). Also

the average months of drug inventory in the hospitals with ABC and VEN was less than the hospital that did not utilize these methods. In addition to this, the hospitals that used minimum-maximum stock level, EOQ and reorder point methods have lower inventory level. In conclusion, it is recommended for hospitals to determine the format of inventory management reports and develop useful methods of inventory control such as, EOQ, ABC, VEN and JIT.

2.8 Health Facilities in Greater Accra Region

There are five hundred and thirty (530) health facilities in the Greater Accra region. The Ghana Health Service operates about 32% of all health facilities in the region. There are approximately 109 hospitals including teaching hospital, psychiatric and polyclinics in the region that provides a total of 4,318 beds for patients (CHMI/PPME-GHS, 2007). There are eight departments which are consistent with majority of the hospitals in the region namely: (i) Surgery; (ii) Medicine; (iii) Obstetrics and gynaecology (OB/GYN); (iv) Paediatrics; (v) Dentistry; (vi) Anaesthesia; (vii) Eye; (viii) Ear, throat and nose. The region has six administrative districts Accra Metropolis, Tema Municipality, Ga West, Ga East, Dangme East and Dangme West. The hospitals in the Region are from all the four different types of hospital operations currently practised in Ghana namely: Government Hospital, Mission Hospital, Quasi Government hospital and Private Hospital. Tables 2.1 and 2.2 below illustrate the number of hospital beds and health facilities available by region in Ghana.

Table 2.1 - Number of Hospital Beds by Region and Ownership - 2006

Region	Government	CHAG	Islamic	Quasi Government	Private	Total	% By Region
Ashanti	1,922	1,131	130	221	594	3,998	18.79
Brong Ahafo	588	1,051	68	44	9	1,760	8.27
Central	1,166	355	32	47	0	1,600	7.52
Eastern	1,505	993	0	177	0	2,675	12.57
Greater Accra	2,937	29	0	759	593	4,318	20.30
Northern	800	362	0	0	0	1,162	5.46
Upper East	537	287	0	0	0	824	3.87
Upper West	346	336	0	0	0	682	3.21
Volta	1,283	956	0	47	0	2,286	10.75
Western	1,149	419	41	360	0	1,969	9.26
Total	12,233	5,919	271	1,655	1,196	21,274	100.0
% By Ownership	57.50	27.82	1.27	7.78	5.62	100.0	

Source: CHIM/PPME-GHS

NB: Data for Quasi Government and Private Hospitals are incomplete

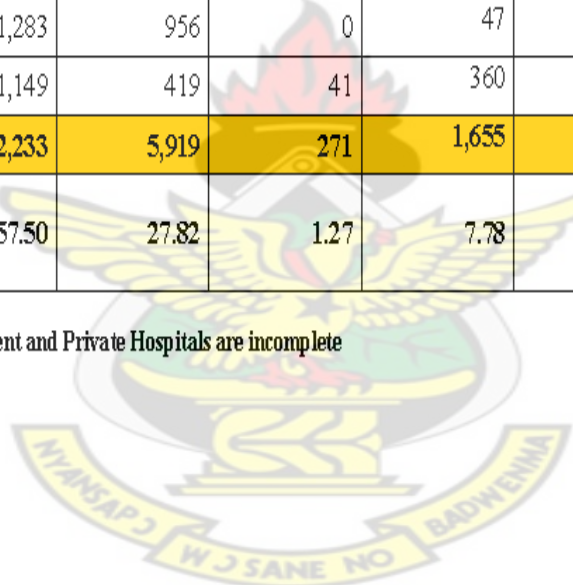


Table 2.2 – Summary of health facilities by type and ownership in all the ten regions of Ghana

SUMMARY OF HEALTH FACILITIES - ALL REGIONS - 2007																				
REGION	TEACHING HOSPITALS	REGIONAL HOSPITALS	PSYCHIA TRIC HOSPITALS	HOSPITALS					POLY CLINIC	HEALTH CENTRE AND CLINICS					MATERNITY HOMES			CHPS		GRAND TOTAL
	GOVT	GOVT	GOVT	CHAG	GOVT	ISLAMIC	PRIVATE	QUASI GOVT	GOVT	CHAG	GOVT	ISLAMIC	PRIVATE	QUASI GOVT	GOVT	PRIVATE	QUASI GOVT	GOVT	PRIVATE	
ASHANTI	1			17	22	3	48	2		32	140	2	161	9	3	105		4		549
BRONG AHAFO		1		9	7	1	6			8	123	0	18	4	3	37		11		228
CENTRAL		1	1	3	8	1	8	1		9	68	0	62	2		34		43		241
EASTERN		1		5	12		5	3		19	165	0	63	7	1	47		44		372
GREATER ACCRA	1	1	2	3	7	2	79	6	7	5	42	1	232	16	2	55	1	4		466
NORTHERN		1		4	8		1	2		25	120	0	5	3		9		10		188
UPPEREAST		1		1	4					15	54	0	11	1		2		55		144
UPPER WEST		1		2	3	2	1			14	60	3	4	0		6		39		135
VOLTA		1		8	11		7	1	1	9	192	0	23	0		24		19		296
WESTERN		1		3	11	1	1	7	2	20	95	2	109	22		60		56	2	392
GRAND TOTAL	2	9	3	55	93	10	156	22	10	156	1059	8	688	64	9	379	1	285	2	3011

Source: CHIM/PPME-GHS

2.9 Pharmacy Department

Pharmacy department of hospitals in Ghana are an essential department of medical support service. The pharmacy department thus acts as a middle party between suppliers and distributors (OPD and IPD departments). The main responsibilities that the pharmacy has to perform are engaged with procurement process and inventory management, and this includes ensuring the delivery of safe, high quality and cost effective medicines to customers (patients). The major roles of the department include procurement, storage, dispensing, and controlling inventory (Thawani et al. 2003). It is set up to facilitate order initiation by delivering required medicines to outpatient and inpatient units.

Outpatient dispensing unit are usually open 24 hours to support the clinical service for outpatients, and inpatient storage handles internal requirements of medicine requested by different wards in the hospitals. There are several types of items in pharmacy stores. All commodities are categorized based on their substantial forms as follows; Tablets, Capsules, Injections, Liquids, Ointments, Drops, Powders, Fluids and Miscellaneous. For pharmacy department, waste means cost. Unwanted and expired medicines rate is an indicator for measuring performance of pharmaceutical inventory management. Minimizing waste is one of the primary goals which allow the department to achieve its objective of cost-effective product utilization.

2.10 Inventory Management by Pharmacists

There is no such position as of a store keeper being responsible for inventory management. Inventory control is handled by pharmacists and nursing staff. A

combination of inventory control methods are used for monitoring inventory. In addition to stock record card method, computerized information system is also used in some hospitals so that the overwhelming information can be stored and more accurate reports can be generated. Another important activity that must be performed regularly is physical inventory.

Physical inventory is a process of manual counting in order to ensure that actual inventory is consistent with the numbers recorded in the stock cards. The two types of physical inventory performed at the pharmacy store are complete physical inventory (i.e. the responsible persons will count all the items in stock once a year) and random physical inventory or cycle counting which is a daily activity. Selected products will be counted and checked against information on stock record card.

Apart from paper-based inventory methods done manually, technology is extremely important in inventory management. The current technology used in the hospital is Hospital Information System which is used to collect, store, retrieve, and communicate patient care and administrative information for all hospital activities. The existing technology has facilitated the pharmacy department by storing information and providing reports.

However, most of the activities with regards to procurement and inventory control are still performed manually since the existing program was not designed to fully facilitate inventory control but general administrative operations. There are approximately two hundred and twenty-four (224) pharmacists in the Greater Accra Region as well as sixty-five (65) Dispensary Technician or Assistance in the hospitals in the region. Details of health professionals distribution in the various regions in Ghana is shown in the table 2.3 (refer to appendix).

2.11 Current Processes of managing inventories at hospitals

In order to identify difficulties and find a room for improvement, the current process of drug inventory management must be observed and analysed. This provides a better understanding of the whole process that the pharmacy department has to function regarding inbound and outbound logistic activities; the flow of activities of regular ordering routine is summarized and illustrated in figure 2.4 below:

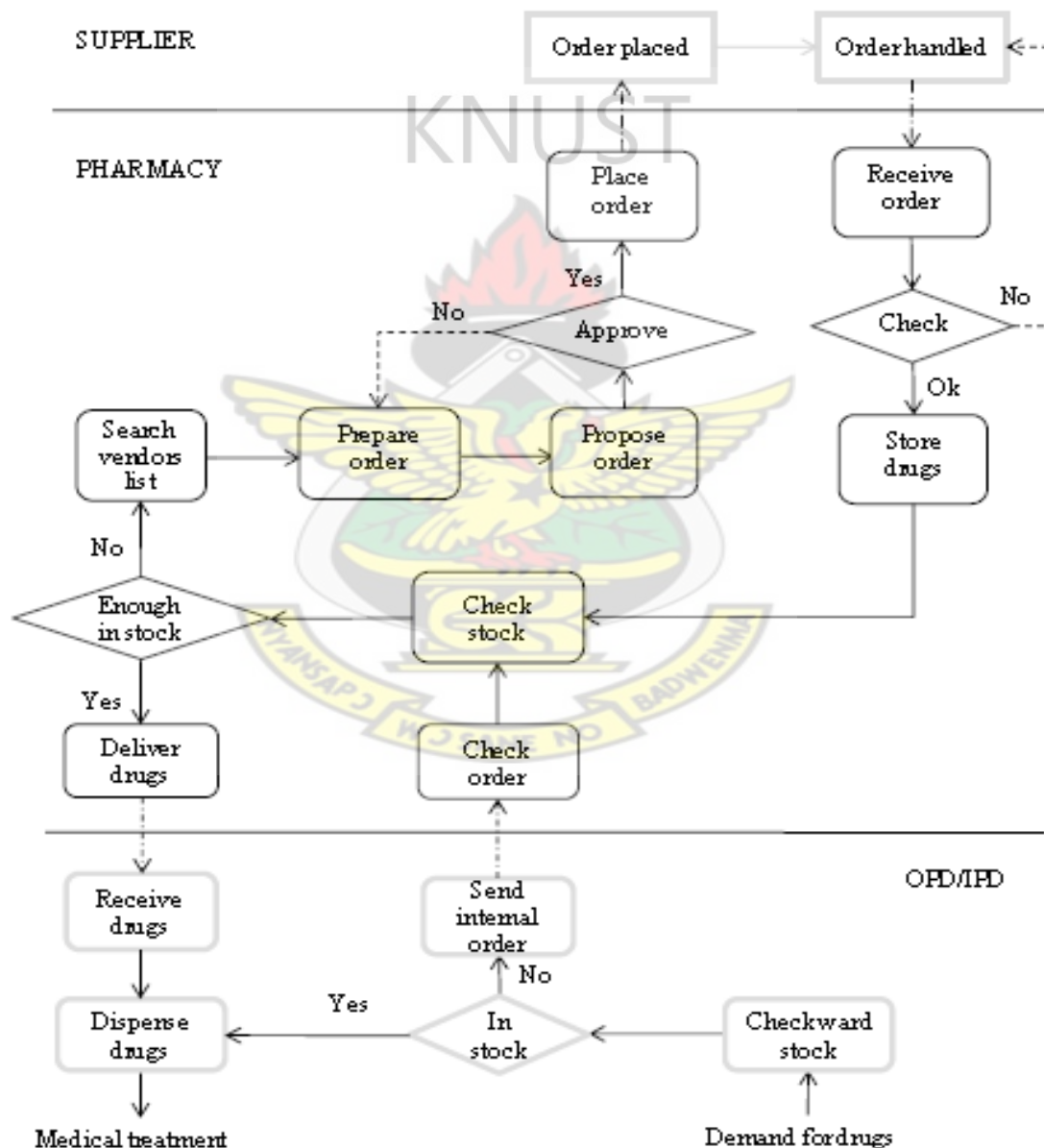


Figure 2.4 : Regular Inventory Routine (Adopted from Thawani et al. 2003)

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the research design and procedures that were used for the study. This method includes; collection of data, population of the study and sampling techniques. The instruments used and the data collection procedures and administration would also be described in this chapter.

3.2 Research Design

Research Survey (field) was deemed appropriate for this study as against many research designs such as; experimental design, correlational design and meta-analysis. The rationales for the survey selection were due to the following reasons as suggested by Sekaran (2003); (i) it studies have participants in their natural settings, hence it maximises realism; (ii) systematic and unbiased manner of eliciting information; and (iii) ability to generalize information to a larger population. The research tool is a questionnaire which consisted of both open and close questions some of which were on likert scale. The first part of the questionnaire collected demographic data of the respondents before the main questions followed. The researcher designed the questionnaire, based on important issues in the literature that was reviewed. The questionnaires were issued in the names of the heads of the pharmacy units in the hospitals. The Pharmacists or Dispensary Technicians selected were permanent staff of the hospitals and also were either heads of their department or were supervisors in their unit.

3.3 Population

The target population in this study was envisaged to cover all the health facilities and their pharmacy departments in the Greater Accra region as well as patients in these hospitals. As already noted there are five hundred and thirty (530) health facilities in the region including one hundred and nine hospitals and polyclinics. Also there are approximately two hundred and twenty-four (224) pharmacists in the Greater Accra Region as well as sixty-five (65) Dispensary Technician or Assistance in the hospitals in the region. However, due to time and monetary constraints, the study area was limited to some selected districts and respondents in the region namely, Accra Metropolis, Tema Municipality, Ga West, Ga East, Dangme East and Dangme West.

3.4 Sampling and Sampling Technique

Purposive sampling was used for this study and Dane (1990) points out the advantage of purposive sampling as it allows the researcher to home in on people or events, that have good grounds in what they believe, will be critical for the research. Again using purposive sampling might not only be economical but also informative in a way that conventional probability sampling cannot be (Descombe, 1998). It is a strategy where Lincoln & Guba (1985) describe as 'emergent and sequential'. Almost like detective, the researcher follows a trail of clues, which leads the researcher in a particular direction until the questions have been answered and things can be explained (Robson, 1993).

3.4.1 Population Sample Size Obtained

According to Israel (1992) there are several approaches used in determining the sample size. These, include using a census for small populations, imitating a sample size of similar studies, using published tables, and lastly applying formulas to calculate a sample size. For this study the first and the latter were applied. The total number of hospitals in the Greater Accra Region is 109. The sample size was determined using the formula by (Kish, 1965).

$$n = \frac{n^1}{1 + \frac{n^1}{N}}$$

Where **n** = sample size

$$n^1 = \frac{s^2}{v^2}, s^2 = p(1 - p)$$

N = Total population = **109**

s = Maximum standard deviation in the population elements

p = proportion of the population elements that belong to the defined category

i.e. p = 0.5 (95% confidence level)

v = standard error of the sampling distribution i.e. v = 0.05

Hence solving for n^1

$$s^2 = p(1 - p) = 0.5(0.5) = 0.25$$

$$v^2 = 0.05^2 = 0.0025$$

$$n^1 = \frac{s^2}{v^2}, n^1 = \frac{0.25}{0.0025} = 100$$

$$n = \frac{n^1}{1 + \frac{n^1}{N}}$$

$$= 100 / 1 + (100/109)$$

$$n = 53$$

The sample size formulae like the one used above, provides the minimum number of responses to be obtained. From previous works done, researchers such as Cochran (1963), and Israel (1992) commonly add 10% increase on the simple size to compensate for non-response. Therefore the total number of hospitals pharmacy departments used as respondents for this study is 58.

3.5 Data Collection Procedures

Both primary and secondary data sources were used for the study. Data from the primary source was basically from the field. Data collected was at two levels; one at the institutional level and the other at the patients' level; and information gathered was cross-sectional. Data from the secondary source was from published books, quarterly reports, journals, and articles and from the internet. Fifty-eight (58) questionnaires (see Appendix one) were issued to Pharmacists in thirty hospitals in the region. With the exception of Korle-Bu Teaching hospital (KBTH) which was issued with thirty questionnaires due to the presence of more than thirty pharmacy sub-unit or in-patient pharmacy department, the rest of the responding hospitals were issued with a one questionnaire each.

All the questionnaires were answered and returned giving 100% response rate. Again, Patients' survey was also conducted, with 100 respondents all from KBTH. Also,

due to the peculiar nature of the patients filling questionnaires, it was done on the spot at the pharmacy unit at the various units at KBTH. The sampling method selected for the patient was non-probability random sampling method with a tenth of every patient the researcher met at the pharmacy unit was asked to fill the questionnaire. The response rate for the patient survey was also 100%.

3.5.1 Pre-test

This enhances validity and the restructuring of questionnaire to ensure that the required information can be obtained without any ambiguity. The researcher reformed some of the questions so they become clearer to respondents having sent about five questionnaires out for pre-testing at the Nyaho Clinic's pharmacy department in Accra. Hence the pre-testing was done in order to ensure that the best questionnaires were administered to the respondents.

3.6 Method of Data Analysis

Statistical Package for Social Sciences (SPSS) software package version 17 was used for the analysis of data. Descriptive statistics were used because the level of analysis is bivariate. Both qualitative and quantitative approaches were used to analyse the data. Analysis of data involved the use of tables to explain how drugs are purchased, stored, and distributed as well as how inventories are controlled at the pharmacies. Also frequency tables, percentages and counts will be employed to analyse the relationship drug inventory management at the hospital pharmacies and how it affects patients' accessibility and recovery process.

3.7 Difficulties and Problems Encountered

Data collection was rather difficult especially with the Patient; some were so weak and found it difficult to fill the questionnaires. It was difficult for the researcher getting responses from pharmacists. This is due to their busy schedules and workloads. The researcher went to some of the places more than once.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

In this chapter, the data collected from the field on drug inventory management at hospitals in the Greater Accra region and its effect on patient care are presented and analyzed. It also provides a descriptive and qualitative analysis on inventory management at pharmacies in the region. Thus, it will also provide the reader with a discussion and analysis of findings.

4.2 Descriptive Presentation of Survey Questions

This field survey was conducted in March 2012; the survey utilized a questionnaire designed to collect data regarding drug inventory management at hospitals in the Greater Accra region and how its effect on patient care. Fifty-eight questionnaires (58) were issued to Pharmacists working in thirty Hospitals in the Greater Accra Region. Also 100 questionnaires were issued to one hundred patients at the same hospitals. All the questions on the questionnaires were designed specifically to respond to each objective.

4.3 OBJECTIVE ONE

To find how the pharmacy departments at the various hospitals are managed.

Table 4.1 – A table showing the types of hospitals in the studied region (Greater Accra)

Studied Hospital-Types	Frequency	Percent	Valid Percent	Cumulative Percent
Government	30	51.7	51.7	51.7
Quasi Government	4	6.8	6.8	58.5
Mission	6	10.3	10.3	68.9
Private	18	31.1	31.1	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.1 above shows the types of hospitals respondents in this study were drawn from. From the results, out of the total of fifty-eight (58) respondents, thirty of them representing 51.7% worked in the government hospitals in the region, while eighteen (18) worked at private practice. A further 10.3% worked in the mission hospitals with only one (4) which represent 6.8% worked for a quasi-government hospital.

Table 4.2 – A table showing the positions of the respondents

Positions	Frequency	Percent	Valid Percent	Cumulative Percent
Principal Pharmacist	5	8.6	8.6	8.6
Senior Pharmacist	30	51.7	51.7	60.3
Pharmacist	23	39.7	39.7	100.0
Dispensary Tech.	0	0	0	
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.2 above shows positions of the respondents at their respective pharmacy departments. Majority of the respondents representing 51.7% in the table held the title as Senior Pharmacist, while 39.7% were Pharmacists and approximately 8.6% were Principal Pharmacists in their respective hospitals. Out of the total of 58 respondents there were no Dispensary Technicians or Technologist interviewed.

Table 4.3 – A table showing the professional experience (years) of the pharmacists

Professional Experience	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
1-5years	4	8.9	8.9	8.9
6-10years	28	48.2	48.2	57.2
11-15years	18	31.0	31.0	88.2
16-20years	7	8.9	8.9	97.8
above 20years	1	2.2	2.2	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.3 above shows the professional experience (years) of the pharmacists respondents in the pharmacy unit of the various hospitals. The table shows that, majority of 48.2% of the pharmacists had worked in the unit between 6 to 10 years. This was followed by 31% of pharmacists who had professional work experience of between 11 to 15 years. While the least was those who had worked at the department for more than 20 years, there were equal number of 8.9% of respondents in the various hospitals who had between 1 to 5 years and 16 to 20 years professional experience.

Table 4.4 – A table showing whether respondents have any inventory management experience.

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
YES	56	96.6	96.6	96.6
NO	2	3.4	3.4	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.4 above shows whether respondents have any inventory management experience. From the table, out of the 58 respondents 96.6% responded “yes” while only 3.4% responded “no”.

Table 4.5 – A table showing the percentage of drug that are made or bought by the pharmacy unit in the hospitals

Percentage of Drug Made and Purchase at the Unit.	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Make (0%), Buy (100%)	40	69	69	69
Make (1-10%), Buy (90-99%)	18	31	31	100.0
Make (11-30%), (70-89%)	0	0	0	-
Make (31-50%), (50-69%)	0	0	0	-
Make (50-100), Buy (0-50%)	0	0	0	-
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.5 above shows percentage of drug that are made or bought by the pharmacy unit in the various studied hospitals. The results presented above shows that approximately 69% of the hospitals buy 100% of their drug stock. This is followed by

31% of the hospitals who make between 1 to 10% of their drug stock and buy between 90 to 99%. None of the hospitals made drugs above 10%.

Table 4.6 – A table showing whether respondents’ work with a computerised inventory management

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
YES	11	19	19	19
NO	47	81	81	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.6 above shows whether respondents work with a computerised inventory management at their respective pharmacy units. From the table above 81% of the total respondents of 58 said their inventory systems were not computerized. Only 19% of the respondents said they use computerised inventory management system.

4.3.1 Analysis of Management of Pharmacy Departments in the Hospitals

The results presented in table 4.1 demonstrate that all the four types of hospitals in Ghana are in the Greater Accra Region, namely; government hospitals, quasi-government hospitals, mission hospitals and private practice hospitals. Predominant amongst them are the government hospitals. The Greater Accra Region (Henceforth would be GAR) has one Teaching Hospital; Korle-Bu Teaching Hospital which has a centralised pharmacy unit as well as in-patient and out-patient pharmacy departments.

For the positions, all the Regions have the Director of Pharmacy (Chief pharmacist), Deputy Director, Principal Pharmacist, Senior Pharmacist and Pharmacist.

For GAR, there are five Deputy Directors of Pharmacy of which four are in Korle-Bu Teaching Hospital (KBTH). The remaining one is in the Ghana health service. That is why majority of people who filled the questionnaire were senior pharmacists, pharmacists and principal pharmacists and had work experience of 6 to 10 years, 1 to 5 years and 16 to 20 years respectively. Almost all the pharmacists who answered the questionnaires had inventory management (see table 4.4) and they were not very new to the subject under review.

More than 80% of the hospitals in GAR (as seen in table 4.5) buy all their drug stock. It was found that the mission hospitals buy 100% of their drug stock because they get most of their drug stock through donations from charity organisations. Again, due to the unavailability of certain essential facilities and equipment at the laboratories which are needed to make simple drug has forced government hospitals to buy all their drug stock. Certain pharmacies in the hospitals in the region like the Korle-Bu Teaching Hospital do make some simple generic medicines like Aspirin, Aluminium or Magnesium Triscillicate, Honey-based Cough Syrup etc.

Again whiles some hospitals have computerized their inventory systems, majority have not. The computerised hospitals are basically the private hospitals who have tried to bring some innovation into the healthcare delivery in Ghana. Also few sensitive in-patient pharmacy units especially at Intensive Care Units (ICU) at KBTH have also computerised their inventories to help in re-stocking of certain important drugs.

4.4 OBJECTIVE TWO

To determine how drugs are purchased, stored and distributed in the Pharmacy Units at the various hospitals.

Table 4.7 – A table showing Method of inventory costing used in the various studied hospitals

Methods of Inventory being used	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
First-In-First-Out (FIFO)	56	96.6	96.6	96.6
Last-In-First-Out (LIFO)	1	1.7	1.7	98.3
Average-Cost-Method (ACM)	1	2.2	1.7	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.7 above shows the methods of inventory costing used in the various studied hospitals. Majority of the respondents constituting 96.6% said the inventory costing method used is First-in-first-out. Only an equal measure of 1.7% said they used Last-in-first-out and Average-cost-measure.

Table 4.8 – A table showing how drugs are grouped in storage

Drug Storage groups	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
By Categories of Drugs	48	82.8	82.8	82.8
By Uses of Drugs	10	17.2	17.2	100.0
By Manufacturers	0	-	-	-
By Generics and Brands	0	-	-	-
By Expiry date	0	-	-	-
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.8 above shows how drugs are grouped in storage at the pharmacy units at hospitals. From the results in the table above, 82.8% of the respondent said they store

drugs by grouping them in the various drug categories e.g. tablets, suspension, injections etc. while other 17.2% said they group them by the drug uses. None of the respondents said they group their drugs by their expiry dates, by generic and brands or by manufacturers.

Table 4.9 – A table showing whether there was an approved Suppliers' List in the pharmacy unit

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
YES	52	89.7	89.7	89.7
NO	6	10.3	10.3	100
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.9 above shows whether there was an approved Suppliers' List in the pharmacy unit where respondents work. The table shows that 89.7% of the respondents said their departments have approved lists of suppliers they deal with in the fiscal year. Only 10.3% said they do not have approved lists of suppliers.

Table 4.10 – A table showing who gives approval for the selection of drug suppliers

Authority	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Head of Pharmacy	10	17.2	17.2	17.2
Hospital Tender committee	47	81	81	98.3
Purchasing Officer	1	1.7	1.7	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The one who gives approval for the selection of drug suppliers for the pharmacy units in the hospital is shown in the table. About 81% responded that suppliers lists are approved by the hospitals tender committees while 17.2% said the selection is the call of the head of the pharmacy department. Only one person said that suppliers are selected by the purchasing officer.

Table 4.11 – A table showing the number times inventories are counted

Periods	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Daily	0	0	0	0
Weekly	10	17.2	17.2	17.2
Monthly	45	77.5	77.5	94.8
Quarterly	3	5.2	5.2	100.0
Yearly	0	0	0	
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.11 above shows the number times inventories are counted. The table above shows that 77.5% pharmacists said they check their inventories monthly while 17.2% said they do weekly inventory counts. Only, 5.2% said they count inventories quarterly within the year.

Table 4.12 – A table showing how important the history of the Patients’ conditions are in the determination of the sorts’ drugs to order (purchase)

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	11	19	19	19
Least important	0	-	-	
Important	0	-	-	
Very important	47	81	81	100.0
Most important	0	-		
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.12 above shows how important the condition of the Patient is in the determination of the sorts’ drugs to order. The table shows that 81% of the respondents said their patient histories in terms of conditions are very important. Only 19% said patients’ medical histories are unimportant. None responded in the others.

Table 4.13 – A table showing how important are Physicians' Prescription protocols in the determination of the drug to purchase.

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	-	-	-	-
Least important	10	17.2	17.2	17.2
Important	10	17.2	17.2	34.4
More important	38	65.6	65.6	100.0
Most important	0	-	-	
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.13 above shows how important Physicians' Prescription protocols are in the determination of the drug to purchase. The table shows that 65.6% of the respondents said Physicians' Prescription protocols were very important in determining what to order from suppliers. Approximately, 17.2% said that doctor's prescription protocols are least important and important respectively in the determination of what drug to order.

Table 4.14 – A table showing what happens when there is a Stock-out of a prescribed drug

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Patient has to wait for new deliveries	0	-	-	-
Patient asked to make own arrangement	58	100	100	100
Never run out of stock	0	-	-	
Total	58	100	100	

(Source: Fieldwork, 2012)

The table 4.14 above shows what happens when there is a Stock-out of a prescribed drug. All the fifty-eight respondents said that patients are asked to make their own arrangement to get drug possibly from nearest available pharmacy shop.

4.4.1 Analysis of how drugs are purchased stored and distributed in the Pharmacy

Units at the various hospitals

When the pharmacies at the various hospitals in the GAR run out of stock of drug(s) patients are asked to make their own arrangement (seen at table 4.14). Patients are referred to the nearest pharmacy or chemical store for their prescriptions. During re-

ordering, the sort of drugs to order is mostly dependent on the prescription protocols of the doctors in the hospitals. Tables 4.12 and 4.13 show that patients historic medical conditions informs the pharmacy department of the types of drugs to order.

Most pharmacy units in hospitals in the GAR have a tender committee which approves list of vendors to supply. In the case of some mission and private hospitals a supplier is selected by the head of the pharmacy. The government hospitals are enjoined by the Procurement Act (2003) Acts 663 to form tender committee for government of Ghana funded supplies. Therefore, the District Medical Stores (DMS) supplies the hospitals within the district. The district medical store will then make monthly purchases at the regional medical store and these purchases are authorized by the District Director of Health Services and the District Pharmacist.

The hospitals thus depend on these drug stocks. However, what is not supplied by the district stores is purchased on the open market. As per the procurement guidelines, three quotes are normally obtained and presented to the purchasing committee prior to purchase. The prices obtained in this manner are comparable with those from the regional medical stores, and a few items can be purchased at a cheaper price privately (e.g., infusions made at a local plant). The hospital purchases mostly from the district stores (DMS), at 5 percent mark-up on the DMS price. The hospital may purchase directly from the regional stores, without going through the districts, as the hospital is semi-autonomous and not included under the district health administration.

However, the hospital does require special regional authority to purchase from the central medical store (CMS). From the table 4.11 above, majority of the pharmacists do count their inventories monthly in order to properly help them account for reorder. Very few however, do weekly inventory checking in the region. In terms of drugs dispatch,

almost all the pharmacists said they use first-in-first-out method of inventory costing (see table 4.7). Except in cases where the expiration date for the drug is less than the dosage duration then in that case discretion is used by adopting last-in-first-out for the patient. The drugs in the store are grouped into drug categories e.g. tablets, loose, suspension, injection etc. and the drug uses.

4.5 OBJECTIVE THREE

To determine how inventories are controlled at the pharmacies in the hospitals

Table 4.15 – A table showing who is responsible for tracking inventories

Positions	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Head of Pharmacy	53	91.4	91.4	91.4
Head of Hospital stores	5	8.6	8.6	100.0
Purchasing Officer	0	0	0	-
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.15 above shows who is responsible for tracking inventories at the pharmacy unit in the hospitals. 91.4% said that it is the responsibility of the head of the Pharmacy to track inventories. While the rest of the respondents representing 8.6% said that it is the duty of the head of hospital stores to track inventories in the drug stores.

Table 4.16 – A table showing whether Pharmacists place any importance on proper authorisation of orders to be purchased

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	1	1.7	1.7	1.7
Least important	1	1.7	1.7	3.4
Important	5	8.6	8.6	12
More important	33	57	57	69
Most important	18	31	31	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.16 above shows whether Pharmacists place any importance on proper authorisation of orders to be purchased. About 57% of the respondents said that proper authorisation is more important before orders could be purchased. 31% said that proper authorisation is most important before orders are made. 8.6% thought that seeking authorisation is important while cumulative percentage of 1.7% either thought that the authorisation is unimportant or least important.

Table 4.17 – A table showing whether Pharmacists place any importance on preparation and recording of orders before purchasing

Importance	Frequency	Percent	Valid Percent	Cumulative Percent
Unimportant	1	1.7	1.7	1.7
Least important	6	10.3	10.3	12
Important	35	60.3	60.3	72.3
More important	15	26	26	98.3
Most important	1	1.7	1.7	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.17 above shows whether Pharmacists place any importance on preparation and recording of orders before purchasing. 26% of the respondents said that preparation and recording of orders is more important before orders could be purchased. 1.7% said that preparation and recording of orders is most important before orders are purchased. Majority of 60.3% said that order preparation and recordings are important. 10.3% said it is of least importance while 1.7% said it is unimportant.

Table 4.18 – A table showing whether Pharmacists place any importance on authorisation to be given before drugs are received

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	1	1.7	1.7	1.7
Least important	7	12.1	12.1	13.8
Important	15	26	26	39.8
More important	25	43	43	82.8
Most important	10	17.2	17.2	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.18 above shows whether Pharmacists place any importance on authorisation to be given before drugs are received. About 43% of the respondents said that for drugs to be received it would be more important for authorisation to be given by superiors. 17.2% of Pharmacists said getting authorisation before supplied drug orders are received is most important. 26% said that authorisation before orders are received is important. 12.1% said it is of least importance to get authorisation before orders are received while 1.7% said it is unimportant.

Table 4.19 – A table showing whether Pharmacists place any importance on timely recordings of accurate and complete receipts of drugs.

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	1	1.7	1.7	1.7
Least important	1	1.7	1.7	3.4
Important	14	24.2	24.2	27.6
More important	31	53.4	53.4	81
Most important	11	19	19	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.19 above shows whether Pharmacists place any importance on timely recordings of accurate and complete receipts of drugs. Majority of 53.4% of the respondents said that an accurate and complete recording of drugs received is more important. 24.2% said that an accurate and complete recording of drugs received is most important. While another 19% said that an accurate and complete recordings of drugs received is just important. Another 1.7% apiece said that it is least important and unimportant.

Table 4.20 – A table showing whether Pharmacists place any importance on placing a timely order

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	2	3.4	3.4	3.4
Least important	7	12.1	12.1	15.5
Important	9	15.5	15.5	31
More important	30	51.8	51.8	82.7
Most important	10	17.2	17.2	100.0
Total	58	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.20 above shows whether Pharmacists place any importance on placing a timely order of drug stock-out. 15.5% of the respondents said that placing a timely order is important for inventory control while 17.2% said that it is most important to place a timely order. Majority of 51.8% of the respondents said that it is more important to place a timely order. And finally, 12.1 % of the total respondents of 58 said timely order is least important.

4.5.1 Analysis to determine how drug inventories are controlled at the hospitals'

Pharmacies

Inventories in the Pharmacy units are tracked by the head of pharmacy at the various hospitals. In some few cases it is the responsibility of the head of stores to track inventories. Before reorder are made most pharmacist said that proper authorisation must be sought. Approximately 95.56% said it is important that authorisation is sought before orders are placed. Authorization is the principal means of ensuring that only valid transactions and events are initiated as intended by management.

In the hospitals, authorization procedures are documented and clearly communicated to units' heads and staffs, these include the specific conditions and terms under which authorizations are to be made. Conforming to the terms of an authorization means that employees act in accordance with directives and within the limitations established by management or legislation. To ensure effective controls in stock reordering, pharmacists place importance on authorisation to be given before drugs are received.

Again, Pharmacists place much importance on preparation and recording of orders before and after they are supplied by vendors as well as timely recordings of accurate and complete receipt of drugs. Finally, Pharmacists place importance on ordering a timely stock of drugs for inventory control and also reduce drug stock-out.

4.6 OBJECTIVE FOUR

To determine what effect drug inventory management has on drug patients' accessibility of drug in the hospitals.

Table 4.21 – A table showing whether respondents (patients) has been admitted at hospital before

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes	53	53.0	53.0	53.0
No	47	47.0	47.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.21 above shows whether respondents (patients) have been admitted at the hospital before. Out of the 100 patient interviewed, 53% said that they had been admitted

at the hospital before. Only 47% said they always receive care at the hospital and go home.

Table 4.22 – A table showing whether those who responded affirmative in table 4.20 had all their prescribed drugs given to them by the in-patient pharmacy Unit (IPU).

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes	23	43.39	43.39	43.39
No	30	56.61	56.61	100
Total	53	100	100	

(Source: Fieldwork, 2012)

As shown in the table 56.61% of 53 respondents who responded affirmative in table 4.21 said that they did not get all their prescribed drugs given to them by the in-patient pharmacy Unit (IPU). While 43.39% said that they had their entire prescribed drug supplied by the hospital

Table 4.23 – A table showing the average waiting-time of patients at the pharmacy unit of the hospital

Time range	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
1-15mins	6	6.0	6.0	6.0
16-30mins	20	20.0	20.0	26.0
31-60mins	63	63.0	63.0	89.0
Above 1 Hour	11	11.0	11.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.23 above shows the average waiting-time of respondent (patients) at the pharmacy unit of the hospital. Majority of 63% of the 100 respondents said they had to wait between 31 to 60 minutes at the pharmacy unit in the hospital for their medicines. While 20% said that they had waited between 16 to 30 minutes at the pharmacy unit waiting for their turn. 11% said they waited for more than an hour before they were attended to while only 6.0% said the waited between 1 to 15 minutes.

Table 4.24 – A table showing whether patients receive all the drugs on their prescription form at pharmacy of the hospital

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes, often	13	13.0	13.0	13.0
Yes, sometimes	62	62.0	62.0	75.0
No	25	25.0	25.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.24 above shows whether patients receive all the drugs prescribed by the physician from the pharmacy unit of the hospital. From the table above, 62% said they sometimes do get the entire prescribed drug. Only 13% said they often do get the entire prescribed drug while 25% of the patients said they don't.

Table 4.25 – A table showing whether patients were given different drug other than what is on their prescription form

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes, always	52	52.0	52.0	52.0
Yes, sometimes	37	37.0	37.0	89.0
No	11	11.0	11.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.25 above shows whether patients were given different drug other than what is on their prescription form. From the table above, 37% said they are sometimes given different drug other than what is on their prescription form. More than half (52%) said they are always given different drug other than what is on their prescription form. Only 11% said they had always received what is on their prescription form.

4.6.1 Analysis of what effect drug inventory management has on patients' accessibility to drugs in the hospitals.

More than half of the patients who responded to the questionnaire had been admitted at the hospital before. And a significant number of them said they did not get all their subscriptions while on admission. However, those who said they had received all their prescriptions were those in the sensitive confinement like the Intensive Care Unit (ICU).

Average waiting time at pharmacy units in hospitals in the region is 30 to 50 minutes. Most patients said they had to spend significant amount of time waiting at the pharmacy unit before they are seen. From the results presented in table 4.25, majority of patients don't always get their prescription drug at the pharmacy unit at the hospital.

While some patients get some drugs from the units others are referred to other pharmacy shop out of the hospital to make their purchase.

In spite of the unavailability of some essential drugs there were relatively high levels of tracer items available at the hospital pharmacies especially in the public facilities. Most remarkable are trace items like measles vaccine; retinol and two important drugs used for the treatment of malaria, doxycycline and Oral rehydration salts, BP sachet. Most hospitals also seems to have high levels of the newly promoted anti –malaria drug; artemether amodiaquine and artemether lumefantrine.

The results also revealed that more than half of patients said they are also given different drug other than what they thought the doctor has prescribed for them. No fewer than 37% said that happens to them sometimes. This is reflective of the issue of availability which is once again brought closer to the patient at the point of dispensation. In those pharmacies that dispense what is prescribed, frequent stock-outs of many items will negatively affect dispensing. Similarly, inventory availability often influences prescribing; in other words, drugs that are actually available will be prescribed. Other factors also influence dispensing.

In Ghana, for example, where patients' medications are covered by the National Health Insurance Scheme NHIS, the dispensing of items is likely to be influenced by whether that particular item is an approved drug which is covered by the insurance. The rate of dispensing prescribed items varied greatly by type of hospitals. In public facilities it was very low, with fewer pharmacists dispensing prescribed drugs. This will correspond to a relatively low level of availability of the drug. This is less than in the other two types of facilities. Although the rates of availability for public and mission sectors were comparable, the proportion of prescribed items that were actually dispensed

was higher in mission facilities, perhaps because the prices at the mission facilities were more favourable.

4.7 OBJECTIVE FIVE

To determine how the drug inventory management affect patient recovery.

Table 4.26 – A table showing whether patients became anxious about their medical condition when they were asked to make their own arrangement for their drugs due to stock-out at the pharmacy unit in the hospital

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes, completely	65	65.0	65.0	65.0
Yes, to some extend	31	31.0	31.0	96.0
No	4	4.0	4.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.26 above shows whether patients became anxious about their medical condition when they were asked to make their own arrangement for their drugs due to stock-out at the pharmacy unit in the hospital. 65% said they would completely be anxious while 31% said they would be anxious but to some extent. Only 4% said they would not be anxious because the pharmacy unit cannot provide them with the drug they have been prescribed with.

Table 4.27 – A table showing whether or not patients take all the medication given to them at the pharmacy in its right dosage.

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes, always	9	9.0	9.0	9.0
Yes, sometimes	40	40.0	40.0	49.0
No	51	51.0	51.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.27 above shows whether or not patients take all the medication given to them at the pharmacy in its right dosage. Approximately 9% of patients said “yes” they always take their full medication. More than 51% said that they don’t take their full medication while another 40% said they sometimes take full medication.

Table 4.28 – A table showing whether patients were given all the needed information on drug they were supposed to have taken

Responses	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Yes, definitely	5	5.0	5.0	5.0
Yes, to some extent	40	40.0	40.0	45.0
No	55	55.0	55.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

As regards information on whether patients were given all the needed information on drugs they were supposed to have taken 40% said they are given some information to an extent, while 5% said they were given all the information on the medicine they were to take. However, 55% of the patients said they were not given all the needed information.

Table 4.29 – A table showing how patients rated the importance of pharmacy unit towards their health recovery

Importance	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent
Unimportant	2	2.0	2.0	2.0
Least important	4	4.0	4.0	6.0
Important	13	13.0	13.0	19.0
More important	42	42.0	42.0	61.0
Most important	39	39.0	39.0	100.0
Total	100	100.0	100.0	

(Source: Fieldwork, 2012)

The table 4.29 above shows how patients rated the importance of pharmacy unit towards their health recovery. 94% of the patients out of 100 said that the pharmacy units in the hospitals are important, more important or most important. Only 6% thought that they are least or unimportant.

4.7.1 Analysis of how the drug inventory management affect patient recovery.

The table 4.25 above shows whether patients became anxious about their medical condition when they were asked to make their own arrangement for their drugs due to stock-out at the pharmacy unit in the hospital. 96% either said they became completely anxious or anxious to some extent about their recovery when they were asked to make their own arrangement for drugs. This situation could cause deterioration on their medical condition especially if patient is recovering from a major thoracic or abdominal operation. Hence, anxiety could influence postoperative complications and length of stay if patient is on admission at the hospital (Mitchinson, et al., 2007).

Again, more than 51% said that they don't take their full medication while another 40% said they sometimes take full medication. If you juxtapose this with the responds that more patients thought they have been given different drug other than what the doctor prescribed for them, you could conclude that patients are gradually distrusting the hospital pharmacy units. There is also a growing fear that hospitals keep their drugs away from patients with the NHIS card because of delays in payments of the health insurance claims by the hospitals. Finally, there is a belief amongst patients that the pharmacy units in the hospitals are of a significant importance towards their health recovery. 94% of patients out of 100 said that the pharmacy units are important, more important or most important.



CHAPTER FIVE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The concluding chapter is not intended to be read in isolation from the preceding ones because it provides further discussions of the outcomes that were uncovered as well as a brief overview of the research findings. It is finally, followed by recommendations for policy. Thus this chapter addresses the main findings obtained from the analysis in the light of the objectives of the study.

5.2 Summary of Findings

The findings of results demonstrate that all the four types of hospitals in Ghana are in the GAR, and that there were more senior pharmacists with more than 5 years of experience, than there are with pharmacists and principal pharmacists. There are additional five Deputy Directors of Pharmacy of which four are in Korle-Bu Teaching Hospital (KBTH). The remaining one is in the Ghana health service acting as a supervising head in the region. Most of the hospitals in GAR buy all their drug stock; this is due to the unavailability of certain essential facilities and equipment at the laboratories needed to make simple generic drugs.

While some hospitals have computerized their inventory systems, majority have not. Most patients in the region are given prescription form to purchase drugs outside the hospitals due to unavailability of drugs. During re-ordering, the sort of drugs to order is mostly dependent on the prescription protocols of the doctors and also patients' historic medical conditions in the hospitals. Most pharmacy units purchase drugs from the open market through the hospitals' tender committee which approves list of suppliers to deal

with. However, most purchases are made through the district medical stores which also source their supplies from the regional medical stores.

Again, most pharmacists do count their inventories monthly in order to properly help them account for reorder and when drugs are being dispatched to patients, the pharmacy stores use first-in-first-out method of dispensing. Except in cases where the expiration date for the drug is less than the dosage duration of the patients, then in such cases, discretion is used by adopting last-in-first-out method of drug dispensing for the patient in order for the drug to last longer. Furthermore, the finding of the research showed that drugs are stored by grouping them into drug categories e.g. tablets, loose, suspension, injection etc. and its drug uses.

In addition, pharmacies in the hospitals control their stocking by tracking them through the pharmacy heads. Also reorder for new drug could only be made through a proper authorisation process. Authorization is the principal means of ensuring that only valid transactions are initiated as intended by the hospital management. Pharmacies also placed much importance on preparation and recording of orders before and after they are supplied by vendors. Pharmacists said that placing a timely order is important for inventory control and also, it reduces drug stock-out.

Significant number of patients admitted at the hospitals said they did not get all their prescription while on admission. However, those who said they had received all their prescriptions were those in the sensitive confinement like the Intensive Care Unit (ICU). While some patients get some drugs from the pharmacy units others are referred to other pharmacy shop outside the hospital to make their purchases.

In spite of the unavailability of some essential drugs, there were relatively high levels of tracer items available at the hospital pharmacies especially in the public facilities. The results also revealed that more than half of patients said they are also given

different drug other than what they thought the doctor has prescribed for them. This is reflective of the issue of availability which is once again brought closer to the patient at the point of dispensation. In those pharmacies that dispense what is prescribed, frequent stock-outs of many items will negatively affect dispensing. Similarly, inventory availability often influences prescribing; in other words, drugs that are actually available will be prescribed.

Finally, patients became anxious about their medical condition when they were asked to make their own arrangement for their drugs due to regular stock-out at the pharmacy unit in the hospital. This has led to postoperative complications and length of patients' stay at the hospital. This has led to increase in patients distrust in the hospital pharmacy units. There is also a growing fear that hospitals keep their drugs away from patients with the NHIS card because of delays in payments of the health insurance claims by the hospitals.

5.3 Conclusions

In all the thirty hospitals in the GAR, their pharmacy units are effectively managed in relation to staffing. They have well experienced and professional pharmacist manning the units. However, almost all the drug stock are purchased from the district or regional medical stores and in some cases from the open market through vendor selection process that follows the procurement Act. While some hospitals have computerized their inventory systems, majority have not. When dispensing drugs to patients, the pharmacy stores use first-in-first-out method of dispensing. Also drugs in the store are kept by grouping them into drug categories e.g. tablets, loose, suspension, injection etc. and its drug uses.

In addition, inventories in the pharmacies in the hospitals are controlled by first tracking stocking through the pharmacy heads. Also reorder for new drug are made through a proper authorisation process. Upon receipt of the authorization, time is taken to prepare and record orders before and after they are supplied by vendors. Even though Pharmacists appreciated the importance of placing a timely order as an efficient inventory control, this however was not done, hence, cases of frequent drug stock-out.

The result is that patients are not always given all their prescription when they go to the pharmacies in the hospital. However, those who said they had received all their prescriptions were those in the sensitive confinement. Finally, the situation of unavailability of drug stock at the pharmacies in the hospitals has led to patients becoming anxious about their medical condition hence leading to health deteriorations and worsening their medical conditions.

5.4 Recommendations

The overall research findings have established that indeed drug inventory management have an effect on the patient care in hospitals in Greater Accra Region and that, the current situation has established a retrogressive effect on patients. From the findings made and conclusions drawn after the analysis of data collected, the following recommendations are presented. Firstly, practitioners on the one hand may use the findings of this research to find a way to draw attention from all the stakeholders in the health industry to help address the issue of properly managing drug stock in the hospital pharmacies in Ghana.

Secondly, most of the health facilities should be advised by the Ministry of Health to use the computerized system to control their inventories. This approach of inventory

control helps to minimize waste since it is one of the primary goals which allow the department to achieve its objective of cost-effective product utilization. Thirdly, it is recommended that heads of institutions should ensure that some basic equipments and essential drugs on relatively high demand are always made available at the pharmacies to prevent stock-out of drugs at the pharmacies in the hospitals which make patients become anxious about their medical condition hence leading to health deteriorations and worsening their medical conditions. Finally, the National Health Insurance Authority should address the challenges associated with the payment of claims to hospitals since there is also a growing fear that hospitals keep their drugs away from patients with the NHIS card because of delays in payments of the health insurance claims by the hospitals.

5.5 Suggestions for Future Research

Due to the short period of the research duration only one segment of the total problem was considered. Future research work could be directed at research such as the following;

- The effect of the National Health Insurance scheme on inventory management of the hospital pharmacies.
- The role of computerised inventory management systems in the promotion of drug availability to patients in Ghana.

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APPENDIX A

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY INSTITUTE OF DISTANCE LEARNING SURVEY QUESTIONNAIRE- PHARMACY

Research Topic: Drug Inventory Management at Hospitals in the Greater Accra Region and its Effect on Patient Care

Please respond to the following by either writing in the blank space provided or ticking the appropriate box.

Section One - Respondent Profile

1. What type of hospital do you belong?

Government ☐ Quasi Government ☐ Mission ☐ Private ☐
Others (specify).....

2. Which of the following describes your position?

Head of Pharmacy ☐ Senior Pharmacist ☐ Pharmacist ☐
Dispensary Technologist ☐ Pharmacy Assistant ☐

Others (specify)

3. How many years of experience do you have in the Pharmacy Department?

a) Less than 5years ☐ b) 5 years to 10year ☐ c) 10 years to 15 years ☐
d) 16 years and above ☐

Section Two – Drug Inventory Management

4. Have you ever had any form of inventory management experience? Yes ☐ No ☐

5. What percentage of the dispensed drug do you make and buy?

- a) Make (0%), Buy (100%)
- b) Make (1-10), Buy (90-99%)
- c) Make (11-30%), (70-89%)
- d) Make (31-50%), (50-69%)
- e) Make (50-100), Buy (0-50%)

6. Do you use a computerized inventory system?

- a) Yes
- b) No

- 6a. If yes, is there a feature within the inventory system that alerts the user if inventory levels are below or above certain levels?
- a) Yes
 - b) No
7. What method of inventory evaluation do you use in this pharmacy Department?
- a) First-in, First Out (FIFO)
 - b) Last-in, First-out (LIFO)
 - c) Average cost method
8. Who tracks inventory availability at this Pharmacy?
- a) Head of Pharmacy
 - b) Head of Stores
 - c) Purchase Officer
9. How does your Pharmacy unit group its available drug stocks?
- a) By Manufacturers
 - b) By Generics and Brands
 - c) By Imports and Exports
 - d) By Expiry date
 - e) By Categories of Drug i.e. Tablets, Injections, Capsules etc.
10. What happens to lost, damaged, obsolete, or no longer usable and stolen inventory?
.....
11. Is there an approved supplier list?
- a) Yes
 - b) No
- 11a. If yes, who chooses and approves new suppliers for supply of drugs?
- a) Head of Pharmacy
 - b) Tender committee of the Hospital
 - c) Purchase officer
12. If there is a discrepancy between amount of drug-purchased received and amount ordered, what is the process for reconciling?.....
13. Who enters received amounts into the system?.....
14. Is it the same person who receives the inventory?
- a) Yes
 - b) No
15. How often do you have inventory counts?
- a) Daily
 - b) Weekly
 - c) Monthly
 - d) Quarterly

e) Yearly

16. How would you evaluate the importance of the following factors that influence drug inventory purchases at your hospital?

Use a scale of 1 to 5, with 1=unimportant and 5=most important.

Factors that influence drug re-order	Evaluation				
	1	2	3	4	5
Patient's condition					
Prescription protocols of Physicians					

17. How would you evaluate the importance of the basic information on the drugs that are received from suppliers?

Use a scale of 1 to 5, with 1=unimportant and 5=most important.

Basic Information on Drug	Evaluation				
	1	2	3	4	5
Expiry Date					
Manufacturer					
Serial Number					
Unit of measurement used					

18. How would you evaluate the effectiveness of the current process in achieving the following control objectives? Use a scale of 1 to 5, with 1=Not effective and 5=highly effective.

Control Objective	Evaluation				
	1	2	3	4	5
Purchase orders are properly authorized					
All purchase order transactions are completely prepared and recorded on a timely basis					
All purchase order transactions are reliably processed and reported					
Receipts of materials and supplies are properly authorized					
Receipts of material and supplies are recorded accurately and completely on a timely basis					

All material and supply receipt transactions are reliably processed and reported					
Employees and management are provided the information they need to control the process of obtaining material and supplies.					
Orders are placed on a timely basis					

19. What happens to patients when you run out of drug stock in your pharmacy unit?

- a) Wait till we get new supplies
- b) Patient ask to make own arrangements
- c) We never run out of stock

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APPENDIX B

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY INSTITUTE OF DISTANCE LEARNING

SURVEY QUESTIONNAIRE- PATIENT

Research Topic: Drug Inventory Management at Hospitals in the Greater Accra Region and its Effect on Patient Care

Please respond to the following by either writing in the blank space provided or ticking the appropriate box.

Section One –Patient Respondent Profile

1. Have you ever been admitted at a hospital before?
Yes ☐ No ☐
2. If yes were you always given the requested medicine at the ward?
Yes ☐ No ☐
3. What is your average waiting time at the hospital pharmacy?
 - a) 1-15mins
 - b) 16-30min
 - c) 31-60min
 - d) above 1HR

Section Two-Drug Information and Patient Care

4. Do you always get your prescription drug at the pharmacy unit in this hospital?
 - a) Yes, often
 - b) Yes, Sometimes
 - c) No
5. Sometimes in a hospital, doctor will prescribe a drug and the Pharmacist will give you another thing which sometimes is quite different from what the Doctor prescribed. Did this happen to you?

- a) Yes often
b) Yes, sometimes
c) No
6. Overall, did you feel you were treated with respect and dignity while you were in Pharmacy Unit at the hospital?
- a) Yes often
b) Yes, sometimes
c) No
7. Do you get anxious about your condition or treatment; especially when asked to find your own drug outside the hospital pharmacy?
- a) Yes, completely
b) Yes, to some extent
c) No
8. Have you ever received drug from the pharmacy unit you did not use?
- a) Yes
b) No
- 8a. If yes Why...
9. Did the Pharmacist give you or someone close to you all the information they needed know about the drug given to you?
- a) Yes, definitely
b) Yes, to some extent
c) No
10. Did a member of pharmacy staff explain the purpose of the medicines you were to take at home in a way you could understand?
- a) Yes, completely
b) Yes, to some extent
c) No I didn't need an explanation
d) I had no medicines
11. Did a member of pharmacy staff tell you about medication side effects to watch for, when you go home?
- a) Yes, completely
b) Yes, to some extent
c) No I didn't need an explanation

Table 2.3 – Details of the regional distributions of the various health workers

Profession	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Grand Total
Medical Officers	374	81	55	102	661	32	34	14	72	67	1492
Dental Surgeons	5	2	2	2	17				2	4	34
Pharmacists	281	84	45	79	224	56	39	25	56	52	941
Medical Assistants	78	41	41	37	72	50	32	18	37	36	442
Professional Nurses	1410	593	627	899	2543	610	463	358	807	504	8814
Auxiliary Nurses	657	441	518	932	1246	401	294	127	599	478	5693
Physiotherapists	8	6	2	2	25	2			4	3	52
Health Services Administrator	29	13	12	16	29	6	4	6	10	9	134
Health Educators	6	9	2		14	1	1	1	1	1	36
Architects & Engineers	106	46	59	51	164	41	25	15	63	45	615
Accountants/Accounts Officers	251	150	107	173	386	84	73	58	144	85	1511
Dispensing Technician/Assistants	65	39	41	69	65	20	13	6	45	23	386
Estate Officers	10	6	4	4	12	5	3	2	3	4	53
Health Research Officers	1	6	1		9		8	1			26
Dental Technologists/Therapists	4	1		1	5				1		12
Biostatistics Officers	112	60	96	107	170	41	28	22	130	83	849
Catering Officers/Cooks	73	32	77	64	144	31	34	14	81	59	609
Dieticians	3	2	2	3	21	3	1				35
Nutrition Officers	8	6	6	4	13	4	6	2	3	6	58
Technical Officers	259	183	103	189	380	92	84	54	125	153	1622
Administrative Staff	278	169	123	153	365	128	67	72	173	136	1664
Health Planner	1		1	1	11		1				15

Source: CHIM/PPME-GHS.

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