



**INVENTORY MANAGEMENT PRACTICES FOR ESSENTIAL DRUGS AT PUBLIC
AND MISSION HOSPITALS IN MERU COUNTY, KENYA**

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ABSTRACT

BACKGROUND: Essential drugs are important for quality service delivery in the healthcare system. Proper inventory management of essential drugs in the health facilities is critical in ensuring availability of essential drugs (ED). Despite the importance of the required essential drugs at various user points, about one third of the world's population does not have access to ED. This is a serious problem considering that drugs take up a significant portion of the healthcare budget and availability of ED is critical in quality healthcare provision which is a priority of the Health Systems.

OBJECTIVES: To examine the current stock control practices for essential drugs at public and mission hospitals in Meru County, determine the current storage practices for essential drugs at

public and mission hospitals in Meru County and establish the current practices for managing returns of essential drugs at public and mission hospitals in Meru County.

METHODS: Cross-sectional descriptive study design was employed in the study and it involved 205 clinical and inventory management staff dealing with essential drugs inventory management and use in four hospitals in Meru County, Kenya.

RESULTS: Method by which essential drugs are approved and issued were mostly FEFO (First Expiry First Out) 36(90.0%) and FIFO (First In First Out) 2(5.0%) and was significant on the inventory management practices (χ^2 Wald test P-value =0.011). Good inventory control practices were identified mainly in FEFO (First Expiry First Out) approval and issuance methods. Stages of inspection were significant on the inventory management practice (χ^2 Wald test P-value =0.000). There was significant correlation between the inventory management practices and inspection stage of essential drugs (χ^2 Wald test P-value =0.037) with best practices identified when inspection was done before storage. This implies that inspection before storage increased odds of good inventory management practices. From the study it established that the main suppliers of essential drugs were MEDS 35.5%, KEMSA 29.0%, Pre-qualified supplier 19.4% and Private distributors 16.1% (p-value= 0.734). The study established that ordering of drugs mainly depended on past consumption 61.1 % other than request by users 22.2 %, majority of clinical staff 56.6 % complained of receiving drugs of questionable quality from the hospital drugs store indicating a problem in inspection of ED before storage.

CONCLUSIONS: The study concluded that mission hospitals performed better than public hospitals in all aspects of inventory management. This is significant and considering that health care workers use essential drugs to deliver quality services to the clients. Patient visiting mission hospitals were likely to get all prescribed medicine which was a measure of quality on patient perspective than patient seeking health care from public health facilities:

RECOMMENDATION: The study recommends public health facilities to benchmark with mission hospitals to improve inventory management practices thus ensuring availability of ED

KEY WORDS: Essential Drugs, Commodity management, Inventory Management, Returns Management, Safety (Buffer) stock.

INTRODUCTION

According to WHO, Essential medicines or essential drugs (ED) are those drugs that satisfy the priority health care needs of the population and are intended to be available within the context of functioning health systems at all times in adequate amounts and at a price that the individual and community can afford, (WHO 2002). Essential drugs or medicines includes; common antibiotics, common analgesics, antihypertensive, anti diabetes, anti malarias, anti protozoa, emergency drugs and paediatric formulations,(Wangu,2014). Inadequate availability of and access to essential drugs are some of the major barriers to delivery of essential health care in the

developing countries. (Aronovich, Okumu, Mwasango, Karimi and Nyakundi,2001). Critical assessment of the inventory management practices can play a major role in the strengthening of the pharmaceutical management pillar which in turn can help in addressing access to essential medicine. Access to essential medicines and supplies is fundamental to the good performance of the healthcare system since adequate drug supplies including contraceptives security contributes to improved quality of health care (Ndavi & Ogola, 2009).

Availability of essential medicines is commonly cited as the most important element of quality by health care consumers, and the absence of medicines is a key factor in the underuse of government health services. Improving pharmaceutical supply management is one of the elements among many health sector reform efforts. Promising improvements in pharmaceutical supply systems have been made in some countries; however, many continue to struggle with a mix of inefficient public and private health sector supply systems. Decentralization of health sectors has in some cases intensified the problem, establishing logistics systems in the absence of trained human resources, infrastructure, and management systems at the decentralized levels, (Aronovich *et. al.* 2001).

A survey done in Nepal found that the availability of 32 selected essential reproductive health care Commodities in public health outlets was less than 25 percent, while in Nicaragua only 20 percent of essential medicines (EM) were available to the public clients (Rao & Thapa, 2005). In Bangladesh, there are documented challenges on the inventory management of health commodities as well as monitoring consumption which is the primary source of information for forecasting and quantification despite years of support from United States Agency for International Development (USAID) (MSH, 2009).The challenges of inventory management of health commodities including essential drugs have also been experienced in Ghana leading to the development of supply chain management master plan (GOG, 2012). A study by Annor (2012), in Ho Municipality of Ghana, found that 50 percent of the prescriptions were not serviced at the health facility where the patient had been seen. In South Africa, according to a survey done by Medicine San Frontiers (MSF) in collaboration with Treatment Action Campaign (TAC), it was established that across most province, frequent stock-out reports were received, these shortages are not just for HIV and TB drugs, but also relating to a wide range of essential medicines. However, the survey did not clearly establish the cause of all these individual stock-outs (MSF, 2013). In Uganda, the five-year Health Sector Strategic Plan (HSSP) designed by the Ministry of Health (MoH), had outlined goals for 2000/01–2004/05 as; improving access of the population to the Uganda National Minimum Health Care Package(UNMHCP); improving the quality of delivery of the package; and reducing inequalities between various segments of the population in accessing quality health services .However, without the appropriate health commodities, health facilities and health care providers cannot offer the population a full range of comprehensive services and products to meet these goals (MOH, 2000).

A study by Health Action Africa International (HAI) revealed that essential medicines are available in only 50% of the health facilities and 65% of hospitals in Kenya (HAI, 2010). A survey by WHO in 39 low and middle income countries including Kenya established that there was a wide variation on the availability of essential drugs which was at 20% in public sector and 56% in private sector, (WHO, 2010). The extent to which inventory management practices contributes to the variation in availability.

The government of Kenya in the second National Health Sector Strategic Plan recognized inadequate essential drugs and other medical supplies particularly in government-run facilities contribute significantly to the prevailing low quality of health care services, (MOPHS, 2008). Public health facilities experience continuous shortages of essential medicines and medical supplies (EMMS). Another study done in 2008 found that the availability of EMMS in public health facilities varied between 66 percent and 87 percent (GOK, 2008). Also a survey conducted in 2009 reported the availability of prescription medicines by the health facilities as 42 percent at the provincial hospitals, 55.7 percent at the district hospital level and 58.1 percent at the sub-district hospital level (MOPHS/MOMS, 2010).

The government of Kenya channels a lot of financial resources to the Ministry of Health in order to provide essential drugs. Pharmaceuticals are the largest item of expenditure within the public health sector budgets of developing countries, ranging from 8 to 12% of recurrent health budget, hence, asking for prudence in inventory management of pharmaceuticals or health commodities (SIHFW 2010). In Kenya in 2008, drugs accounted for 14% of the health budget and one of the areas targeted was to improve essential drug supply particularly in selection and quantification, (MOPHS/MOMS 2008). Staff attitude towards clients and service delivery can be negatively affected when essential medicines and medical supplies they need to perform their jobs, efficiently and safely, are not consistently available. For many clients lack of essential drugs affects their perception of quality of the service offered by the health facility. The reputation of the entire service is at stake if the required essential drugs are not available, (Walkowiak & Gabra, 2008).

Despite the above referred Government's effort, a survey conducted in 2009, revealed that availability of essential drugs in the health facilities was wanting, as it was only 42 percent at the provincial hospitals, 55.7 percent at the district hospitals and 58.1 percent at the sub-district hospitals (MOPHS/MOMS, 2010). Indeed, Meru County assembly on September 2010 discussed a motion necessitated by unavailability of essential drugs in some health facilities in Meru County whose reasons are not well understood, (Kiogora, 2014). Mungu (2013) associates shortage of essential drugs in public health facilities in Bungoma County with poor inventory management practices. Previous studies have not provided detailed and focused information regarding inventory management practices of essential drugs in both public and mission hospitals in Meru County. Therefore, this study sought to establish the current inventory management practices in public and mission hospitals in Meru County, Kenya.

Even with advent of devolution, health facilities continue to experience shortage of essential drugs (Wangu, 2014). Lack of enough essential drugs has necessitated a motion in the County Assembly of Meru to discuss unavailability of essential drugs in some health facilities (Kiogora, 2014). Riungu (2010), however, emphasizes on the importance of proper inventory management on the availability of essential drugs in both mission and public hospitals. The referred findings aroused the desire to critically examine the current inventory management practices and their effect on the availability of essential drugs in both public and mission hospitals in Meru County.

LITERATURE REVIEW

Health system strengthening (HSS) can be defined as an array of initiatives and strategies that improves one or more functions of the health system and that leads to better health through improvements in access, coverage, quality, or efficiency of the health system (Health Systems Action Network, 2006). A well functioning health system ensures equitable access to essential medical products, vaccines and technology of assured quality, safety and efficacy as well as their scientific soundness and cost effectiveness to use, (WHO, 2007). Health systems in various countries of the world have similar goals of improving health outcomes, through systems that are responsive and financially fair. All health systems carry out the same basic functions, regardless of how they are organized or which health interventions they are trying to deliver. These functions of health systems are the development of human and other key resources; service provision; financing; and stewardship, (WHO, 2006).

Essential Drugs have always remained and are likely to remain the core element in preventive as well as in curative health care. Medicinal drugs inclusive of vaccines, contraceptives, nutritional supplements etc. are indispensable for the prevention, control, treatment and amelioration of a number of maladies that affect human beings. Interestingly, pharmaceuticals are the largest item of expenditure within the public health sector budgets of developing countries, ranging from 8 to 12% of recurrent health budget; therefore asking for prudence in inventory management of pharmaceuticals or health commodities, (SIHFW 2010). All essential drugs needed for health care should be available at all the times, at all the health facilities. Drugs made available should be of good quality and should be safe. Efficient public health supply chain performance which includes proper inventory management is essential for assuring access to health supplies, and thus for positive health outcomes.

Shortage of essential drugs

According to WHO (2000), one third of the world's population do not have access to essential medicines while in Asia and Sub-Saharan African countries, the figure could be as high as half of the population, (WHO, 2000). According to study done by the World Bank in 2004, Shortage of drug and medical supplies, and inequitable healthcare services in many low income and transition countries have resulted in deterioration of general health among individuals and degradation of the health system in developing countries, (WHO, 2007).

Essential drugs programme aims at ensuring equitable access of essential drugs of good quality to all who need them and rational use of drugs. Experiences from many countries show different degrees of success in achieving these objectives. Countries often have similar problems of irrational drug use and drug unavailability. Different intervention strategies have been implemented to address these problems. Their success depends on many factors, including the availability of trained human resources, infrastructure, cultural factors and the socio - economic situation. Solutions that are effective for one country are not necessarily effective in another, (WHO, 2004).

Zimbabwe experienced essential drug shortage until Zimbabwe Essential Drug Programme (ZEDAP) was introduced, during the second phases of the programme drug availability was

strengthened through: improved drug distribution and management; training of staff in drug management, computer skills, finance and general management; Improvement of storage conditions for drugs and other medical items by renovating existing medical stores and by building new stores at national, regional and district levels; implementation of computerized inventory control package was at Government Medical Stores (GMS) now NatPharm facilities, (WHO, 2004).

According to Okiror (2009), 32-50 percent of essential medicines for treatment of common diseases such as Malaria, Pneumonia Diarrhea, HIV/AIDS, Tuberculosis Diabetes and Hypertension are not available in Uganda. Like many African countries, Uganda is struggling to develop adequate health care systems and one of the critical problems is establishment of effective supply chain systems for essential drugs and medical equipment to ensure availability at local treatment facilities. In Uganda 65 percent of health facilities experienced stock outages (Stock out) of essential drugs and other medical supplies in 2008, (MoH 2009).

Transparency International (2011) established that there was acute shortage of medicines and other essential supplies in most of the public hospitals in Kenya. Although, many stop-gap actions have been implemented over time, the problems still persist. In public health facilities most health clients are given the appropriate prescription on consultation after which they have to purchase the drugs from chemists dotting the facility at inflated prices. In case the doctor recommends an injection, patients are forced to buy needles, syringes and gloves from the private chemists or clinics around the public facility, (TI 2011). Adequate access to functioning healthcare systems is particularly difficult in rural districts in Kenya. Lack of a consistent drug supply is identified as a primary reason why health centers are not utilized with resulting high morbidity and mortality rates from malaria, diarrhea and HIV/AIDS, (Mungu, 2013).

The government of Kenya in the Second National Health Sector Strategic Plan recognized inadequate essential drugs and other medical supplies particularly in government-run facilities contribute significantly to the prevailing low quality of services, (MOPHS, 2008). This is a serious problem considering that drugs take up a significant portion of the healthcare budget and that quality healthcare provision is a priority of the government. Inadequate inventory management leads unavailability of essential drugs due to poor stock control that also results in drugs expiring in the shelves or used irrationally, (Mungu2013).

Stock outage of essential medicines is a significant feature of public hospitals in Kenya, a situation that may expose patients to outsource medicines from private vendors with the consequence of high costs, (Orengo, 2012). The implication of stock outages means that patients are less likely to get the prescribed medicines forcing them to purchase the drugs from the private chemists thus affecting their perception of quality of health service offered at the health facility. According to Wangu and Osuga (2014), in a study carried out in Nakuru County it was established that there was stock out of most of essential drugs with analgesics being most affected. Mungu (2014), also established that shortage of essential drugs in health facilities in Bungoma East Sub County is a serious problem which could be attributed to poor inventory management, poor distribution and funding gap.

Lack of health commodities in Kenya has been identified as major reason for poor quality of services in most public health facilities especially in rural areas, (MOH, 2006). In most organizations in the healthcare sector in developing countries such as Kenya, the supply chain and inventory management is not accorded its central role in the overall strategy of the organization. For instance, the national malaria strategy for Kenya lacked supply chain component until it was reviewed in 2009 (MOPHS, MOMS 2011). The same exists in the mission hospitals where supply chain management has not been mainstreamed in the strategy of the hospital and supply chain related decisions are tactical at best and focus primarily on supporting or delivering organizational performance objectives. Although there are an array of new products in the market to treat most of the conditions in health sector, weak links in the health supply chain continue to greatly restrict access to essential health products, including those needed to prevent and treat AIDS, malaria, TB and other deadly diseases, (Riungu, 2010)

In reversing the trends, ensuring availability of essential medicines and medical supplies is crucial to improved health care service delivery (MOH, 2006). Effective inventory management of health commodities ensures that essential drugs are available to the staff serving the patients at the health facility. Availability of the essential drugs in the health facility is also important in building and maintaining demand for health services.

Public Drug Supply System

Drugs form an essential and indispensable resource element in any health facility, be it a small health centre or a big teaching and referral hospital. In order to ensure their prompt availability, at the time of need and in adequate quantities, drugs must be kept ready in stock. This requires careful planning to decide which drug items may be needed during a given time frame and in what quantity. Inventory management of essential drugs is quite complex since almost all finished pharmaceuticals have a defined shelf-life and many of them require compliance with precise storage conditions, (SIHFW 2010).

Even in big hospitals, quality of patient care depends heavily on the efficiency of inventory management. Ironically, in most drug stores of public sector health facilities in some countries, personnel in charge of inventory control never had any sort of training in this specialized job, and are entrusted to run the show somehow in arbitrary and ad hoc manner, SIHFW (2010). With a little orientation and training, the health workers in medical stores can perform their job much more scientifically, to the ultimate benefit of patients and saving of money through less wastage of stock.

The public health supply chains of most African countries, too, are typically unable to respond effectively to existing demands, putting both health commodities and health outcomes at risk. They lack appropriate physical infrastructure (such as storage space), finances and technology to manage supply chain flows. Efficient public health supply chain performance is essential for ensuring access to health commodities for positive health outcomes. This is particularly important in most countries in sub-Saharan Africa where large proportion of the population is served by the public and mission health sectors. The public/mission health supply chain manager dealing with storage and inventory management of health commodities play an essential role in

the realization of global public health goals, for improving maternal health, reducing child mortality, and combating HIV/AIDS, malaria and other diseases, (Riungu, 2010).

An effective supply chain including inventory management and storage of health commodities can play a major role in bringing the direct cost of providing patient care down. Other important benefits proper inventory management and storage of health commodities in public sector includes ensuring availability of ED, reducing counterfeits and wastage, increasing responsiveness, resilience, choices and drug utilization. Proper inventory management also plays a major role in reducing medication errors. A robust and effective supply system would also relieve the caregivers of the duties and stress associated with concerns about medicine availability and quality thus allowing them to focus on what they do best which is patient care, (Riungu,2010).

In healthcare, ensuring that there are adequate drugs and supplies for every patient is paramount, as partial or intermittent treatment can lead to less than optimal results and in some cases, this can even be disastrous, both for the individual patient and the public large. One of the major problems of lack of uninterrupted treatment includes treatment failure and the risk of developing drug resistance. This is a serious consideration in dealing with infectious diseases and in chronic ailments such as diabetes which require continuous treatment in order to keep the disease under control. Adequate drug supplies including contraceptive security contribute to improved quality of health care and satisfaction of health workers. Well-supplied health programs can provide superior service, while poorly supplied programs cannot. Likewise, well-supplied health workers can use their training and expertise fully, directly improving the quality of care for clients. Customers are not the only ones who benefit from the consistent availability of commodities. An effective logistics system helps provide adequate, appropriate supplies to health providers, increasing their professional satisfaction, motivation, and morale. Motivated staffs are more likely to deliver a higher quality of health care service, (USAID/DELIVER PROJECT 2011).

Inventory management

The cycle of inventory management involves the supplies chain management and extends to the point of use where the commodities are finally utilized for service delivery. Ensuring availability health commodity including essential drugs to meet the needs of the clients that it serves is the ultimate goal of an inventory management system which is to make patients (clients) receive the right medicines, in right quantities and at right quality, delivered at the right place, right time and for the right cost, (AMREF, 2007).

According to MSH (2009), commodity management refers to overseeing the logistics of receiving, storing, transporting and distributing health commodities along with commodity accounts, documents, preparing commodity report and keeping commodity losses at an acceptable minimum. Managing drugs, diagnostic test kits, and other health commodities in any setting whether public or Private sector and at any level follows a well-recognized system that can be viewed as a cycle of selection, procurement, distribution, and use. At the center of the cycle is management support. The functions of management support include financing, information management and staffing, monitoring, and evaluation which hold the cycle together.

The cycle rests on a policy and legal framework that establishes the mechanisms for each function and supports the commodity management system, (WHO, 1997).

The aim of inventory management is to encourage reliable procurement to combat counterfeits and sub-standard medical products, vaccines and technology as well as ensure availability of essential drugs in the health facilities, (WHO, 2007). Inventory management has two main concerns; maintaining high level of service and minimizing cost of ordering and maintaining inventory. That is having the right goods in sufficient quantities and in the right place and at the right time with minimum costs. From the seminal works of Walkowiak & Gabra (2008), Health commodities include essential drugs, reagents and test kits, laboratory equipment and supplies, condoms, and other medical supplies and equipment such as specimen collection tools. In health care organization supply chain is a new way of conceptualizing medical supply management. Hospitals stock drugs, surgical equipments and other life monitoring equipments. Inadequate controls of inventories can results in both under stocking and over stocking of ED. Under stocking can results in loss of sales because of dissatisfaction of the physician and surgeons who take their patients elsewhere because the needed medical supplies are unavailable. More importantly under stocking might lead to the death of a patient. Overstocking ties resources which could be productive elsewhere. Although overstocking is a lesser evil of the two excessive overstocking can be very costly when dealing with highly priced inventory such as pharmaceuticals due to wastage, quality deterioration and expiring, (AMREF, 2007).

Stock Control

Inventory control has two main concerns; maintaining high level of service and minimizing cost of ordering and maintaining inventory. That is having the right goods in sufficient quantities and in the right place and at the right time with minimum costs. A successful inventory management and logistics system provides excellent customer service by fulfilling the six rights: procuring the right goods, in the right quantity, in the right quality, delivered to the right place, at the right time, for the right cost, (AMREF, 2007).

Good stock management aims at minimizing stock levels, smooth consumption patterns, and supplies that always arrive on time but this goal is rarely achieved in practice. Components of Inventory Management includes ordering (and re-ordering), receiving and issuing commodities, storage, distribution and record-keeping, (MSH, 2009). Inventories are used to satisfy demand requirements hence reliable estimates of the amounts and timing of demand are essential. It is also essential to know how long it will take for orders to be delivered. The main goal of inventory management and supply chain research is to reduce the cost of health care without sacrificing the service typically by improving the efficiency and productivity of the health care system, (Raja & Mohammad, 2004).

A number of indicators can be applied to evaluate the implementation of good stock management system. The indicators include: use and correct use, of stock cards and stock books; the correct use of the minimum stock (based on three month's consumption and one month deviation); physical accountability (comparing a physical count with the recorded amount); correct ordering

(done monthly, amount ordered equivalent to the minimum stock) and good storage practice which includes first-in first-out principle and cleanliness of the drug store, (WHO 2004).

Storage of Essential Drugs

Good storage and inventory control practices at the national and the point-of-service levels are similar. Written SOPs that document accepted practices for ordering/requisitioning, receiving, inventory management including storage and stock control, issuing and disposing of expired stock should be available at all levels of health care system (Walkowiak & Gabra, 2008). The guidelines for good storage of essential drugs recommend that the storage space should be a secure, lockable area which should be accessible to the people needing the health commodities. The storage place should also be clean and dry with organized shelves and pallets to raise the products from the ground. Ventilation through the use of air conditioning and adequate lighting are also key considerations for a good storage place for essential health commodities. Availability of cold storage for any commodities requiring refrigeration and of cold chain during transportation and availability of fire safety equipment are vital for locations where essential drugs are stored. The storage location for health commodities should also provide for separation of expired, damaged or obsolete commodities from usable ones and free of harmful insects and rodents, (AMREF, 2007).

During storage cartons should be arranged so that arrows point up ensuring that identification labels, expiry dates, and manufacturing dates are visible. Store supplies should also be arranged in a manner accessible by FEFO, counting and general management. Damaged and expired drugs should be separated and disposed without delay, (John Snow Inc., 2000).

Management of returns

Returns Management is the part of supply chain management that includes returns, reverse logistics, gatekeeping, and avoidance. This definition includes activities that are critical to supply chain management such as avoidance and gatekeeping. Avoidance involves finding ways to minimize the number of items that need to enter the return flow. It can include ensuring that the quality of product and user friendliness for the consumer is at the highest attainable level before being sold or offered to the clients. Gatekeeping means making decisions to limit the number of items that are allowed into the reverse flow. Successful gate keeping allows firms to control and reduce the rate of returns without damaging customer service. Gate keeping eliminates the cost associated with returning products that should have not been returned or the cost of products that have been returned to the inappropriate destination. The point of entry into the reverse flow is the best point to evade unnecessary cost and management of materials by screening unwarranted returned merchandise (Dale S., Douglas M., Keely C. and Sebastian G., 2002).

According to AMREF (2007), a health facility may receive health commodities from, the central store / national store such as KEMSA, directly from the suppliers and also from other health facilities. Health facilities may also receive donations from donors. Similarly, a health facility

may issue commodities to, the central / national store such as KEMSA as incase of returns of commodities, to other health facilities and within the health facility from the main drug store to other dispensing areas. During issuing or receiving commodities of the health commodity process, the two important steps are involved, verification of the information (documentation) and visual inspection of commodities being issued or received. This ensures that the health commodities being received or issued are of the right quality, quantity and the documentations are proper.

Inventory Management Challenges

Inventory management challenges vary from mission to public health facilities. For instance, according to a study by Transparency International (2011), Nazareth mission hospital in Kiambu County did not experience a lot of drug shortage compared to Kaimbu level 5 hospital which is a public health facility offering the same level of service in the same county. When asked the reasons for the hospital's success, one of the medical doctors who worked in one of Kenya's public hospitals before moving to Nazareth said: "Inventory Management. At government facilities doctors can't do what they are trained to do. Staff don't show up or are de-motivated when they do, operations are delayed because there is no oxygen in the operating theatre; the bureaucracy creates inertia among staff and supervisors. Here staffs are motivated; doctors have the supplies and tools to do their job," (TI 2011)

In public hospitals patients are unable to afford the extra charges demanded by hospital staff to source for drugs elsewhere when drugs are not available in the hospital pharmacy. The patients accused nurses and other medical personnel of hoarding the drugs and secretly supplying them to private pharmacies. This practice is cited as a key contributor to the shortage of drugs, (TI 2011).

Inventory management challenges includes: lack of knowledge about storage conditions; lack of ideal storage facilities, poor communication between inventory management staff and health workers, lack of proper inventory system, lack of monitoring tools, lack of tools to collect essential data and lack of human capacity, (Jabulani, 2005). Other challenges facing the inventory management are subjective, ad-hoc decisions about order frequency and quantity, inaccurate out-of-date incomplete Stock records, lack of Standardized Operating Procedures (SOPs) to guide staff and Lack of regular performance monitoring. This situation becomes worse where health care managers lack basic skills of proper inventory management, (AMREF, 2007).

METHODS

This cross-sectional descriptive survey was conducted in Meru County referral hospital (Meru level 5 hospital), Nyambene Sub County hospital, Maua Methodist Hospital and St. Theresa Kiiroa Mission Hospital in Meru County. The study targeted 320 staff directly involved in inventory management of essential drugs (pharmacy staff, store staff, procurement) and health care workers (clinical officers, doctors, nurses). 165 health workers were selected using stratified sampling method and 40 inventory management staff selected using purposive sampling method as indicated below:

Table 1: Sample size per hospital

Health facility	Inventory staff sample	Clinical staff sample	% sample representation
Maua Methodist Hospital	11	33	53
Meru County Hospital	15	68	69
St. Theresa Mission Hospital- Kiirua	6	30	52
Nyambene Sub-County Hospital	8	34	55
Total	40	165	57

Data was collected using two sets of structured questionnaires administered to inventory management staff and the other to health care workers upon consent in the presence of the researcher or research assistant. The researcher filled observation check list based on the observations made in various health facilities. Data collection tools were pretested to ensure quality of data collected.

Quality assurance procedures were done on collected data after which data coding, entry and descriptive and inferential statistics were conducted using SPSS version 20.0. Findings were presented as text, bar graphs, pie charts and frequency tables.

Ethical clearance was given by the Kenya Methodist university research and ethics committee, The Medical Superintendent of Meru County Hospital, Hospital administrators and Medical Officers in charge of Nyambene Sub County hospital, St. Theresa Kiirua Mission Hospital and Maua Methodist hospital. Consent was obtained before interviewing the respondents.

RESULTS

Demographic Characteristics of Inventory Management staff

Inventory management staff composed of 27(67.5%) males and 13(32.5%) females. The findings of the study showed that there were more male inventory management staffs than females. Mean age of the staff was 34.6(\pm 6.1) years within the range of 23 to 51 years. Most of the inventory staffs 25(62.5%) were aged 28-37 years, 9(22.5%) were aged 38-47 years, 3(7.5%) were aged 18-27 years, 2(5.0%) were aged 48-57 years while 1(2.5%) was missing. The age distribution of inventory management staff from the mission and public hospitals was different (Mann-Whitney u test p-value=0.027) with majority of staff in public hospitals elderly (above 28 years) while in mission hospitals majority are below 28 years.

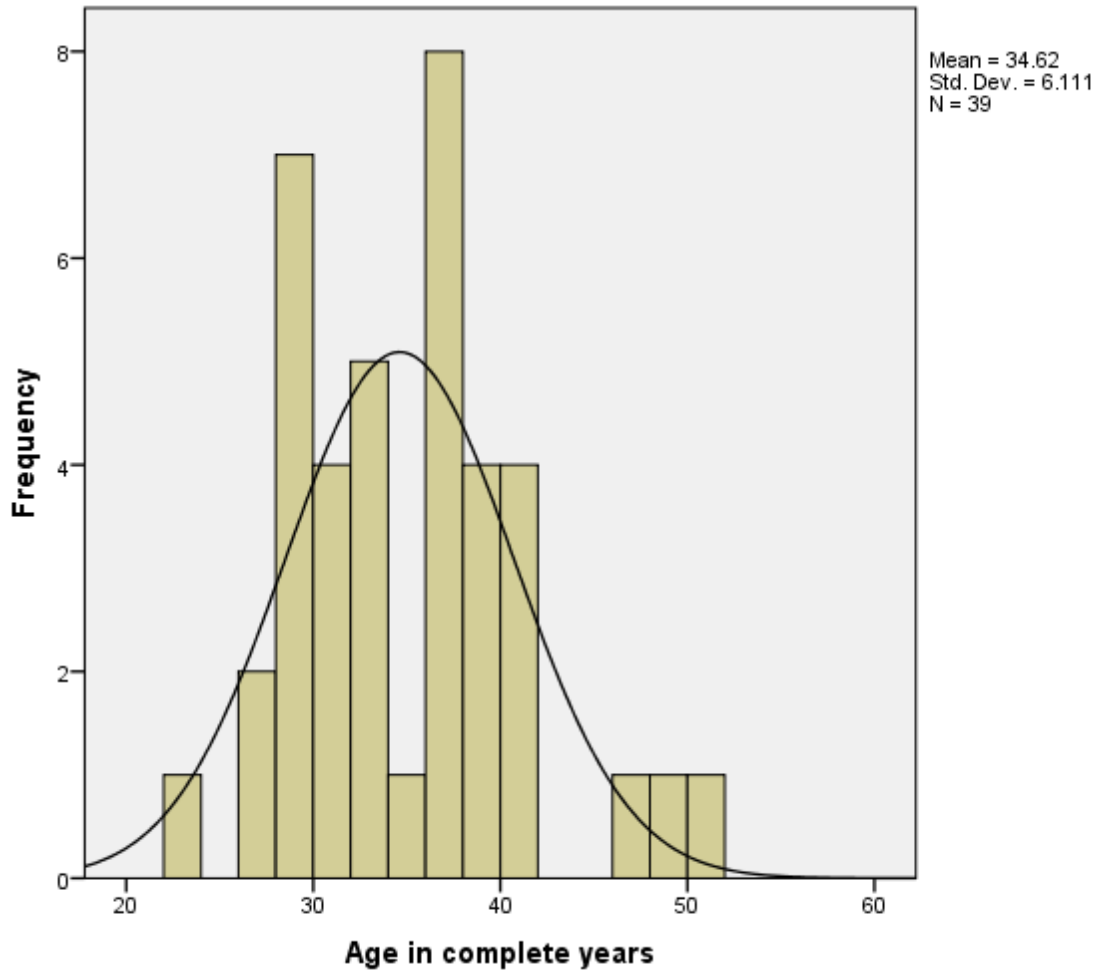


Figure 4.1 Age of Inventory management staff

However, the ages, and gender of the inventory management staff had no effect on the management of the inventory system (p-values>0.05).

Table 4.1 Characteristics of inventory Management staff

CHARACTERISTIC	CATEGORY	FREQUENCY	%	χ^2 Wald test P-value
Gender	Male	27	67.5	0.799
	Female	13	32.5	
Age in complete years	18-27	3	7.5	0.998
	28-37	25	62.5	
	38-47	9	22.5	
	48-57	2	5.0	
	Missing	1	2.5	

Description of inventory management staff

Pharmaceutical staff constituted the majority in the inventory management team 21(52.5%), followed by store keepers 7(17.5%), while 6(15.0%) were supplies officers, 5(12.5%) were procurement officers and 1(2.5%) was health administrator. In relation to education level majority of inventory management staff had diplomas 27(67.5%), 5(12.5%) had college certificates, 4(10.0%) were graduates and 2(5.0%) had completed HND and secondary education each. 10(25.0%) were either users or store keepers, 8(20.0%) were involved in procurement, 6(15.0%) were involved in dispensing, 5(12.5%) were supervisors while 1(2.5%) was missing. Majority of the diploma holders were pharmaceutical technologist and they were involved in ordering of essential drugs, storage and distribution of the drugs to other department in the facility. Regarding the work experience, majority 21(52.5%) had been working in their current positions for 1-5 years, 10(25.0%) had worked for 6-10 years, 7(17.5%) had worked for 11-15 years and the rest had worked for more than 15 years. Majority of the respondents had enough work experience to understand the inventory practices in their institution and their effects on availability of essential drugs. The position in the organization, level of education attained, role in inventory management of essential drugs and number of years worked in current position didn't have significant effects on the inventory management (p-values>0.05).

Demographic characteristics of Clinical staff

The study established that there was 98(56.6%) male and 75(43.4%) female clinical staff respondents. On age distribution for clinical staff 87(50.3%) were aged 28-37 years, 44(25.4%) were aged 38-47 years, 25(14.5%) were aged 18-27 years, 15(8.7%) were aged 48-57 years and 2(1.2%) were aged 58-67. Distribution of clinical staff by cadres was as follows; 89(51.4%) served as nurses, 60(34.7%) served as clinical officers, 23(13.3%) served as doctors and 1(0.6%) did not indicate. On education and the level of training of health workers (clinical staff), it was established that 108(62.4%) had completed diploma, 26(15.0%) were graduates, 20(11.6%) had HND, 16(9.2%) had college certificates, 3(1.7%) had masters degree.

Regarding the role of respondents on the inventory management, it was established that 89(51.4%) were prescribers, 74(42.8%) were users, 9(5.2%) were supervisors while 1(0.6%) missing. The study established that majority of health workers 100(57.8%) had worked in the health facility for 1-5 years, 48(27.7%) had worked for 6-10 years, 19(11.0%) had worked for 11-15 years, 4(2.3%) had worked for 16-20 years, 1(0.6%) had worked for 26-30 years while 1(0.6%) did not indicate. The above information is illustrated in the figure 4.2 below.

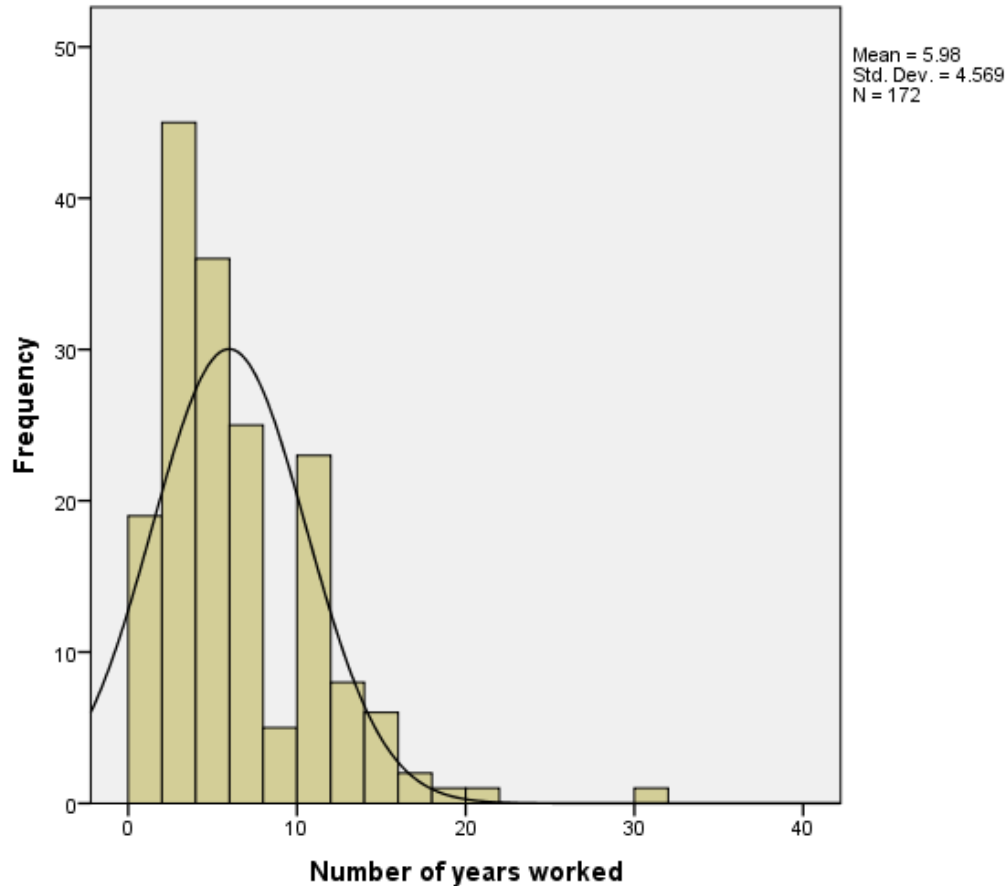


Figure 4.2 experience of clinical staff

Current stock control practices.

Inventory control practices includes: stock taking and stock reconciliation as well as ordering. The current Stock levels control mechanisms applied by the inventory management staff in mission and public hospitals in Meru County included, computer stock control system 13(32.5%), stock audit 12(30.0%), physical counting, stock taking and stock reconciliation 4(10.0%) each and regular stock review, manual tracking and inventory management system 1(2.5%) each. Stock levels were mainly controlled monthly 33(82.5%), weekly 4(10.0%) and quarterly 2(2.5%). Hospitals facilitated smooth running of general inventory management of essential drugs 60.5%, ensured presence of SOPs 53.5% and ensured maximum, minimum and re-order levels in the health facilities 54.5% and stock taking of essential drugs in the health facilities was also conducted 57.5%. According to the study, Persons identified to be responsible for updating stock included the store keepers 27(67.5%), pharmacists 9(22.5%), internal auditor 2(5.0%) and the in-charge and any staff 1(2.5%) each. Frequency of updating stock levels was mostly; monthly 27(67.5%), weekly 10(25.0%) and quarterly 3(7.5%).

From the study, Essential drugs were ordered on monthly basis 23(57.5%), quarterly 15(37.5%) and annually 1(2.5%) mainly by Pharmacist 50.0%, Store keeper 7.5%, procurement officer 5.0% and the in-charge 2.5%. If ordered quantities were not supplied, 22(55.0%) of the inventory

management team notified the suppliers, 13(32.5%) informed management and 2(2.5%) sourced from other suppliers. Quantities to be ordered were mainly determined by the procurement officer 29(72.5%), pharmacist 3(7.5%), store keeper 2(5.0%) and generated by computer system and health facility in-charge 1(2.5%). All the p-values were >0.05 hence not significant on the inventory management practices. On determining the quantity of drugs to be ordered majority of respondents indicated that past Consumption 33(61.1%) was the main criteria used, request from users 12(22.2%) and availability of funds 9(16.7%) were other ways of determining quantity of drugs needed in facility.

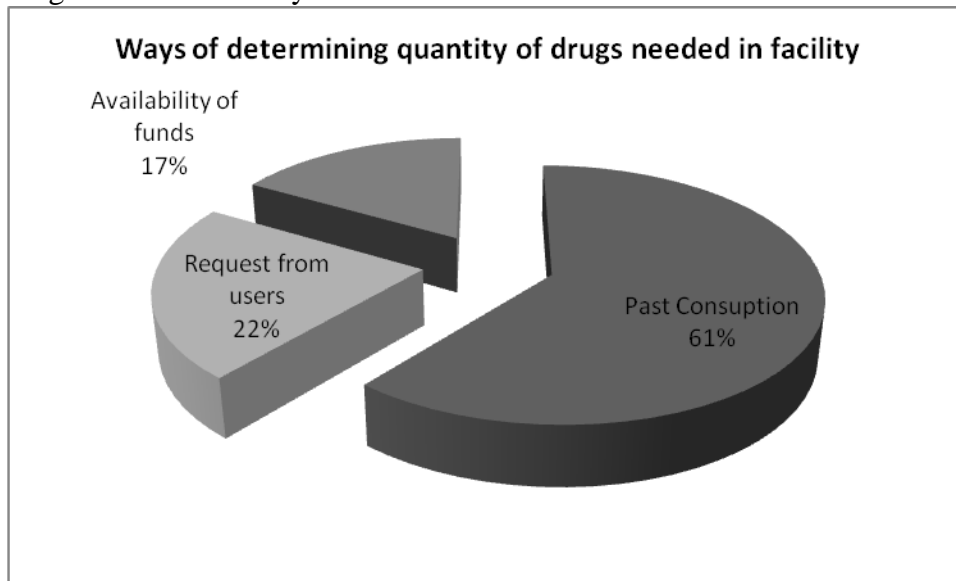


Figure 4.3 Determining the quantity of drugs needed in the facility

Table 4.2 Determining the quantity of drugs needed in the health facility

Type of hospital		Frequency	%
Mission	Past Consumption	16	53.3
	Request from users	10	33.3
	Availability of funds	4	13.3
Public	Past Consumption	17	68.0
	Request user	3	12.0
	Availability of funds	5	20.0

Method by which essential drugs are approved and issued were mostly FEFO (First Expiry First Out) 36(90.0%) and FIFO (First In First Out) 2(5.0%) and was significant on the inventory management practices (χ^2 Wald test P-value =0.011). Good inventory control practices were identified mainly in FEFO (First Expiry First Out) approval and issuance methods. Issuance of essential drugs from store was mainly by approved requisition 100%.

Table 4.3 Method of approving and issuing ED

Type of hospital	Methods	Frequency	%
Mission	FIFO	2	10
	FEFO	18	90

Public	FEFO	18	90
	Others	2	10

The study also established that majority of the clinical staff 143(82.7%) experienced delays in getting ordered essential drugs for the department or the health unit, 29(16.8%) did not experience delays while 1(0.6%) was missing. Majority of clinical staff 154(89.0%) used pharmacy to determine the quantity of drugs to be requested, 17(9.8%) used consumption data to determine the quantity to be requested while 2(1.2%) were missing. Regarding the action taken by the clinical staff if the ordered drugs were not met, majority of the respondents 83(48.0%) informed the management, 22(12.7%) did nothing about it, 20(11.6%) used alternative drugs, 19(11.0%) used the available stock while waiting for more supplies, 12(6.9%) asked for explanation from the supplier, 4(2.3%) referred patients to other facilities, 3(1.7%) borrowed from other facilities, 3(1.7%) re-ordered while 3(1.7%) were missing.

In the event drugs ran short, majority of clinical staff 92(53.2%) referred patients to private pharmacies, 15(8.7%) borrowed from other departments, 14(8.1%) consulted the management on ordering of the drug for the patient, 13(7.5%) used alternative medication, 6(3.5%) borrowed from other facilities, 5(2.9%) ordered for the essential drugs for the client, 25(14.5%) referred the patients to other facilities, 1(0.6%) terminated the treatment while 2(1.2%) were missing.

Storage practices for essential drugs.

Storage practices explored in the study included both pre and post storage activities. The process of inspection of essential drugs on delivery to a health facility included 100% physical inspection 87 % and random sampling 13 %. Stages of inspecting essential drugs were mostly before storage 25(62.5%), after unloading 10(25.0%), before unloading 2(5.0%) and after storage 1(2.5%). Stages of inspection were significant on the inventory management practice (χ^2 Wald test P-value =0.000). There was significant correlation between the inventory management practices and inspection stage of essential drugs (χ^2 Wald test P-value =0.037) with best practices identified when inspection was done before storage. This implies that inspection before storage increased odds of good inventory management practices.

Table 4.4 ED Inspection process

Type of hospital	Inspection process	Frequency	%
Mission	100% physical inspection	19	95
	Random sampling	1	5
Public	100% physical inspection	18	90
	Random sampling	2	10

When they clinical staff respondents were asked if they have ever been supplied with drugs of questionable quality in their department or health unit, 98(56.6%) responded in affirmative while 74(42.8%) denied, 1(0.6%) did not respond. Majority of health workers received drugs of questionable quality indicating that there was a problem in the storage of essential drugs, drugs of questionable quality could not be used in health service delivery , hence shortage of essential drugs.

Management of returns for Essential Drugs

In most health facilities there was provision for returning essential drugs that do not meet the set criteria 80.0% and accepting essential drugs that have been returned to drug store. Documents received along with the commodities were invoices 91.9% and delivery notes 51.4%. Criteria of accepting or rejecting returned essential drugs was; damaged goods 73.0%, quality 29.7%, quantity 18.9%, leakage 13.5% and proper documents 5.4%. From the study, majority of the clinical staff 91(52.6%) stated that they had experienced challenges in returning the essential drugs wrongly supplied while 81(46.8%) had not experienced any challenges. 1(0.6%) were missing. When receiving or ordering essential drugs from the main store, majority of the clinical staff 169(97.7%) were required to fill documents with only 3(1.7%) stating that they did not fill any documents, 1(0.6%) did not respond.

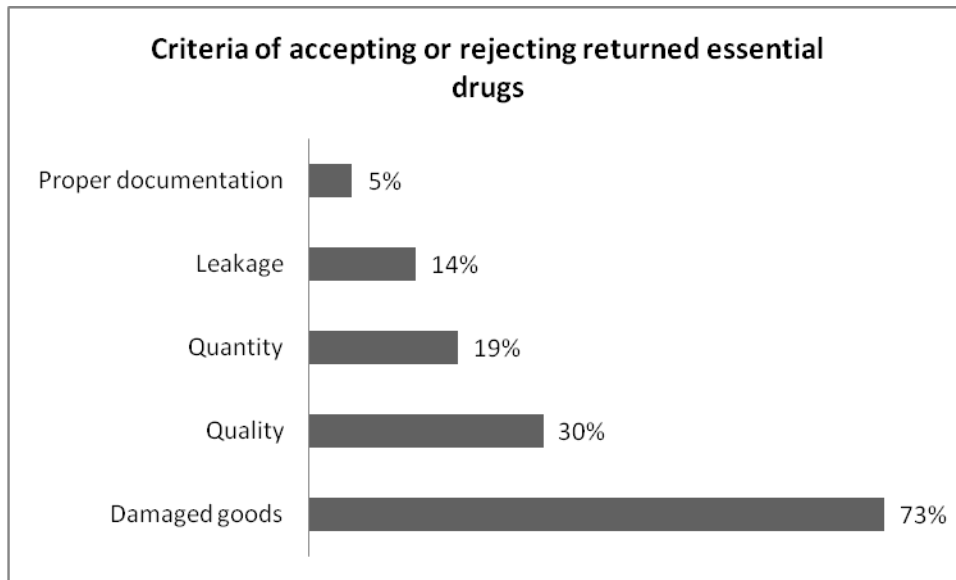


Figure 4.4 Criteria of accepting or rejecting returned ED

Health facilities were doing good enough to facilitate management of return of essential drugs 72.0%. Most health facilities had also maintained separate records for other health commodities and essential drugs 70.5%.

The study revealed that; although majority of respondents were required to fill documentation when receiving or issuing ED, majority of clinical staff had challenges returning ED drugs rejected or wrongly supplied to their department. This resulted to poor distribution of ED within the health facility leading shortage of essential drugs in some areas where they could be used to offer health services and surplus in other areas of the health facility.

From the study it established that the main suppliers of essential drugs were MEDS 35.5%, KEMSA 29.0%, Pre-qualified supplier 19.4% and Private distributors 16.1% (p-value= 0.734). The study also established that time taken to deliver ordered essential drugs was mostly less than a month 22(55.0%), less than two weeks 14(35.0%) and less than four months 1(2.5%).

From the study MEDS was identified as a more reliable supplier compared to government owned KEMSA. MEDS supplied to both mission and public hospital while KEMSA which is a semi

autonomous government agency supplied to public health facilities. Mission hospitals which relied on MEDS for supply of essential drugs experienced fewer instances of drug stock out compared with public hospitals.

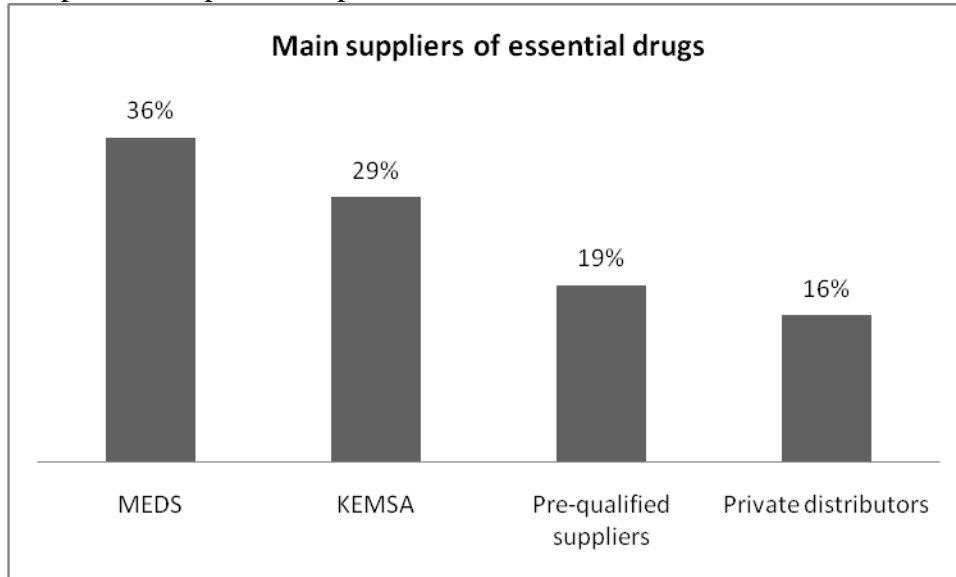


Figure 4.5 Main suppliers of essential drugs

Inventory Management challenges

The study established that the challenges experienced by the inventory management team during work included; stock outs 12(30.0%), 7(17.5%) inadequate storage space, budget constraints 6(15.0%), poor inventory record keeping 4(10.0%), inadequate essential drugs/ stocks, lack of teamwork, delayed supplies 2(5.0%) each, patient inability to pay for drugs, delay in getting suppliers and inadequate staffing in department 1(2.5%) each. Majority of inventory management staff 82.0% stated that they did not have adequate training to perform their duties. As indicated in the Table 4.6; inventory management challenges experienced in public hospitals were different from the challenges experienced in mission hospitals. In mission hospitals budget constraints 4(20%) and inadequate storage facilities 4 (20%) were the major challenges experienced while in public hospitals stock outs of essential drugs 9(45%) and inadequate storage facilities 4(20%) were the main challenges experienced. There was no significant relationship (Pearson Chi-square p-value= 0.373) between the challenges faced in mission and public hospitals. Majority of clinical staff 148(85.5%) affirmed that they experienced running short of essential drugs while offering service to clients, while 25(14.5%) had not experienced running short of essential drugs. The challenges experienced by clinical staff included; frequent stock out of essential drugs 42(24.3%), delay in supply 33(19.1%), inadequate stocks 19(11.0%), disparity in trade names 17(9.8%), delay in ordering 9(5.2%), lack of proper documentation 6(3.5%), poor quality drugs 4(2.3%), lack of funds 4(2.3%), the challenge of being supplied with the wrong drugs 4(2.3%), long /time consuming ordering procedures 4(2.3%) and bulk documentation 3(1.8%). 27(15.6%) did not experience challenges, while 1(0.6%) was missing.

Majority of inventory management staff 38(95.0%) had experienced stock out of essential drugs which was resolved mainly by purchase from local suppliers 45.0%, sending patients to local pharmacies 35.0%, purchasing from pharmacies private pharmacies 5.0% and, prescribing alternative drugs, send patients to other health facilities and wait until supplied 2.5% each. From the study some of the strategies suggested for improving inventory management of essential drugs were increasing the number of properly trained inventory management staff and increased budgetary allocation as highlighted in the figure 4.6;

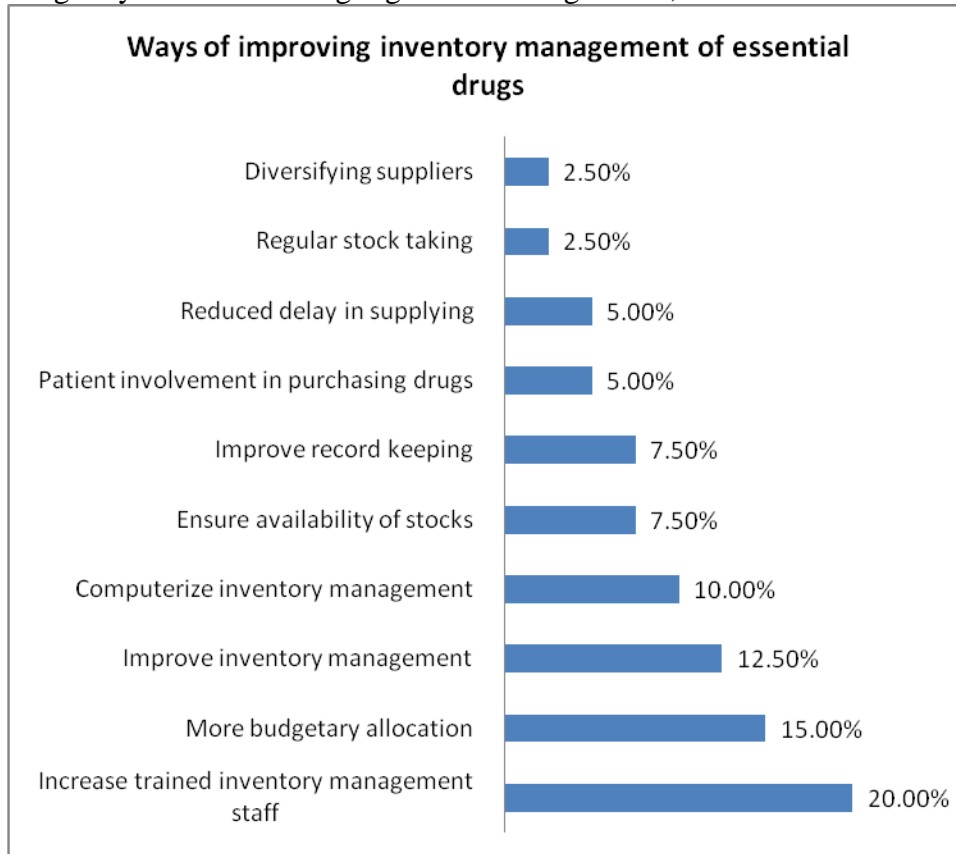


Figure 4.6 Ways of improving inventory management

Regarding the ways of improving inventory management, majority of clinical staff 67(38.7%) suggested involvement of health workers (clinical staff) in inventory management, 47 (27.2%) suggested timely supply of essential drugs and 29(16.8%) suggested ensuring adequate availability of stock throughout. Other suggested ways of improving inventory management included; improving on inventory record management 7(4.0%), improvement and simplification of ordering process 7(4.05%), improvement on documentation 4(2.3%), availability of adequate storage space in drug store 3(1.7%), addressing delivery delays 1(0.6%), availing adequate funds 1(0.6%), ensuring supply of drugs of the right quality 1(0.6%), increase number of staff in drug store 1(0.6%), involving H.O.Ds in procurement process 1(0.6%). reviewing of inventory management systems 1(0.6%) while 3(1.7%) were missing (did not offer any suggestion)

Discussion

The study involved two levels of staff working in mission and public hospitals namely the inventory management staff and the clinical staff. Majority of the inventory management staff were pharmaceutical technologists while the majority of the clinical staff were clinical officers. Mission hospitals had younger staff compared to public health facilities with majority of them having diploma level of education in various fields. The experience of both inventory and clinical staff was skewed towards 1-5 years. Kaimenyi (2012), states that the length of time an individual spends in doing a particular job leads to development of shared understandings and experiences. According to Laaria (2013), the number of years an individual has worked in any field is of importance in explaining the experience gained in working in that field. Although the study established that the experience of clinical staff was skewed towards 1-5 years of work experience, it was observed that the respondents had pre requisite experience on the effects of inventory management practices on the availability of essential drugs in both public and mission hospitals. The respondents also understood the current inventory management practices in their health facilities and the inventory management challenges. The study established that even in health facilities which had staff with over considerable years of experience, the challenges of inventory management existed suggesting that previous solutions may not have worked as required.

The study identified various weaknesses in the current management practices in public and mission hospitals in Meru County which had impact on availability of essential drugs and quality of health services offered by the health facilities. These weaknesses include; lack of proper inventory control and lack of adequate, efficient and reliable storage facilities for essential drugs as well as improper management of returns. Public hospitals were more affected than the mission hospitals. The poor inventory management practices results to chronic stock out of essential drugs. The findings of the study are consistent with similar studies by Transparency International-Kenya 2011, which established that shortage of essential drugs in public health facilities was a common phenomenon (Transparency International, 2011). The findings of the study also agree with a similar study by Wangu (2014) that showed shortage of essential drugs is a major challenge in public hospitals in Nakuru County. Most of the patients seeking health services from public health facilities upon consultation were given a prescription to purchase drugs from private pharmacies at inflated cost. The findings agreeing with a similar study in Ghana that established that about 50% of the patient did not receive the prescribed medicines and purchased the drugs from the private pharmacies, (Annor, 2012). The unavailability of essential drugs in health facilities in Meru County was identified to be consistent with another study by Mungu, (2013) in Bungoma East Sub County which established that indeed shortage of essential drugs exists in health facilities and can be improved by improving essential drugs inventory management practices. The researcher noted that health workers sympathized with patients who had to purchase the drugs from the private chemists and majority of the health workers were of the view that if the required essential drugs were available in the health facility could be cheaper and more convenient to the patient.

In South Africa, a study by MSF (2014), established that a wide range of drugs had been unavailable to patients all across South Africa. Problems occur at multiple points in the

procurement and supply process. Although the study majored with major health facilities in Meru County, similar problems could be facing health facilities in the lower levels as experienced in South Africa where both large and small facilities are affected by stock out of essential drugs with smaller facilities being particularly vulnerable. This is because they depend on bigger facilities for supplies downstream since they do not receive direct supplies from depots. When larger facilities are affected, they too are affected since larger facilities may withhold ED supplies when stocks are scarce, (MSF, 2014).

Majority of inventory management staff 82.0% stated that they did not have adequate training to perform their duties well. One of the ways suggested to improve inventory management was further training in supply chain management. Training of inventory management staff was identified as the main way of improving inventory management practices, this agree with the findings in Zimbabwe where training of inventory management led to improvement in availability of stock, (WHO, 2004). Involvement of clinical staff (Health workers) in inventory management activities like product selection, ordering and storage was identified as the other way of improving inventory management. This is contrary to assertion by State Institute of Health Welfare (2010), that inventory management is an adhoc affair for inventory staff.

The inventory management challenges were found to be different among the two categories of the hospitals which could be attributed to inventory management practices. In mission hospitals budgets constrains was identified as the main challenge while stock out of essential drugs was the main challenge in public hospital. Perennial shortage of essential drugs in public health facilities affects the quality of health services offered by the health facilities. The study also established that inventory practices were better in mission hospitals when compared to public hospitals which agree with the observation made by the researcher on both health facilities on observation checklist scores. The patients from mission hospitals were more likely to get all the prescribed medicine when compared to patient seeking health services from public hospitals. The researcher noted that mission hospitals did better than public hospitals in all aspects of inventory management in the observation checklist score.

Regarding the comparative performance of public and mission hospitals in inventory management practices, it was established that mission hospitals performed well in all aspects inventory management compared to public health facilities as indicated in the figure 4.7 below.

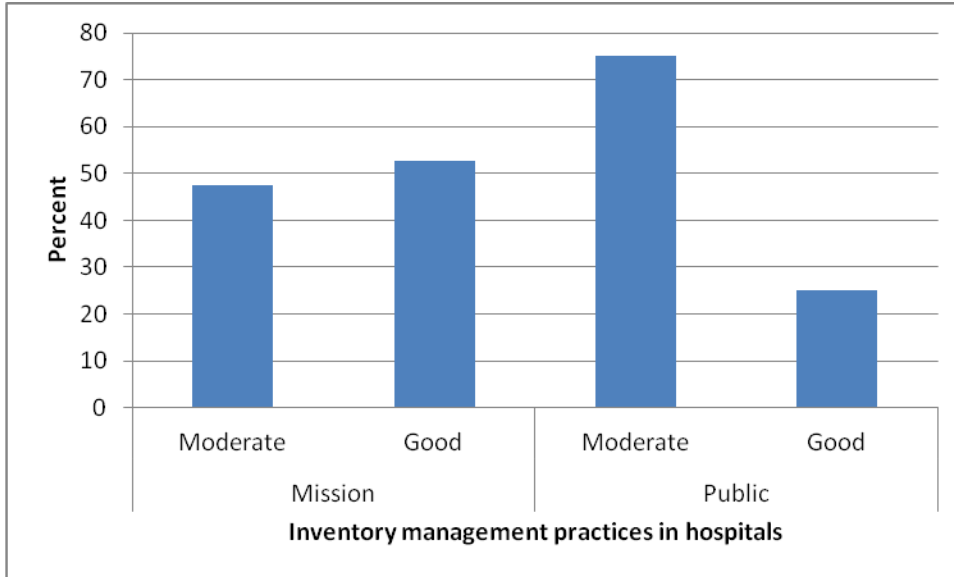


Figure 4.7 Inventory management practices

Satisfaction with inventory management was also different between the two categories of health facilities. Satisfaction with inventory management for mission hospitals was good at 84% while for the public hospitals it was at 16% as shown in the figure 4.8.



Figure 4.8 Satisfaction levels in public and mission hospitals.

The study also established that only 63(36.4%) of clinical staff respondent were satisfied with the general inventory management practices for essential drugs while the majority 105(60.7%) were not satisfied. The findings agree a study by Walkowiak & Gabra (2008), which suggested that staff attitude towards clients and service delivery can be negatively affected when essential medicines and medical supplies they need to perform their jobs, efficiently and safely, are not consistently available, (Walkowiak & Gabra, 2008).

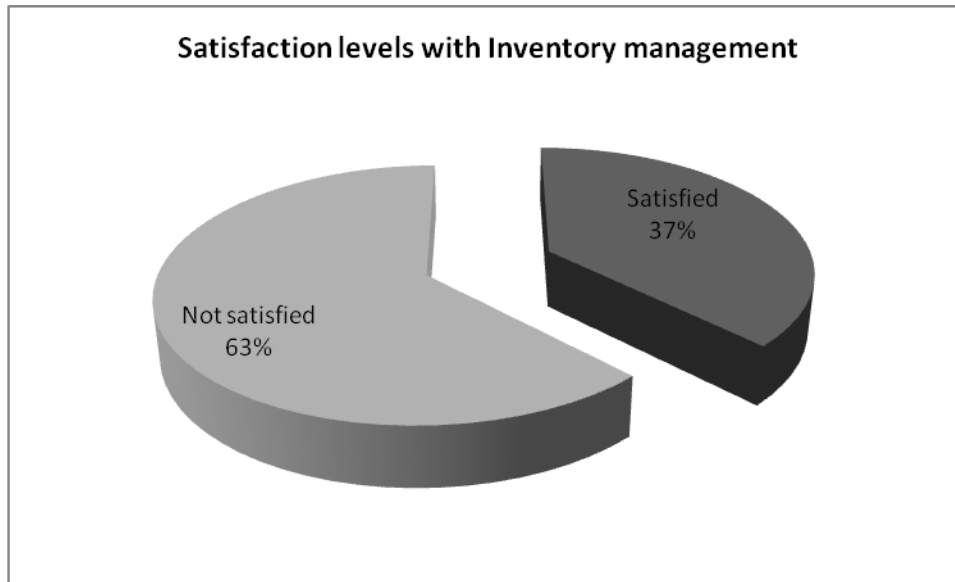


Figure 4.9 Satisfaction levels with inventory management

Satisfaction levels were significant on the inventory management practices (χ^2 Wald test P-value=0.05). Significant correlation was identified between respondent's satisfaction levels and inventory management practices where satisfied respondents mainly had good inventory management practices. Unavailability of essential drugs due poor inventory management practices affected the service delivery by the clinical staff leading to low satisfaction levels. Mission hospitals had adequate storage facilities and slightly higher budgetary allocation for essential drugs as compared to public hospitals. The study agree with a similar finding by Transparency International (2011) that established that doctors at Nazareth mission hospital were more motivated than doctors at Kiambu Level 5 hospital in the same county. This is because doctors at Nazareth hospital performed what they were trained to do since all medical supplies they needed to offer services to patients were available, which was not the case with Kiambu Level 5 hospital, (TI, 2011).

Conclusion

From the study, it was established that Good inventory control practices were identified mainly in FEFO (First Expiry First Out) approval and issuance methods and there was a significant correlation between the inventory management practices and inspection stage of essential drugs with best practices identified when inspection was done before storage. This implies that inspection before storage increased odds of good inventory management practices.

The study established that there were challenges in management of returns and majority of respondents had experienced shortage of essential drugs while offering services, however Mission hospitals performed better than public hospitals in all aspects of inventory management practices.

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REFERENCES

- African Medical Research Foundation;(2007), *Commodity Management for HIV/AIDS*. The African Medical Research Foundation (AMREF),Nairobi.Kenya. Website: www.amref.org. viewed on 14/2/2014
- Aronovich,Dana Gelfeld, and Steve Kenzitt.(2001).Kenya: Assessment of the health commodity supply chains and the role of KEMSA.Arlington, VA:DELIVER/John Snow.inc. for USAID.
- Annor N, (2012).Inventory management in the Ghana Health service and its role in Health care delivery.: A case study of health facilities in Ho Municipality.
- Chandani, Yasmin, Barbara Felling, Claudia Allers, David Alt, Marilyn Noguera, and Alexandra Zuber. (2006). *Supply Chain Management of Antiretroviral Drugs: Considerations for Initiating and Expanding National Supply Chains*. Arlington, Va.: DELIVER, for the U.S. Agency for International Development.
- Dale S. Rogers, Douglas M. Lambert, Keely Croxton and Sebastian Garcia-Dastugue.(2002). The Returns Management Process. *International Journal of Logistics Management*. P. 5, V 13, no. 22
- Jabulani N., (2005).World Bank Training programme, managing procurement and logistics of HIV/AIDS drugs and related supplies. World Bank, Beirut, Lebanon.
- John Snow, Inc.(2000). *The Logistics Handbook: A Practical Guide for Supply Chain Managers in Family Planning and Health Programs*. Arlington, VA: JSI.
- Management Sciences for Health,(2009)Managing drug supply. <http://www.msh.org/resource> centre. Viewed on 20th Oct. 2013
- Management Sciences for Health (2012), Inventory Management. <http://www.msh.org/resource> centre, viewed on 22 August 2014
- Ministry of Health,Ghana, (2012). Health commodity supply chain master plan.MoH. Accra Ghana.
- Ministry of Health, Uganda ,(2000). Health Sector Strategic Plan. MoH. Kampala. Uganda.
- Ministry of Public Health and Sanitation (MOPHS).(2008). 2nd *National Health Sector Strategic Plan. Government of Kenya*. Nairobi. Kenya.

- Ministry of Health (MOH) 2006, Reversing the trends; The second health sector strategic plan of Kenya: Annual Working Plans 2 2006/07. Nairobi. Kenya.
- Mugenda O,& Mugenda A.(2003). *Research Methods: Qualitative and Quantitative Approaches*. Nairobi., Kenya: Acts press.
- Mungu S. (2013), Supply Chain Management practices and Stock levels of essential drugs in public health facilities in Bungoma East-Sub County, University of Nairobi, Kenya
- MoH (2009),National Pharmaceutical Sector Strategic Plan (NPSSP) 2000/10-20013/14, Draft, September Ministry of Health, Government of Uganda. 44
- MSF (2013).The Chronic Crisis: Essential drug stock- outs risk unnecessary death and drug resistance in South Africa
- Ndavi, P.M., S. Ogola, P.M. Kizito, and Johnson K.(2009). Decentralizing Kenya's Health Management System: An Evaluation. Kenya Working Papers No. 1. Calverton, Maryland, USA: Macro International Inc.
- Orengo P. (2012). Drug shortage hits public hospitals, Standard Newspaper, Nairobi. Kenya 28th March 2012.
- Program for Appropriate Technologies in Health (PATH),.(2005).*Prices of Reproductive Health Medicines in Nicaragua*. Seattle: PATH
- Raja S. and Mohammad N.(2004).*Supply chain management for IV/AIDS Medical commodities, National HIV/AIDS programmes*
- Rao, Raja, Peter Mellon, David Sarley.,(2006). *Procurement Strategies for Health Commodities: An Examination of Options and Mechanisms within the Commodity Security Context*. Arlington, Va.: DELIVER, for the U.S. Agency for International Development.
- Rao, Raja, and Dhruva Thapa., (2005). *Nepal: Reproductive Health Commodity Pricing Survey: Understanding Equity, Access and Affordability of Essential Reproductive Health Commodities*. Arlington, Va.: John Snow, Inc./DELIVER, for the U.S. Agency for International Development.
- Riungu, J. M. (2010). Managing health supply chains in Africa. *Africa Christian Health Associations Update*. (11). Retrieved from www.africahap.org
- State Institute of Health and Family Welfare,(2010), Reading material on drug store management and rational drug use for Medical Officers, Nurses and Pharmacist, Rajasthan, India.
- Transparency International,(2011), Kenya health sector integrity study report. TI. Nairobi. Kenya.
- USAID | DELIVER PROJECT,(2011). *The Logistics Handbook: A Practical Guide for The Supply Chain Management of Health Commodities* 2nd Edition, Arlington, Va.: USAID | DELIVER PROJECT,
- Walkowiak, H., and M. Gabra, with G. Sangiwa and Y. D. Mukadi.,(2008). *A Commodity Management Planning Guide for the Scale-Up of HIV Counseling and Testing Services*. Submitted to the U.S. Agency for International Development by the Rational

Pharmaceutical Management Plus Program. Arlington, VA: Management Sciences for Health.

Wangu M, (2014). Availability of essential medicines in Public hospitals ;A study of selected public hospitals in Nakuru, County, Kenya. Kenya Methodist University, Nairobi, Kenya.

WHO.(2000), *World Health Report*. Geneva. Switzerland.

WHO.(2004), How to improve management of essential drugs programme by regular surveys, A case study of Zimbabwe; Geneva, Switzerland.

WHO.(2007),. *Everybody's business, strengthening health systems to improve outcomes, WHO framework of action*. WHO. Geneva. Switzerland.