



IMPLEMENTING AN INTEGRATED HOSPITAL PHARMACY DRUG TRACKING AND INVENTORY MANAGEMENT SYSTEM: A CASE OF SELECTED HEALTH FACILITIES IN KESSES SUB-COUNTY

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ABSTRACT

One of the pillars in Kenya's Health is service delivery and safety. In order to actualize and implement the aforementioned pillar, there is need to embrace and adopt the integration of Health information system. Irrational use of wrong dispensation of drugs is a major challenge that could either turn fatal or if not results to poor health delivery. This Thesis proposal will endeavor to examine challenges faced by sub-county when using the manual system and provide tools for establishing an electronic system. The main aim of the project is to design and integrate computerized Pharmacy inventory system in Kesses Sub County. The researcher will analyze the effect of drug inventory and tracking in the entire sub-county. It will determine how inventories are controlled; maintain a balance of supply and demand of drugs in the pharmacy. The objective of this project is to provide better control access of medication in the pharmacy and provide full audit trail of transactions. The researcher will investigate if there is a footprint in the healthcare centre within the sub county and also establish significant impacts of using the manual pharmaceutical system and also find out the requirements needed in implementation and also asses the behavioral character of staff. The study will adopt the theoretical foundations of Hospital pharmacy Management and development and also McKesson retail pharmacy automation. Six health facilities will be selected (two facilities from each ward) health facility workers will be sampled through questionnaires and interviews. Validity of data collection instrument will be determined through experts' judgment with supervisors, lecturers and colleagues. Data collected will be coded analyzed with SPSS and the results will be presented using the frequency tables and charts. The findings will be used by the researcher as input in the next phase of designing developing and implementing and integrated hospital pharmacy drug tracking and inventory management system. The system will have the capability to improve patients care by promoting medication and dispensing accuracy and its finding will be useful to both the researcher, Sub-County and the entire Uasin-Gishu County.

INTRODUCTION

1.0 BACKGROUND OF THE STUDY

Progress in patient safety and quality has been slow, despite increasing recognition of risk across the health care system. Efforts to reduce harm to patients or to improve quality of care often focus on a single, local intervention or a collection of local interventions, usually seeking to improve a single care process. Although valuable, this approach is incremental, resulting in

modest, though needed, improvements. Most quality improvement efforts miss a larger opportunity to improve and redesign the fabric of health care. It appears that a systems-integration approach that incorporates the fundamental building blocks of health care, from equipment and technology to clinical insight and workflow processes, is needed to take the next major leap in improving quality and safety (Mathews&Pronovost, 2011)

Drug shortages are complex and global phenomenon when drugs cannot be delivered at the moment of patient demand every stakeholder in the health system is affected (Pauwels, Huys, Casteels,& Simoens (2014).

Drug product shortages can adversely affect drug therapy, compromise or delay medical procedures, and result in medication errors. Health care professionals are increasingly concerned about the clinical effect that shortages have on patients and the tremendous resources required to address shortages (Fox, 2009).

Pharmacy Inventory Control is key for pharmacists. Every day, new drugs and their brand variants are introduced to the market. Pharmacists have to adapt new methods to ensure that whatever they stock is up to date and safe. An effective inventory control strategy is centred around the use of technology and curtails significant stock loss. (Dranitsaris,2017).

Drug inventory control of hospital pharmacy is very essential in order to provide continuous supportive services, since it provides the rate of consumption and purchasing cost.

Medical and drug supply system is a pillar that ensures reliable supplies of affordable and quality medicines. Medicines and medical supplies form the second largest component in the budgets of national health services, only exceeded by salaries for staff. Creating efficient medical and drug supply systems that can minimise costs is therefore vital if governments are to balance national health budgets.

Drug management is overseeing the logistics of receiving, storing, transporting and distributing drugs, maintaining drug accounts and documents, preparing necessary drug reports and keeping drug losses to an acceptable minimum (Management Science for Health,2009). Some authors state that an appropriate management of medicines must ensure patient safety in accordance with the right product or the right service to the right patient at the right time using the right way and in the right quantity (Hughes,2008).

A good Pharmacy Management Information System provides the necessary information to make sound decisions in the Pharmaceutical sector. Effective pharmaceutical management requires policy makers, program managers, and health care providers to monitor information related to patient adherence, drug resistance, availability of medicines and patient safety, product registration, financing and program management among other issues (Management Science for Health, 2011).

Globally, there are countries that have adopted the drug tracking system, for instance in Saudi the food and drug authority have adopted drug track and trace system as one of its plan to contribute to the national transformation program. This system enhances food and drug authority role in protecting society and guaranteeing the safety of all drugs by knowing its origin starting from manufacturing phase to consumption.

Regionally, in Malawi the minister for health announces the rollout of tracking system in December 2017. This is to reduce theft in drugs. Malawi began strengthening its health management information system with an analysis of the strengths and weaknesses of existing information systems, sharing findings with all stakeholders. All were agreed on the need for reformation of various, vertical programme-specific information systems into a comprehensive, integrated, decentralized and action-oriented simple system (health policy and planning)

In Kenya, inventory control was not seen to be necessary. In fact excess inventories were considered as indication of wealth. Management by then considered over stocking beneficial. But today firms have started to embrace effective inventory control (Susan & Michael, 2000).

Assessing the pharmaceutical situation in a country provides baseline information on whether its population has access to essential medicines that are of good quality, are efficacious and are being used properly. Results for such assessment can be used as a guide by policy makers and managers to develop and define the necessary changes and priority areas that require support for improved health for all. In the light of the above, WHO supported Kenya in April 2003 to carry out a baseline survey in the pharmaceutical sector to assess the current situation regarding access and use of quality medicines. The survey was carried out using the WHO Operational Package for Monitoring and Assessing the Pharmaceutical Situation in Countries (April 2003 version)

In 2017, KEMSA announced a plan to roll out new technology to enable counties manage stock in their pharmacies. The KEMSA chief officer said that the commodity dispensing system will help track stock levels and movement and make real time reports to the county government for re-order.

According to Dobler and Burt (2006) , inventory alone account for as much as 30% of the organization invested capital. It's for this reason that the Government of Kenya through its Supplies Manual (2007) has instituted procedures and techniques for the purpose of proper inventory control.

According to Kariuki (2017) there are several reasons for keeping inventory of stock. Too much stock could result in poor service delivery such as funds being tied down, increase in holding cost, deterioration of materials, obsolescence, and theft. On the other hand, shortage of materials can lead to interruption of products for sales; poor customer relations and underutilized machines and equipment's. The problem or inventory control exists in the Ministry of State for Provincial

Administration and Internal Security which is organized into five main departments. Inventory control of goods is decentralized, where the ministry has deployed some Supplies Officers in each of the department to coordinate the inventory control activities on the behalf of Head of Procurement.

The annual stock taking report conducted in August, 2011 in the Ministry, reveals that some critical items were out of stock, leading to hasty buying because of low stock levels, the annual stock taking report claimed that the problem might have been attributed to poor funding and long bureaucratic procedure. The report also revealed the cases of inaccurate recording or poor entering of some data information, which was a good indication of poor inventory control. Auditors from the Kenya National Audit Office on August, 2011 highlighted various observations in the Ministry of State for Provincial Administration and Internal Security.

Invariably, the Ministry must neither keep excess inventories to avoid an unnecessary tying down of funds as well as loss in fund due to pilferage, spoilage and obsolescence nor maintain too low inventories so as to meet users demand as at when needed. Therefore, the mere fact that ineffective inventory control affects virtually the organizational objectives necessitates this type of research work.

Statement of the problem

The Uasin-Gishu County at large has not laid great emphasis on electronic inventory management system which chiefly centres on pharmacy stock inventory, dispensing and drug tracking. Currently Kesses Sub- County health facilities are using the manual system which associated with drug expiry, delay in placing orders, drug shortage which causes adverse patient outcome and frustration to both health workers and patients

Research Purpose

The purpose of the study is to implement a pharmaceutical system that will ensure an efficient drug supply and a well-managed inventory at Kesses Sub-County.

Specific objective of the study

The main objective is to provide better control access of medication in the pharmacy and provide full audit trail of transactions.

1. To examine if the current manual system can provide footprints of drug dispensation to patients between different healthcare centres of Kesses Sub-County.

Research Design

The research design will be mixed research design. First, the researcher employ descriptive survey to gather data about the challenges arising from the use of the manual system in inventory, dispensing and drug tracking. Secondly, a scientific method of developing a prototype based on the findings of phase one will be adopted.

Sampling procedures.

The sampling procedure used is purposive sampling. The researcher will use the expert judgment to select a participant to represent the entire population. In this case clinicians, nurses, pharmacist and store clerks will be selected in all health facilities

Sample Size

A sample is any part of population of individuals on whom information is obtained (Jack, Frankel and Wallen,(2008)

Sampling is the process of selecting individuals to participate.

The study adopted a formula from Nassiuma (2000) using the coefficient of variation for estimating a sample size, n, from a known population size, N.

$$n = \frac{NC^2}{C^2 + (N - 1) e^2}$$

Conclusion

There is no/less history on patient's records and tracking of drugs. This was 100% positive. No tracking of dispensed drugs when a patient misses a drug he/she is advised to go buy thus causing frustration to patients

There is need to provide a better control access and provide full audit trail of drug transaction.



Abbreviations and Acronyms

ASHP	American Society of Health system Pharmacist
CDCP	Centres for Disease Control and Prevention
CO	Clinical Officer
DSCSA	Drug supply chain security
HER	Electronic Health Records
HIS	Health Information System
ICTA	Information and Communication Technology Authority

KEMSA	Kenya medical supplies agency
KMHFL	Kenya Master Health Facility List
MHO	Ministry of Health
PDMP	Prescription Drug monitoring program
PSIS	Pharmacy Stock Inventory system
PSQH	Patient safety and quality Health care
SPSS	Statistical package for social Science
UG	Uasin-Gishu
WHO	World Health Organization

Acknowledgements

First and foremost I wish to thank the almighty Father for his great love, care, protection and ability that he gave me to work on this proposed project.

Many thanks go to my husband Dr. Kemboi and the extended family for their love encouragement and providing me with all the basic needs during my course work and the time of the project.

Much thanks also goes to my supervisors, Dr. Lamek Ronoh and Dr. Ann Mugalavai for their selfless guidance and encouragement that they gave me.

ETHICAL APPROVAL

Ethical approval and consent were obtained from the National commission for Science Technology and Innovation and also Ministry of Health Uasin-Gishu County

References

Anacleto, T. A., Perini, E., Rosa, M. B., & César, C. C. (2005). Medication errors and drug-dispensing systems in a hospital pharmacy. *Clinics*, 60(4), 325-332.

Brady, J. E., Wunsch, H., DiMaggio, C., Lang, B. H., Giglio, J., & Li, G. (2014). Prescription drug monitoring and dispensing of prescription opioids. *Public Health Reports*, 129(2), 139-147.

Burt, D. N., Dobler, D. W., & Starling, S. L. (2003). *World class supply management: The key to supply chain management*. Irwin/McGraw-Hill.

Chaulagai, C. N., Moyo, C. M., Koot, J., Moyo, H. B., Sambakunsi, T. C., Khunga, F. M., & Naphini, P. D. (2005). Design and implementation of a health management information system in Malawi: issues, innovations and results. *Health policy and planning*, 20(6), 375-384.

Closs, D. J. (1989). Inventory Management: A Comparison Of A Traditional Vs. Sys. *Journal of Business Logistics*, 10(2), 90.

CONCERN, A. R. O. C. (1999). Essential Medicines and Health Products Information Portal A World Health Organization resource. Australian Prescriber, 22(1), 19.

Davis, F. D. (1993). User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International journal of man-machine studies*, 38(3), 475-487.

Domecq, J. P., Prutsky, G., Elraiyah, T., Wang, Z., Nabhan, M., Shippee, N., ... & Erwin, P. (2014). Patient engagement in research: a systematic review. *BMC health services research*, 14(1), 1-9.

Dranitsaris, G., Jacobs, I., Kirchhoff, C., Popovian, R., & Shane, L. G. (2017). Drug tendering: drug supply and shortage implications for the uptake of biosimilars. *ClinicoEconomics and Outcomes Research: CEOR*, 9, 573.

Fox, E. R., Birt, A., James, K. B., Kokko, H., Salverson, S., & Soflin, D. L. (2009). ASHP guidelines on managing drug product shortages in hospitals and health systems. *American Journal of Health-System Pharmacy*, 66(15), 1399-1406.

Henderson, D., Lunak, R., Markiewicz, E., & Tobin, C. C. (2013). *U.S. Patent No. 8,478,604*. Washington, DC: U.S. Patent and Trademark Office.

Howitt, P., Darzi, A., Yang, G. Z., Ashrafian, H., Atun, R., Barlow, J., ... & Cooke, G. S. (2012). Technologies for global health. *The Lancet*, 380(9840), 507-535.

Hughes, R. (Ed.). (2008). *Patient safety and quality: An evidence-based handbook for nurses* (Vol. 3). Rockville, MD: Agency for Healthcare Research and Quality.

Kaakeh, R., Sweet, B. V., Reilly, C., Bush, C., DeLoach, S., Higgins, B., ... & Stevenson, J. (2011). Impact of drug shortages on US health systems. *American Journal of Health-System Pharmacy*, 68(19), 1811-1819.

Kariuki, S. W., & Rotich, G. (2019). Role of stores management in reduction of redundant stock, a case study of Keroche Breweries Limited, Kenya. *International Journal of Project Management*, 1(1).

Laffel, G., & Blumenthal, D. (1989). The case for using industrial quality management science in health care organizations. *Jama*, 262(20), 2869-2873.

Leedy, P. D., & Ormrod, J. E. (2005). *Practical research*. Pearson Custom.

Longino, A. (2015). International Journal Of Environmental Research And Public Health. *Wilderness & Environmental Medicine*, 26(1), 99.

Mathews, S. C., & Pronovost, P. J. (2011). The need for systems integration in health care. *JAMA*, 305(9), 934-935.

McKemmish, S., Acland, G., Ward, N., & Reed, B. (1999). Describing records in context in the continuum: the Australian Recordkeeping Metadata Schema. *Archivaria*, 3-37.

Ofori-Asenso, R., & Agyeman, A. A. (2016). Irrational use of medicines—a summary of key concepts. *Pharmacy*, 4(4), 35.

Osborne, D., & Plastrik, P. (1997). *Banishing Bureaucracy: The Five Strategies for Reinventing Government*. Addison-Wesley Publishing Company, Inc., 1 Jacob Way, Reading, MA 01867.

Pauwels, K., Huys, I., Casteels, M., & Simoens, S. (2014). Drug shortages in European countries: a trade-off between market attractiveness and cost containment?. *BMC health services research*, 14(1), 438.

Regoniel, P. A. (2015). Conceptual framework: A step by step guide on how to make one. *SimplyEducate. Me*.

Rutta, E., Senauer, K., Johnson, K., Adeya, G., Mbwasi, R., Liana, J., ... & Alphonse, E. (2009). Creating a new class of pharmaceutical services provider for underserved areas: the Tanzania accredited drug dispensing outlet experience. *Progress in community health partnerships: research, education, and action*, 3(2), 145-153.

Santhi, G., & Karthikeyan, K. (2016). Recent review article on pharmaceutical inventory models. *International Journal of Pharm Tech Research*, 9(5), 435-443.

Sarpong, P. A. (2012). *Drug Inventory Management at Hospitals in the Greater Accra Region and its effect on Patient Care* (Doctoral dissertation).

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.

Shankar, P. R., Subish, P., Mishra, P., & Dubey, A. K. (2006). Teaching pharmacovigilance to medical students and doctors. *Indian journal of pharmacology*, 38(5), 316.

Susan, T., & Michael, K. (2000, October 28) TCRP Research Results Digest-Number 40

Trifirò, G., Pariente, A., Coloma, P. M., Kors, J. A., Polimeni, G., Miremont-Salamé, G., ... & Caputi, A. P. (2009). Data mining on electronic health record databases for signal detection in pharmacovigilance: which events to monitor?. *Pharmacoepidemiology and drug safety*, 18(12), 1176-1184.

Waako, P. J., Odoi-Adome, R., Obua, C., Owino, E., Tumwikirize, W., Ogwal-Okeng, J., ... & Aupont, O. (2009). Existing capacity to manage pharmaceuticals and related commodities in East Africa: an assessment with specific reference to antiretroviral therapy. *Human resources for health*, 7(1), 21.

Woo-Miles, K. (2015). Evaluating Hospital Pharmacy Inventory Management and Revenue Cycle Processes: White Paper Guidance for Healthcare Internal Auditors. *Costa Mesa, Deloitte*.