Procurement and Management of Pharmaceutical Supplies at the Siaya County Referral Hospital

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Summary

INTRODUCTION

Pharmaceuticals are integral in-patient care and consume significant institutional and national health expenditure. Pharmaceutical management practices worldwide adopt a centralized, decentralized or mixed approach, to varied outcomes. In Kenya, the Ministry of Health (MOH) alludes to frequent stock-outs, poor procurement and storage practices, inconsistent treatment guidelines, and the use of counterfeit drugs as shortcomings in streamlining patient care and improving health outcomes. The aim of this study was to evaluate the logistical management of pharmaceutical supplies in Siaya County Referral Hospital (SCRH).

MATERIALS AND METHODS

This was a cross-sectional study. Purposive sampling was done for key-informant interviews (KII). Chart review utilized hospital inventory data for the preceding quarter. Ms Excel was used to analyse the inventory data and the qualitative data was reported and manually analysed thematically.

RESULTS

SCRH has three pharmacies, a drug and therapeutic commission (DTC), an essential drug list (EDL) but is without a formulary or quality assurance department, even though procurement, flow and storage of medicines adheres to set national guidelines. Kenya Medical Supplies Agency (KEMSA) supplies 73.9% of the drugs while direct hospital purchases account for 17.4%. Most drug consumption occurs in the outpatient department (73.5%) and tablets constitute the largest portion of formulations consumed (64.3%). Finally, consumption is less than supply for all the individual drug types.

CONCLUSION

The facility adheres to national guidelines of procuring and handling pharmaceuticals. Notable shortcomings include the inadequate staffing, lack of a hospital formulary, quality assurance department and an inactive drugs and therapeutic commission (DTC). Also, significant shortfalls in tracer medication exist due to inconsistent delivery timelines by KEMSA.

***Keywords**: Pharmaceuticals, Formulary, SCRH, KEMSA, Procurement, Management*

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Introduction

Pharmaceuticals constitute an integral aspect of patient care. They play a critical role in interfacing health practitioners' intervention and actual patient recuperation (1). Managing pharmaceuticals, usually multidisciplinary, involves the shared responsibilities of various hospital personnel and follows specific guidelines (1,2). Despite the existence of established management guidelines and the continually increasing expenditure on pharmaceuticals (3), medication access in developing regions remains elusive for up to 33% of the population (4). The reasons for that include wastages, diversions, misappropriations and losses, due to flawed processes of procurement, storage, distribution and dispensation (4). Therefore, exploring the aspect of rational and judicious drug management is thus timely-conceived, as is the approach to make the safe acquisition and use of medicines a sustained reality.

Worldwide, the procurement and management practices of drugs vary markedly, due to differences in drug policies, practice environments and even supply chains (5)**.** The UK, for instance, has the National Health Service (NHS) and national and local procurement groups for pharmaceuticals (PPGs) that direct drug management (5). In the USA, states collaborate with the department of human health services (HHS**)** to appropriately manage pharmaceuticals (6). However, the situation in Vietnam is decentralized, with the procurement policies, upholding medication quality, storage and use of medications as a preserve of the hospitals and not being centrally managed by the ministry of health (6). In South America, drug management is centralized (7), just as South Africa relies on the National Essential Medicines List Committee (NEMLC) and the department of health (8, 9) for proper national drug management.

The intricate organization notwithstanding, pharmaceuticals face the daily threat of rogue workers, physical theft, illegal sale and distribution (10). These lead to frequent stock-outs, poor procurement and storage practices, inconsistent treatment guidelines, and the use of counterfeit drugs, according to a health facility survey on the access to essential medicines in Kenya by the Ministry of Health (MOH) (11). Muhia, et al., in their case study at Narok County Referral Hospital, Kenya, attest to the crucial role procurement plays in the availability of pharmaceuticals in the facility (12). There, procurement of drugs accounts for up to 40% of the health expenditure in the facility, but is plagued by issues of poor transportation, inadequate funding, inventory mismanagement, lack of skilled personnel and bureaucracy (12). In the facility, procurement and supply of drugs is managed by the Kenya Medical Supplies Agency (KEMSA), a body constitutionally mandated to procure and supply pharmaceuticals to public health facilities/programmes in the country (13, 14).

Understanding the steps involved in the procurement and delivery of pharmaceuticals is significant in ensuring constant supply and timely delivery. This will

ensure timely ordering to take care of the lead-time and delivery of commodities with adequate shelf life to avoid stock outs, which have been shown to last for up to 90 days in some facilities (11). Further, the knowledge and implementation of a secure drug management cycle, including proper departmental distribution and physical drug storage is vital. They inform all-round medication availability in various departments of the facility as well as keep at bay scrupulous professionals (10). Importantly, tracer medications offer a surrogate assessment of the availability of essential medication in a facility. Their availability, therefore, provides confidence as to the prudence of drug acquisition and management processes in a facility.

Problem Statement

The Siaya County Referral Hospital **(**SCRH) frequently experiences medication shortages and formulation stock-outs, continually putting the catchment population at a disadvantage of missing out on the highest attainable health standards. These shortages increasingly put the population at risk of complicating or dying from treatable conditions. Further, healthcare expenditure is also increased multiple fold as patients are forced to purchase medications from private entities, hence deprived of the government subsidization. An examination of the process of acquisition and management of pharmaceuticals in the facility is, therefore, important in identifying gaps that can be firmly addressed to ensure equitable and supply-driven management of pharmaceutical supplies. Importantly, better drug management also enhances goal three of the Sustainable Development Goals (SDGs); that advocates for the pursuit of good health and wellbeing.

Study Significance

The organization, uptake and proper utilization of healthcare commodities such as pharmaceuticals provides one of the anchors for sustainable and improved healthcare outcomes. The outcomes of the study will aid in illuminating the state of pharmaceutical care in a County hospital in the country, hence furnishing the governments, both county and national, with data to work on mainstreaming efficient drug management practises in the country. This will eventually improve the availability, accessibility, and affordability of quality drugs at both devolved and national level health facilities, hence allaying patient suffering and improving health outcomes especially in far-flung areas. Crucially, it will add to the knowledge body of the existing comparative drug management practices, their assessment and analyses.

Study Objectives

General Objective

The aim of the study was to evaluate the logistical management of pharmaceutical supplies at the Siaya County Referral Hospital (SCRH).

Specific Objectives

1. To establish the steps involved in procurement and delivery of pharmaceutical supplies at the SCRH.
2. To assess the distribution criteria of pharmaceuticals to various departments at the SCRH.
3. To assess the supplier-provided and facility-provided security measures for pharmaceuticals at SCRH.

4. To establish the availability of tracer drugs for patients at SCRH.

Materials and Methods

Study Setting

The study was carried out in the pharmacy, nursing department, accounts unit and storage departments of the SCRH. Siaya County Referral Hospital (SCRH) is a major catchment level 4 facility located in Alego-Usonga Sub-County, Siaya County. The operational organization of the facility reflects the workings of most County health facilities in the country, and hence it provided an opportunity to assess the model of pharmaceutical management, especially in the wider Western Kenya region.

The hospital is a 220-bed facility with departments such as medicine, surgery, general and surgical paediatrics, obstetrics and gynaecology, TB centre, comprehensive care centre (CCC), rehabilitation centre, hospice, emergency and casualty wings as well as morgue services. It also hosts health-related non-governmental organizations such as CDC and the University of New Mexico who participate in research projects that seek to continually identify and improve management modalities for HIV/AIDS and malaria respectively, two conditions with high prevalence in the County and region in general.

Study Design

The study employed a cross-sectional design, having a qualitative aspect and a retrospective chart review component. The chart review component involved access to and analysis of pharmaceutical records for the preceding financial quarter, taken as such because of their recentness in the data needed. Qualitative data was obtained using key informant interviews. The double approach was essential in assessing whether the staff adheres to the processes in place and whether that reflects in prudent drug management in the facility.

Target Population

The target population was the staff of the various departments involved in the procurement and management processes of drugs at the facility, owing to their expertise on the pharmaceutical management processes in the facility and without.

Sampling

Purposive sampling was employed where informants who were better placed in providing information regarding the study were selected. That involved the pharmacy officer in charge, the pharmacy store manager, the nurse in charge and the accounts officer.

Data Collection

Access of the records required was accomplished by the involvement of the facility pharmacist who provided the records of pharmaceutical usage for the previous quarter (September 2019 to December 2019). The records were then examined and analysed to compare the supply and consumption of essential and tracer medicines used within the facility as well as check patterns of drug use.

The essential and tracer medications looked into were randomly predetermined based on the most common medicines consumed in the facility. Five major categories were chosen: antibiotics (ceftriaxone, amoxicillin, gentamicin and flucloxacillin), analgesics (tramadol, paracetamol, ibuprofen and morphine),

anticonvulsants (carbamazepine, valproate, diazepam and phenobarbitone), cardiovascular drugs (nifedipine, enalapril, losartan, carvedilol and hydrochlorothiazide) and miscellaneous (nitrofurantoin, oxytocin, metronidazole, tranexamic acid, hydrocortisone and atropine). Antimalarials, antituberculosis (TB) drugs and Antiretroviral therapy (ART) drugs were specifically left out due to their special acquisition framework involving funding from non-governmental organizations.

Qualitative data collection involved conducting key informant interviews with the heads of the pharmacy, store as well as accounts and nursing departments to get information on the procurement processes, storage, use and financial transactions of pharmaceuticals. All of the heads were informed and informed consent taken from them promptly. The interviews were conducted using a predesigned interview guide specifically made for each of the mentioned departments, on specific different days of the week. The responses then formed the qualitative component of the data gathered.

Data Management and Analysis

Computation analysis of the data from chart review was accomplished using Microsoft excel program. It involved the calculation of the percentage use of medications, comparisons between supply and consumption as well as the patterns of medication use. That was used to assess the effectiveness of the process of drug management.

Qualitative data obtained using the interview guide was manually analysed thematically using thematic patterns identified from the data collected. Data was presented in form of texts, which explored the processes around acquisition, distribution, storage and dispensation of medication in the facility. Where possible, real-time responses were captured by note-taking and used to augment the themes. Soft copy forms of the chart review data were encrypted and securely stored in a drive. The researcher safely stored the hard copy forms of the notes taken from key-informant interviews.

Ethical Considerations

Permission was sought from Maseno University Ethics Review Committee (MUERC), SCRH leadership as well as the departmental heads involved to allow for conduction of the study. The informants' consent was obtained both verbally and in written form after explaining to them what the study entailed. Confidentiality and anonymity was assured.

Results

Qualitative Pharmaceutical Organization

SCRH had four satellite pharmacies; the main pharmacy (had an outpatient section), in-patient pharmacy, the Centres for Disease Control and Surveillance (CDC) pharmacy and the Maternal and Child Health (MCH) pharmacy (now dysfunctional). Only the main pharmacy operated 24-hours-a-day, and hence handled all after-hours emergencies. The inpatient pharmacy provided medication to the wards and theatre to last 24-hours.

"The CDC pharmacy is unique and semi-autonomous since it is funded and operates under the auspices of CDC/KEMRI (Kenya Medical Research Institute) which collaborate with the county government in running the HIV/AIDS and TB in the county."

Operational Layout

The main pharmacy served the consultant clinics, accident and emergencies as well as the MCH. The inpatient pharmacy catered for the wards, theatre, imaging department and the renal unit using specific timelines. New admissions and the theatre were served during morning hours so that afternoons were left for handling discharges and additional new admissions. Workload in the various pharmacies also varied.

"Our average daily dispensing at both pharmacies varies according to the activities of the day. Some days are allotted for consultant clinic visits, others are for major ward rounds and others are for elective theatre sessions. Generally, the dispensed amount is highest on Wednesdays and Fridays, the days allotted to the physician's clinic."

"Average monthly collections amount to Ksh. 1.7M, inclusive of the National Hospital Insurance Fund (NHIF) costs."

There existed no drug reviews to highlight shortfalls around prescription or formulation use. Despite that, the facility had a facility-based *medication errors reporting tool*, which borrows from standard medication error reporting by the WHO. It was filled and managed by the pharmacist and reported to the Drugs and Therapeutics Committee (DTC). Additionally, adverse drug events were reported using specific tools designed by the pharmacy and poisons board (PPB) and reported there. Prescriptions were also tightly regulated.

"We confirm prescriptions using specific patient reference numbers, issuance of unique prescription books to specific clinicians, signature storage for clinicians and having duplicate prescription notes."

Other than the departmental check-ins, the pharmacies and storage areas for the medication in SCRH did not undergo any regular formal quality assurance inspection.

"The department heads do perform regular visual inspections to ascertain specific standards as well as operations. No predetermined indices or measurement values are checked during such inspections and they are often carried out in the mornings before the commencement of the day's activities."

Further, the department operated under strict efficiency to avoid wastages and maximized benefits to the patients. This was accomplished through forecasting and quantification, quotations, inventory management and non-reception of damaged goods.

"Quantification is done to inform supply. We avoid wastages by substituting drugs, redistribution to other facilities and employing the first expiry-first dispensed-first approach. Expired and damaged medicines are disposed of through incineration, upon authority from the disposal committee. It is ratified by the facility pharmacist and public health officer using the F058 form."

Staffing Needs

The SCRH pharmacy department, according to a participant, was understaffed. Nevertheless, they followed organized shifts from a roster prepared monthly by the facility pharmacist. The shifts were morning, afternoon, night-off, weekend and weekend-off (recuperation) shifts. The pharmacist also oversaw leaves for the staff, in conjunction with the hospital administrator.

"The pharmacy has 12 staff: one clinical pharmacist, three pharmacists, 5 pharmaceutical technologists and three attaché students (at a given moment), tending to over 200 admitted patients and many more at the outpatient unit. That is partly why the MCH pharmacy had to be closed."

Importantly, continuous medical education (CMEs) occurred every six weeks as part of the established sequence of departmental presentations in the whole facility. Topics of interest were selected for discussion by the department leadership. The sessions also earned the staff professional points as a requirement of the rules for their continued licensure to practice.

Drugs Oversight by DTC

The Drug and Therapeutic Commission (DTC) was not very active. Nevertheless, it decided on drug stocking, medication monitoring, clinical care supervision, and medication policy implementation. It comprised of the facility pharmacist (who doubled up as its secretary), the medical superintendent (who was also the chair), the nursing officer in charge, the hospital administrator, the laboratory manager, a representative for clinical officers and all individual heads of the various clinical departments. The DTC met quarterly.

"Recently the DTC has been inactive and did not even meet in the last quarter, likely due to the frequent change of the hospital and departmental heads who constitute it as well as lack of incentives."

The facility had no hospital formulary. It instead used an Essential Drugs List (EDL) reproduced off the Kenya EDL 2018. The reproduction was guided by the disease patterns in the region.

Centralized Procurement Axis

The facility spent roughly between Ksh. 400000-600000 quarterly (0.1% of the whole quarterly budget) on pharmaceuticals. Medications were acquired through county government purchase (major modality), direct facility purchases, donations and borrowing (in emergency states).

"Our purchase of pharmaceuticals is mainly from KEMSA through the county government, in line with the KEMSA Act of 2013 which directs all public facilities to procure pharmaceuticals from KEMSA."

Procurement begun at the facility with quantification projections based on departmental consumptions (drug inventory). The projections were then sent to the chief officer of health in the county, who is mandated to issue authority to incur expenditure (AIE). Slight overstocking was included to cater for stock-outs during the intervening periods of delivery.

"The hospital pharmacist and, medical superintendent and hospital administrator do the budgeting and formulation and forward it to the county ministry of health for ratification and drawing rights."

The AIE allowed the facility pharmacist to log in to the KEMSA website and fill a standard order form, sent to the county office. The forms were aggregated at the county office for various facilities to generate a proforma invoice. The county procurement office then wrote a local purchase order (LPO) to KEMSA. Drug delivery by KEMSA was made along with a delivery note and invoice and checked on arrival.

"Honestly, the digitization of the whole process has helped a great deal in enhancing promptness of submission and reducing manual paperwork entry."

"There is an inspection committee that checks the received consignment and issues an S11. It comprises of the pharmacist, nursing officer in charge, procurement officer and the store manager."

The invoice, LPO, delivery note and S11 duplicate were then forwarded to the facility's accounts department and used to raise an F020 (payment voucher) to remit the dues through a written cheque. Details in the S11 were used to fill individual drug bin cards at the store.

If any medication was unavailable at KEMSA, KEMSA had to issue a letter of confirmation of its unavailability and of authority to procure it elsewhere. That allowed the facility to do tendering and receive bids through a tendering committee. Firms were allowed to bid and the lowest bidder who could provide products of the required quality won. The facility then proceeded to process an LPO to the winning bidder, who then worked on the order and delivered it using the delivery note and the invoice. The subsequent processes were similar, except for a S13 form issued instead of the S11. The documents ensured reliability of the procurement process and acted as proof of purchase.

Medication Storage

The drug store was a permanent building only for storing drugs. Security measures included CCTVs and a double-padlock system. Medications had serial numbers, bar codes and batch numbers.

"The double padlock can only be accessed by both the pharmacist and store manager at a go. There is a dangerous drug room for storing dangerous and controlled substances. They have a special register and only the facility pharmacist can access them."

The store also had an expiry drug register checked monthly to prevent drug expiry. Real-time data on stocking and consumption was also managed by a software called FUNSOFT, which was yet to be fully linked at the time of the study. The store used bulk-stocking order system to distribute drugs to satellite pharmacies, especially on Tuesdays and Fridays. It was mandatory for drugs exiting the store to signed out by the store manager on shift. The pharmacist was tasked with preparing the inventory of revenue and supplies monthly.

The Role of Nurses

Nurses are integral in the final phase of drug administration to patients. They collect medication from pharmacies, every morning in the case of inpatients and administer to patients. The medical administration record (treatment sheet) provided the only proof of administration. It contained the patient details, the prescribed medication characteristics, the prescribing physician's signature (for confirmatory purposes) and sections for confirmation of administration by the nurse. No other level of proof of administration existed.

Discussion of Findings

Qualitative

The organization of pharmaceutical services was extensive and multilayered. In SCRH, the existence of satellite pharmacies within the facility ensured that work distribution was achieved and that each section of the department operated with the maximum attainable efficiency. Additionally, one of the satellites, the CDC pharmacy, helped inject donor finances and standards whose ripple effect was the overall improvement of the department as a whole. The commonest organizational layout of most facility medicines management systems consists of bulk storage units, inpatient and outpatient dispensing wings, emergency medications storages, controlled substances unit and after-hours pharmacy (15). Although the central coordinating person is the hospital pharmacist, the inpatient wing was restricted to managing orders from the wards, OR and imaging department while the outpatient one catered for the outpatient department.

The location and interoperability of the setups was critical in not only ensuring collaboration but also enhancing the efficiency of dispensation.

The SCRH had effected various working modalities to reflect the global standard pharmaceutical management practices. First, there was a definite path of flow of drugs which enhances accountability and traceability of the medicines. The supplier-store-pharmacy-patient flow outlook, though mundane, was crucial in ensuring that all medications received could be accounted for since specific documentation was made at various entry and exit points of each of the phases mentioned (16).

The S13, S11, bin cards and patient prescription duplicates were crucial in the final tallying of stock-ins and stock-outs of the medications. Additionally, there were also times for dispensation which varied from 24 hours operations for main-pharmacy and daytime for the inpatient one. The implication of this was the segregation of workflow and improving the continuity of services so that the facility is covered all through (16). As will be demonstrated by the chart review subsequently, the difference in time of operation between the two satellites was not just an arbitrary decision by the facility but most likely influenced by workload.

The final service delivery to the patient were only as good as the operations, and thus the measures taken to ensure timely, appropriate and efficient dispensation of the medication bore wholesome implications on the perception of patients as well as their recuperation (17).

As such, aspects such as the prompt distribution of drugs to the pharmacies from the store, having adequate professional dispensing personnel as well as mechanisms of confirming prescriptions were critical in maintaining efficiency. Confirmation of prescription was particularly of concern since fake prescriptions may form avenues for pilferage of medication, enhance unlikely drug dependence of controlled substances or even lead to severe maiming or death of a patient if one is handed the medication meant for another or is the recipient of a wrong/exaggerated dosage of a particular drug. Thus, the intricacies of confirming prescriptions implemented by the facility were justifiable.

The DTC is perhaps the most important cog in the implementation framework of any facility's pharmaceutical department and should be a mainstay in any level 4 facility or bigger (16). In SCRH, it occupied an important niche in line with informing various crucial aspects of the department as a whole. Hierarchically, the DTC represented the ultimate decision-making organ relied upon to advise on the management processes of medication in a facility. The DTC appropriate and apportions the quantitative and qualitative aspects of drugs before procurement and is also responsible for quality assurance of pharmaceuticals at the facility level, performance of drug use review, approving of facility's medicine list and adverse drug event reporting (16). The setting up of DTC appreciates the thought that use of medication is an inherently complex undertaking and thus demanding of continued monitoring. More often, it dictates, in the long term, the policies, programs and plans geared towards improving the medication use safety and cost-effectiveness. Cost-effectiveness is particularly critical due to the underfunding of health and related ventures in most set-ups. Generally, DTCs are constituted by nurse representative, administration, quality assurance representative, the chief pharmacist and doctors(from each department), totalling to about eight to fifteen members (18). Therein, subcommittees exist to tackle specific issues.

An overarching role of the DTC is that of hospital formulary oversight as it influences purchase and stocking. That ensures stocking of essential medications and their second lines, limiting of brand duplications, stocking based on existing standards/guidelines and disease patterns as well as appropriate drug strengths (18). Acquisition and management of the approved medicines should not be under the care of a single individual. Commonly, the chief pharmacist prepares an inventory of the needed medication, which is then approved by the DTC and then with the involvement of the administration and accounting departments, drugs are procured, confirmed and stored appropriately (18). Selection of which drugs to stock are also based on hospital drug formularies as well as the EDL and should reflect user needs much as being up to date with evidence-based guidelines. The DTC should thus be a very active outfit constantly on the lookout on how to better the pharmaceutical services in the facility.

Adequate staffing in a pharmaceutical department is important because it is linked to service efficiency as well as minimization of medication errors. In Nepal (India) there exists a regulation for approximating the number of pharmacist

requirement in a hospital using the bed-capacity of the facility. Nepalese practice provides that there should be 2-3 pharmacists for every 25beds in a facility (19). Although not an adopted practice the world over, this ratio has seen most patient medication needs met in those facilities. Additionally, the distribution of pharmacists makes it easier for service delivery, with at least one being in the drug distribution section, another in the store, others dispensing, another heading quality control and then one providing overall supervision. By these standards, SCRH falls way below hence perhaps the long queues and slow service delivery witnessed during dispensation.

Remarkably, there were no quality assurance rounds or checks at SCRH since the available professionals were already burdened by the other commitments. Shifts were lengthy with limited time for recuperation. On the flip side, the CMEs provided by the facility enhanced continual grasp of the tenets of practice and even infused the professionals with novel mechanisms of service delivery.

The accounting/procurement and storage sections of the drug management cycle are also very sensitive. When improperly executed, they leave avenues for losses, stealing or even undue distribution of pharmaceutical commodities by scrupulous officials. The SCRH has put in place extensive measures for the observance of proper procurement practices as well as the standards of storage and dispensation of medicines. The role of KEMSA is particularly pivotal here, and being the main supplier, streamlining its processes to make it easier to procure has only made them smoother. The ability to order online by use of their website has reduced the lagging paperwork and waiting time that used to be associated with the delivery of the physical LPOs. Additionally, the role of the county in regulating and approving any orders for medicines-through the county health leadership-acts to streamline processes and minimize avenues of pilferage.

SCRH has been particularly on the forefront of ensuring proper practices through processing the required documents needed in procurement, payment, inspecting the supplied commodities and documenting appropriately. Indeed, the absence of any drug expiry and damaged products can be attributed to the meticulous nature of inspection and measures instituted to reduce wastages and expiry. Though lacking in formal quality assurance checks, SCRH benefited from timely inventory management, forecasting management (which reduces the frequency of stock-outs), proper redistribution strategies and zero disposals (no drug expired in the preceding 3 years). Occasionally, KEMSA delayed in distributing supplies, putting the facility in a strained position of service delivery. As well, the county allocation for drug supplies often fell short of the health demands of the population. Storage of drugs at SCRH was laudable and strategies to ensure security were as numerous as they were diverse.

Collection and administration of medications, accomplished by nurses, formed the endpoint of the drug cycle. Nurses form the bulk of primary care delivery and as such constitute an integral force in the delivery of health services at SCRH. Confirmation of patient details and medication viability are a prerequisite as are the appropriate technique of delivery and subsequent documentation to

avoid adverse drug events or wrong patient administration. Fortunately, although the facility had an inadequate number of nurses which put them at strain in terms of adequate patient care in the various departments, their professionalism in drug management was enviable.

Chart Review

According to figure 1, most medications were supplied by KEMSA (73.9%). That adhered to the inception of the 2013 KEMSA Act that directed all public facilities to procure their pharmaceutical and non-pharmaceutical products from the semi-autonomous government outfit. The long-term goal of this was to streamline procurement practices in public health facilities to minimize wastages and pilferage of resources as well as provide uniform standards as to the kind of medical products provided for by these facilities to their clients.

While that may have been realized to an extent, the act of coalescing all government health facilities to one procurement agency has in a way left it overwhelmed with the number of orders it deals with, which manifests in the form of numerous and sometimes protracted delays in the supply of ordered commodities, leading to adverse outcomes in the health service provision.

Similarly, the same diagram indicates the relative percentage consumption of drugs in the inpatient versus outpatient departments. The outpatient department consumed a greater fraction of the medicines (73.5%), likely due to the greater influx of patients in the outpatient than inpatient department. Additionally, special review clinics for consultants were part of the outpatient department in SCRH hence adding to the number of patients trooping to the hospital every other day for follow up of chronic conditions and management of acute illnesses.

In figure 2, it comes out clearly that in terms of formulations, tablets were the most consumed (64.3%), followed by capsules (31.7%) then injectables (4.01%). Moreover, tablets and capsules were consumed more in the outpatient department, possibly due to the relative stability of patients visiting the section which warrants enteral dosing as a form of treatment. The injectables, however, were the only formulation to have more consumption in the inpatient wing. Again, that could be explained by the established knowledge that parenteral medication remains a preserve of severe cases usually found in the wards.

Also contributing to the high consumption of tablets/capsules at the outpatient in SCRH was a large number of patients with chronic illnesses who visited the facility all through the week for consultant review, follow-ups and refills.

Finally, figures 3 and 4 illustrate the supply and consumption mechanics for the specific drugs during the mentioned period. In a snapshot, most medication show consumption patterns not exceeding the supplied amounts. The effect of this is that stock-outs were minimized and hence patients could access the particular medications during that timeframe. Additionally, it shows that the inventory management and forecast balancing for medication use in the previous quarter was appropriately done hence informed adequate drug availability for the period in reference. Specifically, ceftriaxone experienced a stockout, with the consumption

slightly arching over the ordered amount. The difference was however plugged by hospital purchases. Diazepam and phenobarbitone were not ordered for in that quarter since there were adequate amounts in stock.

Conclusion and Recommendations

In sum, SCRH in many ways adheres to the standard national and international guidelines informing the organization and execution of pharmaceutical practice in facilities. Processes of procurement, supply, inspection, storage, distribution, dispensation and administration of medication have been intricately but properly fashioned to provide the end-user with the intended benefit: therapeutics. Significant shortfalls were also noted, and they included inadequate staffing needs, absence of a hospital formulary, non-existent pharmaceutical quality assurance department as well as a relatively inactive DTC.

Consequently, to elevate the level of pharmaceutical care in the facility even further, the recommendations provided are to enact laws that mandate KEMSA to provide deliveries within a specific period of receiving orders at a national level. The facility leadership is also encouraged to provide incentives and work out modalities of making the DTC active, to engage the DTC in coming up with a hospital formulary and to lobby for the employment of more pharmaceutical staff members. It is also recommended that it initiates and implement a pharmaceutical quality assurance department and inspectorate system based on specific standards as well as designate the specific nurse to collect medications from the pharmacy in each department.

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Availability of Data and Materials

The data collection tool(s) and data from which the study conclusions are drawn can be requested from the authors.

Conflict of Interest

The author declares no conflict of interest.

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Appendix

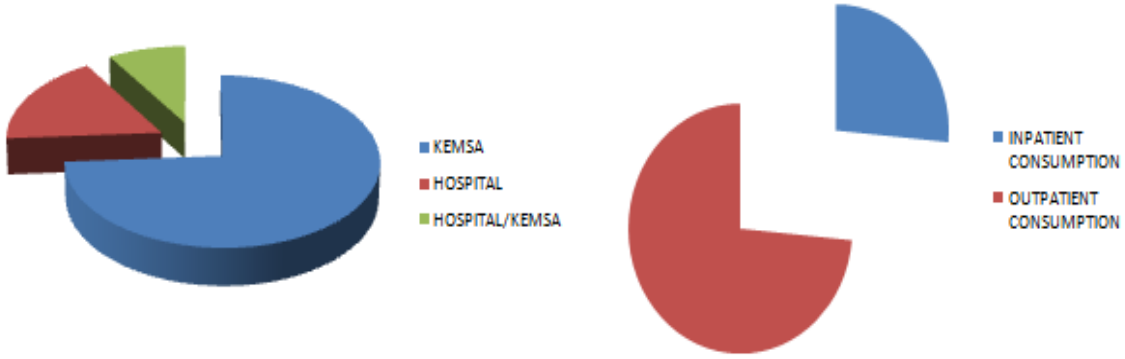

Figure 1: A pie-chart A comparing the different sources of drugs by the facility and the relative amounts supplied by them for the Oct-December 2019 quarter and B demonstrating the average consumption of medication in the inpatient and outpatient departments for the Oct-December 2019 quarter.

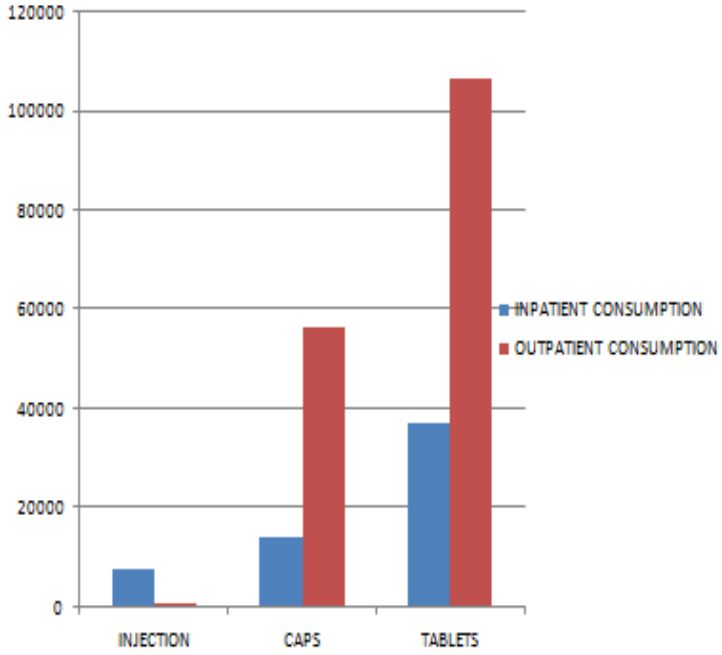

Figure 2: Is a multiple bar graph that demonstrates the average sectoral consumption of medicines based on their formulations for the Oct-December 2019 quarter. The main sectors depicted are the inpatient and outpatient departments. The y-axis represents figures in discrete units.

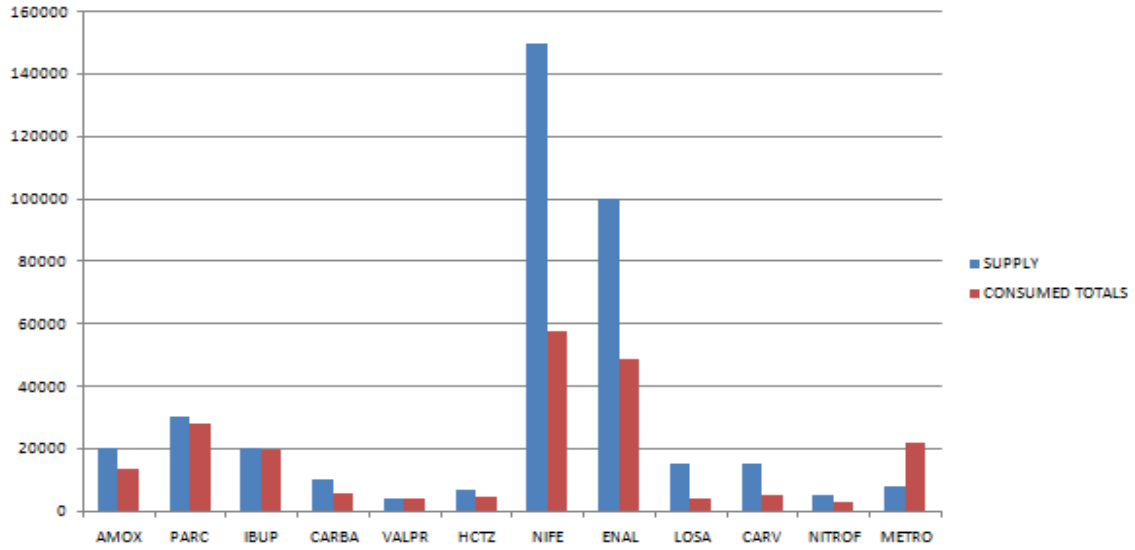

Figure 3: Multiple bar graph demonstrating the comparison between supply and consumption for the individual drugs (enteral formulations) in the Oct-December 2019 quarter. Values in the y-axis represent discrete quantities.

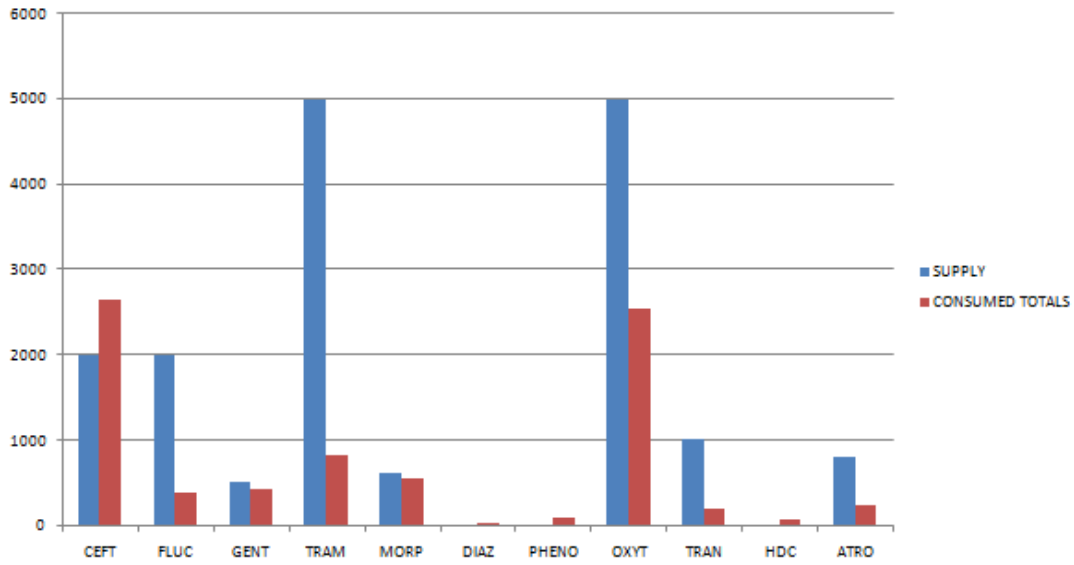

Figure 4: Multiple bar graph demonstrating the comparison between supply and consumption for the individual drugs (parenteral formulations) in the Oct-December 2019 quarter. Values in the y-axis represent discrete quantities.