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Identification of Factors Leading to Unfit Medical Products and Other Health Commodities, Disposal Management and Related Perceived Consequences to Health Supply Chain in Rwanda. Case of Rwanda Medical Supply Ltd and Medical & Allied Service Solutions Ltd

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Abstract

Background: Unfit medical products, especially poor quality / damaged / expired / and phased out (no longer accepted for use) are among health challenges that need careful attention and adequate management in developing countries health supply chains, including Rwanda. Not only does medical wastage affect the public health in general, but also it affects financial capabilities. Actually, according to the Management Science for Health, countries on average spend about 25% of their total health expenditure on medicines, and a significant part of the funds expended on critical drugs is wasted.

Objectives: The main objective of this study is to identify the factors leading to unfit medical products and related perceived consequences to the supply chain management in Rwanda.

Specific Objectives

1. To identify the most commonly found unfit medical products in RMS and MEDIASOL.
2. Explore factors contributing to unfit medico-pharmaceuticals in RMS and MEDIASOL.
3. To explore perceived consequences of unfit medical products to the supply chain management in RMS and MEDIASOL.
4. To explore the disposal methods of unfit pharmaceuticals management in RMS and MEDIASOL

Methods: The mixed method research design used, data were collected from 20 key informant by doing interview, A questionnaire containing open questions was used and cross-sectional study were used both focusing on identify the most commonly found unfit medical products in RMS and their management, then the shared data were transcribed and translated by the researchers. Main ideas from each Key informant were merged under each theme and sub themes by reading and then rereading to identify common words, phrases and perceptions that were coded. Quantitative data were coded and analyzed using SPSS and EXCEL software.

Results: The study found that the most common unfit medico-pharmaceuticals are the laboratory commodities, malaria commodities and program products including quinine, and Haloperidol retard 50mg/ml injection and Insulin combinations, the study indicated that the Lack of local manufacturers of pharmaceutical products according to market needs; Change of medical products protocols; Minimum shelf life not specified while ordering the products; and Lack of accurate data to facilitate quantification were highlighted by the respondents as the main factors leading to unfit medicinal products. And the study found that the total unfit products were 3% of the average annual loss in unfit medicinal products compared to the total stock.

The study recommended that further research should be done on this topic especially by exploring effective mechanisms and strategies to mitigate the wastage of medical products and other health commodities in Rwanda.

Conclusions: Medical products are critical for preserving lives in morbid diseases, yet they can get unfit from their intended use for different identified reasons in this study as presented in the summary of factors leading to unfit medical products. Those factors are for example the: Low consumption rate of some products; Sudden change of medical treatment protocols; Procurements without specific minimum required shelf life of products at arrival; etc. Then, were identified twenty-three (23) common unfit products also presented in the results, as well as the perceived consequences of unfit medical products to the supply chain; and three main applied disposal methods are incineration, plastic materials recycling and reuse of unfit products for other purposes. Future studies are needed to explore this important topic more broadly and come up with sustainable strategies to properly manage the medical products throughout the entire supply chain

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Keywords: Unfit medical products, the supply chain management, the disposal methods, Rwanda

1. Introduction

The pharmaceutical sector is one of the fastest growing sectors in Rwanda.(1) Although, medical products wastage is one of the challenges of health supply chain management in developing countries, evidence on the extent and type of wastage as well as its contributing factors are limited 6(2). On average, countries spend approximately 25% of their overall health spending on medicines, and according to the Management Science for Health, in typical supply systems, up to 70% of the funding invested in essential medicines can be lost or wasted, while with only basic management improvements it is possible to make significant changes (3). On the other hand, even though there were studies on quality and storage conditions of medical products in Rwanda, there was lack of research-based data on the root causes and nature of the wasted medicines, as well as their perceived consequences on the overall logistics and budgeting (4). This study was developed to identify the leading causes of unfit medical products in Rwanda, disposal management and their perceived consequence to the supply chain of two important medical stores at the national level, namely the RMS and MEDIASOL

2. Methods

Study setting

The selected facilities (RMS LTD and MEDIASOL LTD) for our study are pharmaceutical depots, all facilities are situated within Kigali (the capital city of Rwanda), they have been selected as the primary sourcing for medical products to the public health facilities in Rwanda.

Study design

Mixed method research design was used. The data were collected from key informant interviews, and cross-sectional study and quantitative research design were used to identify the most commonly found unfit medical products in RMS Ltd. and their management, then the shared data were transcribed and translated by the researchers.

The main ideas from each informant were merged under specific themes and subthemes by reading and then rereading to identify common words, phrases and perceptions that were coded. Quantitative data were coded and analyzed using Excel and SPSS software.

Data collection instrument and procedure

Semi-structured interview guide has been developed for qualitative interview by the research team based on the study objectives and relevant literature, Examples of theme addressing the aim of this study was "Certain factors lead to the unfit medico-pharmaceuticals products".

The audiotape-recorder also as a common place instrument often used to record spoken data, for avoiding to miss the important ideas spoken. For unfit medicines, a checklist tool has been developed for identifying management of unfit medicines through application form found in the health facility.

To ensure the validity and reliability the semi-structured questionnaire was pretested with two key informants from various medical and pharmaceutical supply to confirm its validity. The correctness of the research tool utilized has been appropriately verified after the surveys have been returned.

Ethical consideration

Ethical considerations were considered to ensure that the research was conducted according to the requirements. The confidentiality was respected, and all data were collected with consent agreement of the informants. Analysis of the data was presented in a way that excludes the possibility of the identification of individuals. The approval of ethical clearance was issued by the university though Institutional Review Board and National Health Research Committee

Results

Respondent Socio-demographic characteristics

The Results indicated that male was (65%) while the minority of the study participants (35%) were female, Result indicates that the large number of the respondents have attained the bachelor's degree level of education and above as displayed in table 1

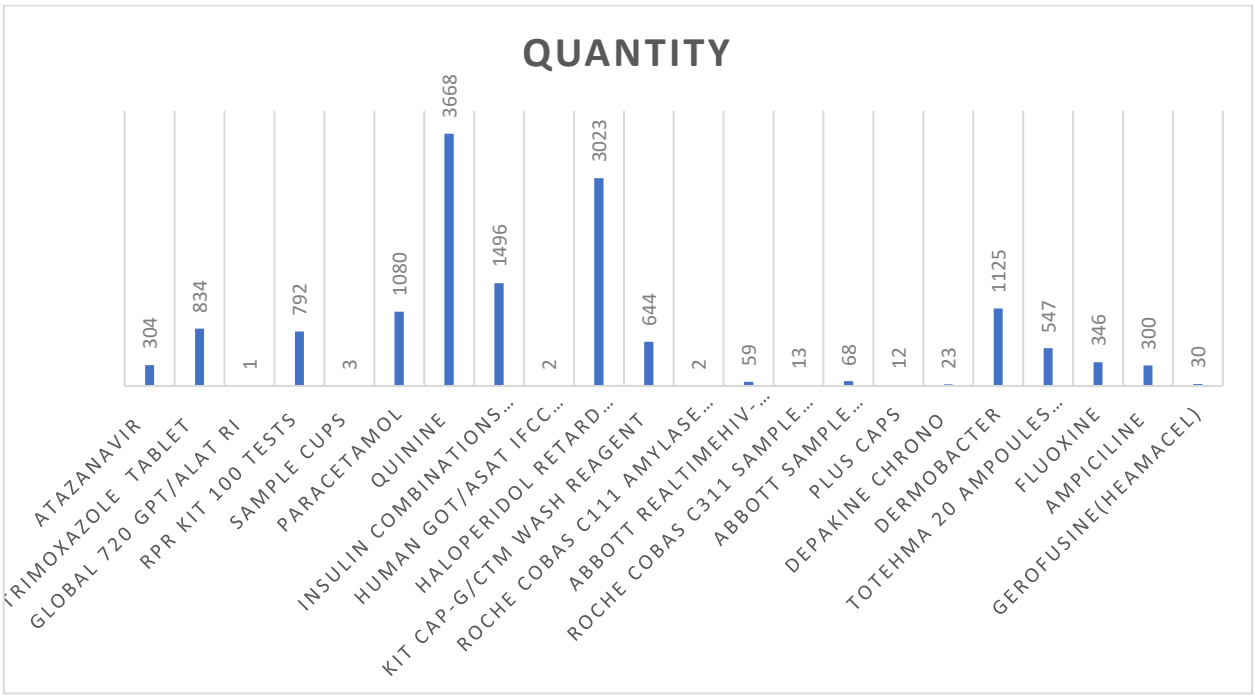
Table 1: Respondent Socio-demographic characteristics

Variables	Characteristics	Frequency	Percentage
Gender	Female	7	35%
	Male	13	65%
Educational Qualification	Advanced Diploma	**1**	**5%**
	Bachelor	12	60%
	Masters	7	35%
Years of Service	1 – 10 years	9	45%
	10 – 20	10	50%
	Above 25	1	5%

The most commonly found unfit medical products

Figure 1 below shows that during the period of this study, the previous year preceding this study, Quinine was the most expiring and damaged in the store of selected medical store facilities, followed by the drugs known as Haloperidol retard 50mg/ml injection and Insulin combinations placed at the third position, the fourth are Paracetamol and Derimobacter.

Figure 1:The most commonly found unfit medical products from January to December 2021



The most commonly unfit medical products according to participants view

In order to know the staff's understanding of the common unfit medical products, the respondents were asked their perceptions and provided the following information:

Various respondents stated that the most common unfit medical products are the laboratory commodities, malaria commodities and program products:

"*Lab Reagents, HIV commodities and malaria commodities b*ecause they have short shelf life by nature" (Key informant, 2022).

Other staff emphasized that: *"Program products expired most because of low consumption rate due to the change of number of patients".*

Moreover, next respondents highlighted that the HIV commodities tend to be expired at the store *Anti-retroviral (ARV), and, Stavudine expired most due to the change in protocol and poor information before requisition (Key informant, 2022).*

Factors contributing to unfit medico-pharmaceuticals

Various respondents in the following theme highlighted that it is due to the low consumption of medical products because of the change in customer needs and medical prescriptions:

"Because of low consumption due to the change of number of patients for example, we purchase some drugs that will not be consumed because doctors do not often prescribe them to patients when they have other alternative prescriptions. (Interview with a key informant, January 2022)

In additional, to the first respondent, Respondent 4 stated that there are some drugs which are not covered by health insurance companies, and that can be expired due to low consumption or be stocked out due to a limited number of users.

"Misplaced in system, some products not found on the list of insurance payment like health coverage" (Interview with a key informant, January 2022)

Furthermore, other respondents stated that inappropriate recording of drugs information in the warehouse system may lead medical products to become unfit.

"Poor or bad recording of medical products information like wrong expiration date or variant names in the warehouse system negatively affect the use of stored products" (Interview with a key informant, January 2022)

Furthermore, in the following table 2.1 summarized the most factors leading to unfit of medical products as perceived by the staff.

Table 2:Factors contributing to unfit medico-pharmaceuticals

Factors leading to unfit medical products	**Number of respondents**
Procurement forecasting without clinicians' advice	3
Lack of local manufacturing companies to avail timely the needed medical products	3
Low consumption rate of some products	2
Issues related to the procurement of substandard and falsified (SF) medical products	2
Poor organization of supply chain actors and data system management from central to peripheral levels	2
Issues related to doctors prescribing other medication variants	2
Issues related to medical products not covered by health insurance	2
Procurements without specific minimum required shelf life of products at arrival	2
Lack of accurate data to facilitate quantification	1
Sudden change of medical treatment protocols	1
Weak internal control and monitoring mechanisms, and not controlling on daily basis	1

Perceived consequences of unfit medical products to the supply chain management

At both medical store companies, the study found that the total value of unfit products was not more than 3% in average compared to the total annual stock value.

Moreover, this study highlighted the consequences unfit medico-pharmaceuticals from stuff perceptive as detailed in the table 3.1 below

Table 3:Perceived consequences of unfit medico-pharmaceuticals

Perceived consequences of unfit medical products to the supply chain management	**Number of Respondents**
Lack of faith in our supplier chain	5
It provokes stock out	4
Increased cost of disposal	4
Monetary loss	3
Dissatisfied customer needs	2
Institution's poor reputation	2

The frequency and disposal methods of unfit pharmaceuticals management

The result indicated that both supply facilities do not have incineration facility, they hired the external company for handling the unfit medical products; which use novel high temperature incineration and the majority of participants of both facilities (75%) stated that undertake the disposal of unfit medicines on monthly basis as indicated in table

Table 4:The disposal methods and frequency of unfit medical products

Method used regularly to dispose unfit medical products by RMS Ltd. and MEDIASOL Ltd		**Frequency of disposal**			Total
		On monthly basis	Once a year	When necessary (no specified time period)	
Novel high temperature incineration	Respondents' frequency	15	4	1	20
	Percentage of respondents	75%	20%	5%	100%

Discussion

Medico-pharmaceuticals are critical for preserving lives in morbid diseases, yet they can get damage or expire before reaching the customer(5). When drugs become ineffective, they require more careful care and handling than previously, necessitating the use of special procedures to attend to them.(6) In most situations, authorities fail to implement acceptable systems for a variety of reasons, including a lack of relevant technology, insufficient financial resources, and a lack of professional waste management training(7).

This study aimed to identify the factors leading to unfit medical products and related perceived consequences to the supply chain management in Rwanda

This study revealed that unfit medical products in supply facilities was common among medicines for health program including malaria commodities which are more prone to be unfit where Paracetamol and Cotrimoxazole tablet were found to be unfit, the same study done in Uganda to identify the expiry of medicines in supply facilities was common among medicines for vertical health programs (with percentage of outlets reporting expiry), including vitamin A capsules, antiretroviral medicines, antituberculosis agents, chloroquine, sulfadoxine/pyrimethamine, and nystatin tablets, though it was also common among anticancer agents, tetracycline eye ointment, and mebendazole (8). According to a study conducted in the Saudi community to determine the prevalence of unused or expired medicine, the prevalence of unused or

expired medicine was 89.3 percent, with inhalers, sprays, asthmatic drugs, cosmetics, and nonsteroidal anti-inflammatory drugs being the most common unused and expired medicine (9).

On other hand, the previous study which aimed to assess the factors that contribute to expiry of medicines at Medical Procurement and Production Division, the findings show that all the statements given to the participants were agreeable with a percentage above 60; for example, rare diseases, Abrupt change in policy of use, short shelf life affect the expiry of medicines, Expensive medicine and donation of management affects the expiry of medicines(10).

Proper disposal handling and management of unfit pharmaceutical products prevents avoidable toxicities and promotes the safe and friendly environment, and improper disposal can contaminate the environment and pose significant risks to water, air, agricultural products, food chain, harm animals and livestock(11)

Limitations were expected but the researcher tried to suggest solutions to overcome them so as to conduct the research as planned, the first limitation was the sample size, while the study was restricted to a small number of respondents who were expected to fulfill their work duties and responsibilities, and sometimes they were unable to provide all information necessary for this study, to counter this, the researcher used purposive sampling and chose respondents to participate in the study based on population availability.

Conclusion and recommendation

Medical products are critical for preserving lives in morbid diseases, yet they can get unfit from their intended use for different identified reasons in this study as presented in the summary of factors leading to unfit medical products. Those factors are for example the: Low consumption rate of some products; Sudden change of medical treatment protocols; Procurements without specific minimum required shelf life of products at arrival; etc. Then, were identified twenty-three (23) common unfit products also presented in the results, as well as the perceived consequences of unfit medical products to the supply chain; and three main applied disposal methods are incineration, plastic materials recycling and reuse of unfit products for other purposes.

Future studies are needed to explore this important topic more broadly and come up with sustainable strategies to properly manage the medical products throughout the entire supply chain, as well as the effective and adequate disposal methods minimizing as much as possible the wastage.

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