

Drug Distribution Strategies and Availability of Drugs in Hospitals in the Rural Areas of Jos, Plateau State

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ABSTRACT

The study investigates drug distribution strategies and the availability of drugs in hospital in the rural areas of Jos, Plateau State, while the following specific objectives are also considered and they include to; investigates the impact of traditional drug distribution strategy, inpatient services drug distribution strategy, floor stock system of drug distribution strategy and unit dose drug distribution strategy on the effective management of hospital in the rural Areas of Jos, Plateau State. Four research questions and hypotheses guide the study. The design for the study was descriptive. The population for this study consists of all staff and patient in hospitals in the rural areas of Jos, Plateau State, while the target population is about 2,875 inpatients, outpatients and hospital staff as the respondents. The composition was as follows; Inpatients (1,510) which is 52% of the entire respondents, outpatients (960) which is 33% of the entire respondents and hospital staff (405) which makes up the 15% of the respondents. The sample size for the study is 357 representing 13% of the total population of 3, 320 which was determined using Taro Yamane's formulae. The simple random sampling technique was adopted in selecting the sample size. The instrument for data collection was questionnaire and it was prepared to cover the objectives of the study. However, it was submitted to the research supervisors for vetting and validation before it was administered to the respondents. The reliability of the instrument was tested using the test-retest method, 20 respondents were randomly selected from rural hospitals in a nearby state to Jos after which, the exercise was repeated on the same set of respondents in order to ascertain the reliability of the instrument. The Cronbach's alpha co-efficient were used to test research instruments for reliability co-efficient result of 0.70 was accepted. The results of the average and t-test distribution of the responses from the respondents on the various drug distribution strategies and the availability of drugs in hospitals in the rural areas of Jos, Plateau State shows that there is significant difference between the responses of the respondents. However, it was found that to high extent traditional drug distribution strategy, inpatient services, floor stock system and the unit dose system of drug distribution strategy has effect on the availability of drugs in the hospitals in the rural areas of Jos, Plateau State. On the issue of the availability of drugs in the hospitals in the rural areas of Jos, Plateau State, Comparatively, it was found that Plateau north senatorial district has the highest numbers of drugs selected and stock outs in the last six months follow by Plateau south senatorial district and Plateau central senatorial district respectively. The test of hypotheses presumes the existence of a significant and positive association between traditional drug distribution strategy, inpatient services, floor stock system and the unit dose system of drug

distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. It was also found that total effect of drug distribution strategy has a positive and significant effect on availability of drugs in hospital rural areas of Jos, Plateau State. From the findings, it is obvious that to a high extent there is a significant difference in the various drugs distribution strategies such as traditional, inpatient services, floor stock and unit dose systems. The variations in the distribution strategies could be caused by wrong drug supply strategies, poor supplier lead-time, supply of drugs with short expiration dates, official complicity, poor handling of drug stocks, poor management of inventory and other human, environmental and financial constraints. Therefore, there is need for urgent reforms in drugs distribution strategies such that the process should be implemented in a manner that is equitable, devoid of religion, geographic and economic barriers.

Keywords: Drug, Distribution, Strategies, Availability, Hospitals, Rural, Areas

1.1 Introduction

The drug manufacturing and distribution has recently been under the spotlight of public interest. The public figures have voiced concerns over the rising cost of manufacturing and distribution drugs and health care, of which prescription drugs account for 10% (Latunreng, & Nasirin, 2019). According to Latunreng, and Nasirin, (2019), the U.S. health care spending has increased 2.4% faster than GDP since 1970 and is expected to exceed \$4.3 trillion in 2018. In 2009, health care spending hits an unprecedented 17.6 percent of the GDP.

A clear understanding of the usefulness of drug distribution strategies and the Availability of Drugs in hospitals in the rural areas is lacking among healthcare personnel and other levels of caregivers in Nigeria. A gap in knowledge exists regarding the exact methods of drug distribution strategies and the effective management of hospital in the rural areas in Nigeria, but subjective data project less than 5% implementation of any form of drug distribution strategies in a country of more than 150 million people.. Latunreng and Nasirin, (2019) explained that Nigeria remains the biggest pharmaceutical manufacturing country in West Africa, accounting for more than 65% of local manufacture of medicines relevant to the people and diseases of the nation and West African sub-region. Some of the product lines include antimalarials, antiretrovirals, analgesics, herbal preparations, and medicines for sickle cell disease. The maiden National Drug Policy (NDP) for Nigeria was launched in 1990 to curb the myriads of challenges militating against the inadequacies in drug availability, supply, and distribution. According to Latunreng and Nasirin, (2019) these challenges include ineffective and poor drug administration and control, inadequate funding of drug supply and drug control activities. High dependence on foreign sources for finished drug products, pharmaceutical raw materials, reagents and equipment, inadequate storage facilities, poor transportation and distribution of drugs were inclusive. Other limitations include poor selection and procurement practices, involvement of unqualified persons in procurement, distribution, and sale of drugs, poor performance of drug suppliers to public health care institutions and lack of political will to provide safe, efficacious, and good quality drugs to meet the health needs of her teeming population.

Drugs manufacturers have mixed responses to these new agreements while the overall supply chain impact is still being debated by industry observers. Some manufacturers are experimenting with alternative models, such as a Direct-to-Pharmacy (DTP) agreement where drug wholesalers manage distribution for a fee and inventory ownership shifts upstream to the manufacturer. Drug

manufacturers face fundamental normative questions about the optimal go-to-market channel strategy and extent the traditional drug distribution strategy, Inpatient Services drug distribution strategy, Pharmacy controlled imprest-based system drug distribution strategy, Pharmacy controlled patient issue system of drug distribution strategy and Ward-controlled system of drug distribution strategy enhanced the effective management of hospital in the rural Areas.

Unfortunately, the existing literature provides insufficient guidance to help managers answer these important questions. Also, another problem was the issue of inefficient distribution agreements within the supply chain and prescription drug costs have been two key contributors to the rise of health care expenditures. Complex, government-run drug distribution systems in developing countries are a topic of some interest in the pharmacy literature. Although there are a number of studies of drug distribution and supply in developing countries, only some of that literature is helpful to assist health officials or policymakers to design or evaluate a drug distribution system that is able to meet the needs of the population consistent with available resources. Therefore, it is against this background that this study investigates drug distribution strategies and availability of drugs in hospitals in the rural areas of Jos, Plateau state

1.3 Research Questions

The following research questions are also considered and they include to;

1. To what extent does traditional drug distribution strategy affect the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State?
2. To what extent does inpatient services drug distribution strategy affect the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State?
3. To what extent does floor stock system of drug distribution strategy affect the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State?
4. To what extent does unit dose system of drug distribution strategy affect the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State?

1.4 Research Objectives

The main aim of the study is to investigate drug distribution strategies and the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State, while the following specific objectives are also considered and they include to;

1. Determine the effect of traditional drug distribution strategy on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
2. Determine the effect of inpatient services drug distribution strategy on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
3. Determine the effect of floor stock system of drug distribution strategy on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
4. Determine the effect of unit dose system of drug distribution strategy on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

1.5 Hypotheses

The following hypotheses were set to guide the study and they include;

- HO1: Traditional drug distribution strategy does not have any significant effect on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
- HO2: Inpatient services drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
- HO3: Floor stock system of drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
- HO4: Unit dose system of drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
- HO5: There is no significant relationship between traditional, inpatient services, floor stock system and unit dose system strategies and their effect on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State
- HO6: There is no significant relationship between the total effect of the various distribution strategies and availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Literature Review

2.1 Concept of Drug Distribution

Drug distribution is defined as, "Physical transfer of drugs from storage area in the hospital to the patient's bedside". This involves two types of drug distribution. They are: in-patient distribution and out-patient distribution. According to Reyaz, Raj, Ali and Hemant (2021) this must be done in such a way that the drug distributed to the inpatient department which can be carried out from the outpatient dispensing area. Also, the pharmacists involved in dispensing the drugs for outpatient can dispense drugs for in patients too and the pharmacist employed for drug distribution to the inpatient wards should be well skilled and qualified staff. According to Dong, (2018), Drug distribution is the disbursement of an unmetabolized drug as it moves through the body's blood and tissues. The efficacy or toxicity of a drug depends on the distribution in specific tissues and in part explains the lack of correlation between plasma levels and the effects that are seen. Understanding drug distribution is important in establishing: The amount of drug available to the target organ to produce action. The amount of drug distribution to non-target organs that could potentially result in an adverse drug reaction.

2.1.2 Drug Distribution Strategies in Nigeria

According to Cleary; West, Sancia and David (2019), there are two main strategies employed for public drug distribution in Nigeria and it include; the Central Medical Store system and the use of Petroleum (Special) Trust Fund (PTF). The Central Medical Store system is the one in which the government is the owner, manager and financier of the whole system. The use of Petroleum (Special) Trust Fund (PTF) is like a quasi-autonomous body set up to improve, generally, public utilities in Nigeria between 1994-1995. Petroleum (Special) Trust Fund (PTF), intervention was thus extended towards improving public drug supply in Nigeria. This study

however found that both strategies have not met public drug's needs. Peters, (2018) further explained that factors identified as possible reasons for this failure includes inadequate funding, poor management of available fund, poor procurement system, deficient drug management information system, expiration and spoilage, stock out of essential drugs and shortage of vehicle for drug distribution.

The impact of these plethora of funding support on the geographic and economic accessibility and sustainability of public drug supply remains to be seen. Funding mechanism was reported to be adequate to purchase all needed drugs (Dong,2018). The persistence of stock out of essential drugs and expiration and spoilage of drugs at storage points however call to question the adequacy of public drug financing and, more importantly, the management of available fund for drug supply.

2.1.3 Potential Challenges to Drug Distribution Channels in Nigeria

In an attempt to identify potential threats in the distribution channels, it was necessary to examine the relationship between planning, management processes, and activities, as well as to assess the effectiveness of distribution (Currie, 2018). It was found that the environments of companies, government, and the integration of internal and external resources can have a significant impact on the sustainability of the distribution channel. We concluded that company operating environments increase the effectiveness of distribution channel security. Companies that recognize more security issues within their distribution channels tend to have higher levels of perceived distribution channel security effectiveness (Efayena, Enoch and Patricia, 2018).

Manikandan and Nagini (2018), opined that an industry with advanced techniques, patented products, generic/brand medications and medical devices is always going to bring with it challenges. For the pharmaceutical marketer, there are often more challenges than there are solutions arising alongside such manufacturing complexities. Generally, and luckily, the pharmaceutical industry is one that is currently thriving, but as the industry evolves - biosimilars and new technologies come to mind - new challenges will be presented that will affect pharmaceutical marketing. Some of those challenges will form internally and some will form externally. All marketing teams face common challenges, such as the challenge of generating leads, securing adequate budget for proposed marketing activities or proving the ROI for those marketing activities.

2.1.4 Challenges Facing Hospitals in the Rural Area and Strategies in Confronting the challenges

WHO (2015) admitted that rural communities continue to face health challenges and disparities, with higher percentages of preventable deaths, higher rates of Medicare and Medicaid populations, and much fewer providers, according to a panel discussion at Academy Health National Health Policy Conference, being held February 4-5 in Washington, DC. Similarly, in a study by Nathan and Devon (2021), reported that health facilities in Uganda, especially those in rural areas, are poorly equipped. Between 2013 and 2015, only 56% of health facilities reported the availability of 12 essential antibiotics and 39% reported the availability of 17 non-communicable disease medicines (World Health Organization (Nathan and Devon, 2021). Some rural regions have also experienced civil wars which have had a significant impact on the capacity building of essential healthcare services for the public (McPake *et al.* 2015). Also another challenge facing hospitals in rural areas is the issue of poor staffing. World Health

Organization (WHO) 2016) revealed that staffing attributes can affect service delivery and quality of care. Countries are required to have policies in place to ensure that health facilities have the appropriate number of nurses to care for patients (World Health Organization (WHO) 2016b). Hospitals with adequate staffing levels have less likelihood of leaving aspects of patient care unattended (Chairun & Andries, 2020). Chairun & Andries (2020).

Also, the main problem faced by hospital services is their increasing costs or the changes needed to make them more efficient. This always seems to come back to the cost of caring for and treating elderly people and the 'burden' that such treatment imposes on the hospital services. There is a feeling that the combination of increasing demands from elderly people and increasing severity of their disabilities will require more and more hospital services and that little of this can be substituted for by services in the patient's home. Quite a high proportion of the hospital beds for the acute specialties are occupied by elderly people (Castro *et al*, 2021).

2.3 Review of Empirical Studies

Jelena, Slobodan & Angela (2020), examine analysis of risk factors in the channels of drug distribution: professional perspectives. The subject of this paper is pharmaceutical companies and the risk factors that occur in the distribution of drugs. The paper will present guidelines for the risk management of changes in the environment of pharmaceutical distribution channels. To identify, analyze, and priorities risks. The study used a systematic literature review and the Delphi method. Identification and assessment of important risk factors in drug distribution channels were conducted based on opinions of experts from 10 international pharmaceutical companies operating in Southeast Europe. The purpose of the research was to get opinions from experts about the impacts of the risk factors on the distribution of drugs, which was accomplished through interviews and questionnaires that were conducted. The study demonstrated a total of 78 risk factors in the distribution channels of drugs and pharmaceutical services. The results of the research combined separate evaluations for risk factors in all categories for easier data analysis. After data were obtained, results were arranged to show which risk factors had the biggest influence upon the distribution of drugs and to determine the negative effects they can produce. The research of risks was done primarily to help the representatives of distribution channels gain better insight into drug distribution.

Gamila (2010), investigated the dispensing errors of unit dose drug distribution system at central pharmacy of Penang hospital. The observational prospective study was conducted at Central Pharmacy of Penang Hospital for six months to determine data on patients' demographic characteristics, incidence of dispensing errors, pharmacological classes of drugs and types of medications involved and also the risk factors. A total of 2,254 cassettes from medication trolleys which filled with 12,283 prescribed medications for inpatients of medical wards were evaluated. Out of 2,254 cassettes evaluated, 560 cassettes (24.8 %) were found to have dispensing errors. These 560 cassettes consisted of 800 medications that have dispensing errors. The incidence of dispensing errors based on the total number of medications (12,283 medications) was 6.5%. This is mean that the accuracy of filling or dispensing was 93.5% The most common types of dispensing errors were undispensed medications (31.0 %), followed by wrong dose strength (23.0 %), unauthorized drug (13.1 %), inappropriate medication label (12.2 %), wrong dose interval (10.8 %), dose miscount (6.1 %), wrong dosage form (1.9 %), and wrong duration (1.9 %).

2.4 Theoretical Framework

The theoretical framework of this study is built on the following theories and this may include;
Stakeholder Theory

According to Aaltonen, Jaakko and Tuomas (2012), the stakeholder theory was propounded by Edward R. Freeman in 1984. The theory deals with organizational management and business ethics that addresses morals and values in managing an organization. It focuses on the relationship between an organization and its stakeholders. The relationship exerts significant effect on how the organization functions and conducts its activities (Mehraeen et al., 2014). According to Aaltonen, Jaakko and Tuomas (2012) stakeholder include customers, suppliers, employees, government and many others. It could be a person or group emerging from within or outside the business. The stakeholder theory evolved from the work of Edward R. Freeman (Mehraeen *et al.*, 2014). The fundamental idea of the stakeholder theory is that organizations survive longer and perform better when they create and manage effective relationship with their stakeholders as compared to organizations that fail to do so.

The theory is relevant to this study because healthcare industry is made up of several stakeholders that contribute significantly to the unified mission of quality healthcare services. This therefore enables patients to return to be healthy. The hospital in the Rural Areas of Jos, Plateau State are not different from such. The hospital has significant number of stakeholders including employees, the clients, patients. government etc that play vital roles within hospital in the rural areas of Jos, Plateau State. In order to provide quality healthcare to the medical care community, these stakeholders cannot be ignored in the decision making process. Therefore, effective relationship is required among all stakeholders in order to achieve the overall objective of the hospital in the rural areas of Jos, Plateau State.

Administrative Management Theory

According to Angus (2014), the administrative management theory was developed by Henri Fayol in 1841. The Administrative management is more concerned with how the organization is run and the distinction of basic managerial functions. Angus (2014), explained that the first person to group management functions that today are summarized as planning, organizing, leading, coordinating, controlling and staffing. He identified fourteen management principles that included: (i) division of labour (specialization leads to greater efficiency); (ii) authority (managers have the authority to get things done); (iii) discipline (members of the organization need to respect the rules and regulations that govern it); (iv) unity of command (avoid conflicting and/or confusing instructions); (v) unity of direction (only one manager should be responsible for an employee's behaviour); (vi) subordination of individual interest to the common good (the interests of individual employees should not take precedence over the interests of the entire organization); (vii) remuneration (pay for work done should be fair to both the employee and the employer); (viii) centralization (managers should retain the final responsibility); (ix) scalar chain (a single uninterrupted line of authority should run rank to rank from top management to the lowest level position in the company); (x) order (materials and people need to be in the right place at the right time); (xi) equity (managers should be both friendly and fair to their subordinates); (xii) stability and tenure of staff (stability and tenure should be enhanced and high staff turnover should be avoided); (xiii) initiative (subordinates should be given the freedom to formulate and carry out their own plans; (xiv) esprit de corps (promoting team spirit gives the

organization a sense of unity. The theory is relevant to this study in the area of the application of management principles that are widely practiced by many companies and major hospitals today.

Methodology

3.1 Population

The population of this study comprised of about 2,875 Inpatients, outpatients and hospital staff as the respondents. The composition is as follows; Inpatients (1,510) which is 52% of the entire respondents, outpatients (960) which is 33% of the entire respondents and hospital staff (405) which makes up the 15% of the respondents. These data are gotten from the Medical record office of the hospital management in the rural Areas of Jos, Plateau State, 2021.

3.2 Sample and Sampling Techniques

The sample size for the study is 357 representing 13% of the total population of 3, 320 which was determined using Taro Yamene's formulae (See Appendix 1 for details). The study will use multi-stage sampling technique for selecting the representative households. The first stage involved the purposive selection of the hospitals based on the three Senatorial districts representing Plateau South, Plateau Central, and Plateau North, the second stage involved the random selection of three rural hospitals in the LGAs within the three Senatorial districts. The third stage involved the use of systematic sampling to obtain the required Inpatients, outpatients and hospital staff as respondents. In this context, every sixth household will be interviewed. A total number of 357 respondents will be sampled using a well-structured questionnaire, however, 352 questionnaires were retrieved. The information obtained was on drug distribution strategies and the effective management of hospital in the rural areas of Jos, Plateau State.

3.3 Methods of collecting Data

A total of 357 copies of the instruments were administered to inpatients, outpatients and hospital staff of hospitals in the rural areas of Jos, Plateau State. This will be made easy with the help of four trained Research Assistants who will properly brief on the modus operandi of the administration of the instruments to the respondents. After the administration of 357 questionnaires, 352 were properly filled and responded which is 98.60% retrieval rate and was made possible with the help of four trained research assistants, while the useful responses were 352 which gives 97.20% of the retrieved instrument

3.4 Instrument used

The instrument of the study is a self-designed questionnaire titled "Drug Distribution Strategies and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State" The questionnaire is divided into two sections, namely: section "A" which is concerned with the demographic data, while the section "B" is composed of the questionnaire items which elicited information on drug distribution strategies and the effective management of hospital in the rural areas of Jos, Plateau State.

3.5 Test of Reliability and Availability of Instrument used

The questionnaire instruments were administered to 30 academic staff who will not be part of this study, in order to establish the consistency of the test items. The Cronbach's Alpha statistics was used to analyze the data collected from the respondents; the Cronbach alpha is suitable because it measures internal consistency between items when the instrument is dichotomous in nature. The Cronbach alpha coefficients obtained is 0.83.

3.6 Techniques of Data Analysis

The research questions were answered using mean and independent sample t-test while the null hypotheses will be tested with Correlation and simple regression model. Ary, Jacobs & Sorensen (2010) described Correlation and simple regression model as one applied when the intention of the researcher is to association and relationship the variables. In the present study, the researcher intended to association and relationship the variables in hospitals in the rural areas of Jos, Plateau State. The number of copies of the instrument administrated, the rate of their responses, retrieval and copies not retrieved as well as their usability.

Results

To answer Research Question 1, the mean and t-distribution were calculated from the frequency distribution of the responses. The result of the computation is shown in Table 4.1

Table 4.1: Average and t-test distribution of the Responses from the respondents on Traditional Drug Distribution Strategy and Availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State

S/N	Items	Average	t***	df	P-Value
1	Traditional drug distribution strategy Reduces Distribution Channel Options	3.2241	99.265	356	0.000
2	Increases Internal Workload thereby hindering the availability of drugs in hospitals in the rural Areas of Jos, Plateau State	3.1485	52.728	356	0.000
3	Traditional drug distribution raises fulfillment costs	3.0980	72.267	356	0.000
4	It increases billing and order tracking therefore hindering the availability of drugs in hospitals in the rural Areas of Jos, Plateau State	3.3361	133.251	356	0.000
5	Traditional drug distribution strategy increases expenses to deliver a drug to patients.	3.2157	54.381	356	0.000

Source: *Researcher's Field Result, 2022*

Note: **One Sample t- test (H_0 : average =3)

Table 4.1 shows the average and t-test distribution results of the responses from the respondents on traditional drug distribution strategy and availability of drugs in hospitals in the rural areas of Jos, Plateau State. From the results obtained the average of the respondents' responses for each item is higher than the decision mean of 3.00 (that is 3.2241, 3.1485, 3.0980, 3.3361, and 3.2157 > 3.00). The one sample independent -t test give an estimated value of (99.265, 52.728, 72.267, 133.251, and 54.381) with their degree of freedom(df) of (356) and with their corresponding probability value (0.000) which is less than the conventional standard probability value of (0.005). This shows that the responses of the respondents are not exactly equal, but they are close enough to assume equal variances. Also, since the estimated p-value (0.000) for our independent samples t-test is less than the standard significance level of 0.05, we can say that there is significant difference between the respondent's responses. From the results obtained the respondents shared similar opinion that to a high extent traditional drug distribution strategy has effect on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State. This simply means that traditional drug distribution strategy enhanced the reduction in the cost of the distribution channel options. Although, it increases internal workload thereby hindering the effective management of hospital in the rural Areas of Jos,

Plateau State. It decreases billing and order tracking therefore hindering the effective and availability of drugs in hospitals in the rural Areas of Jos, Plateau State.

To answer Research Question 2, the mean and t-distribution were calculated from the frequency distribution of the respondents' responses. The result of the computation is shown in Table 4.2

Table 4.2: Average and t-test distribution of the Responses from the respondents on Inpatient Services Drug Distribution Strategy and the availability of Drugs in Hospitals in the Rural Areas of Jos, Plateau State

S/N	Items	Average*	t**	df	P-Value
6	The Inpatient Services drug distribution strategy of dispensing drugs to outpatient area enhancing wider visibility and the availability of drugs in hospitals in the rural Areas of Jos, Plateau State	3.1373	46.753	356	0.000
7	Inpatient services drug distribution enhancing the pharmacists involved in dispensing drugs to outpatient to dispense drugs for in patients too effectively	3.0812	78.333	356	0.000
8	With the help of Inpatient Services drug distribution strategy, the pharmacist employed for drug distribution to the inpatient wards are well skilled and qualified staff	3.6246	120.130	356	0.000
9	To delivery process of this system is accomplished by the use of medications carts which enhances the effective management of hospital in the rural Areas of Jos, Plateau State	3.3277	133.765	356	0.000
10	Using Inpatient Services drug distribution strategy, drugs cannot be distributed in the absence of the patients thereby hindering the availability of drugs in hospitals in the rural Areas of Jos, Plateau State	3.1373	46.753	356	0.000

Source: *Researcher's Field Result, 2022*

Table 4.2 shows the average and t-test distribution of the Responses from the respondents on inpatient services drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. From the results obtained the average of the respondents' responses for each item is higher than the decision mean of 3.00 (that is 3.1373, 3.0812, 3.6246, 3.3277 and 3.1373 > 3.00). The one sample independent -t test give an estimated value of (46.753, 78.333, 133.765, 133.765 and 46.753) with their degree of freedom(df) of (356) and with their corresponding probability value (0.000) which is less than the conventional standard probability value of (0.005). This shows that the responses of the respondents are not exactly equal, but they are close enough to assume equal variances. Also, since the estimated p-value (0.000) for our independent samples t-test is less than the standard significance level of 0.05, we can say that there is significant difference between the respondent's responses. From the results obtained the respondents shared similar opinion that to a high extent the inpatient services drug distribution strategy has effect on the availability of drugs in hospitals in the rural areas of Jos, Plateau State.

To answer research question 3, the mean and t-distribution were calculated from the frequency distribution of the respondents' responses. The result of the computation is shown in Table 4.3.

Table 4.3: Average and t-test distribution of the Responses from the respondents on Floor Stock System of Drug Distribution Strategy and Availability of Drugs in Hospitals in the Rural Areas of Jos, Plateau State

S/N	Items	Average*	t**	df	P-Value
11	the Extent Impact of Floor Stock System of Drug Distribution Strategy and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State	3.0616	51.302	356	.000
12	the Extent Impact of Floor Stock System of Drug Distribution Strategy and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State	3.0952	76.008	356	.000
13	the Extent Impact of Floor Stock System of Drug Distribution Strategy and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State	3.3277	133.765	356	.000
14	the Extent Impact of Floor Stock System of Drug Distribution Strategy and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State	3.0616	51.302	356	.000
15	the Extent Impact of Floor Stock System of Drug Distribution Strategy and the Effective Management of Hospital in the Rural Areas of Jos, Plateau State	3.0952	76.008	356	.000

Source: *Researcher's Field Result, 2022*

Table 4.3 shows the average and t-test distribution of the responses from the respondents on floor stock system of drug distribution strategy and availability of drugs in hospitals in the rural areas of Jos, Plateau State. From the results obtained the average of the respondents' responses for each item is higher than the decision mean of 3.00 (that is 3.0616, 3.0952, 3.3277, 3.0616 and 3.0952 > 3.00). The one sample independent -t test give an estimated value of (51.302, 76.008, 133.765, 51.302 and 76.008) with their degree of freedom(df) of (356) and with their corresponding probability value (0.000) which is less than the conventional standard probability value of (0.005). This shows that the responses of the respondents are not exactly equal, but they are close enough to assume equal variances. Also, since the estimated p-value (0.000) for our independent samples t-test is less than the standard significance level of 0.05, we can say that there is significant difference between the respondent's responses. From the results obtained the respondents shared similar opinion that to a high extent the floor stock system of drug distribution strategy has an effect on the availability of drugs in hospitals in the rural areas of Jos, Plateau State.

To answer Research Question 4, the mean and t-distribution were calculated from the frequency distribution of the respondents' responses. The result of the computation is shown in Table 4.4

Table 4.4: Availability and t-test distribution of the Responses from the respondents on Unit Dose System of Drug Distribution Strategy and Availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State

S/N	Items	Average*	t**	df	P-Value
16	unit dose system of drug distribution enhances Patients to receive better health.	3.2241	99.265	356	0.000
17	service and have to charge for those drug and doses which are administered to them.	3.1485	52.728	356	0.000
18	unit dose system of drug distribution strategy Reduces revenue losses thereby enhancing effective management of hospital in the rural Areas of Jos, Plateau State.	3.0980	72.267	356	0.000
19	It does not require ambulatory services thereby enhancing effective management of hospital in the rural Areas of Jos, Plateau State	3.3361	133.251	356	0.000
20	Drugs ordered, packaged and administrated in single or multiple units containing predetermined amount of drug and doses which enhanced effective management of hospital in the rural Areas of Jos, Plateau State	3.2157	54.381	356	0.000

Table 4.4 shows the average and t-test distribution of the responses from the respondents on unit dose system of drug distribution strategy and availability of drugs in hospitals in the rural areas of Jos, Plateau State. From the results obtained the average of the respondents' responses for each item is higher than the decision mean of 3.00 (that is 3.2241, 3.1485, 3.0980, 3.3361 and 3.2157 > 3.00). The one sample independent -t test give an estimated value of (99.265, 52.728, 72.267, 133.251 and 54.381) with their degree of freedom(df) of (356) and with their corresponding probability value (0.000) which is less than the conventional standard probability value of (0.005). This shows that the responses of the respondents are not exactly equal, but they are close enough to assume equal variances. Also, since the estimated p-value (0.000) for our independent samples t-test is less than the standard significance level of 0.05, we can say that there is significant difference between the respondent's responses. From the results obtained the respondents shared similar opinion that to a high extent unit dose system of drug distribution strategy has effect on the availability of drugs in hospitals in the rural areas of Jos, Plateau State. To address issues related to availability of drugs in hospitals of the rural areas of Jos, Plateau State, it is well noted that Jos, Plateau state has three senatorial districts and they are namely; Plateau north senatorial district, *Plateau south senatorial district* and Plateau central senatorial district. However, the rural areas in these senatorial districts were selected to assess the availability of drugs in the hospitals of the rural areas of Jos, Plateau State, and table 4.5 below contains the detail.

Test of Hypotheses

HO₁: Traditional drug distribution strategy does not have any significant effect on the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Table 4.5: Simple Regression of the relationship traditional drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
		(Constant)	.634	.080				7.920	.000	.476
	Traditional	.869	.028	.855	31.114	.000	.814	.924	1.000	1.000
R ²	0.732									
AdjR ²	0.731									

Source: Researcher Extract from SPSS Version 26 OUTPUT

Table 4.5 show the simple regression of the relationship traditional drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The model in Table 4.6 shows that there is a positive and significant relationship between traditional drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The coefficient of determination (R²) is 0.732 which show that 73.2 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the use of the traditional drug distribution strategy all things being equal. The remaining 26.8 are variations are expounded by other factors not considered in the model. We can see that the VIF value for traditional drug distribution strategy is 1.000. Thus, the VIF value of 1.000 is smaller than 10. We can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the independent variable (traditional drug distribution strategy). Figure 4.1 below contains the normal P-P plot of the linear regression establishing the relationship traditional drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

HO2: Inpatient services drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Table 4.6: Simple Regression of the relationship inpatient services drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
		(Constant)	.785	.134				5.854	.000	.522
	Inpatient Services	.754	.045	.667	16.848	.000	.666	.842	1.000	1.000

R ²	0.444									
AdjR ²	0.443									

Source: *Researcher Extract from SPSS Version 26 OUTPUT*

Table 4.6 shows simple regression of the relationship inpatient services drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The results in Table 4.8 shows that there is a positive and significant relationship between inpatient services drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The coefficient of determination (R²) is 0.444 which show that 44.4 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the use of the inpatient Services drug distribution strategy all things being equal. The remaining 26.8 are variations are expounded by other factors not considered in the model. We can see that the VIF value for inpatient services drug distribution strategy is 1.000. Thus, the VIF value of 1.000 is smaller than 10. We can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the independent variable (inpatient services drug distribution strategy).

HO3: Floor stock system of drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Table 4.7: Simple Regression Analysis of the relationship floor stock system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
	(Constant)	1.189	0.147		8.109	0.000	0.901	1.478		
	Floor stock system	0.569	0.046	0.553	12.502	0.000	0.480	0.659	1.000	1.000
R ²	0.306		.304							
AdjR ²	0.304									

Source: *Researcher Extract from SPSS Version 26 OUTPUT*

Table 4.7 shows the results of the simple regression of the relationship between floor stock system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The results in Table 4.8 shows that there is a positive and significant relationship between floor stock system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The coefficient of determination (R²) is 0.444 which show that 44.4 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the use of floor stock system drug distribution strategy all things being equal. The remaining 26.8 are variations are expounded by other factors not considered in the model. We can see that the VIF value for floor stock system

drug distribution strategy is 1.000. Thus, the VIF value of 1.000 is smaller than 10. We can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the independent variable (floor stock system drug distribution strategy).

HO4: Unit dose system of drug distribution strategy does not have any significant effect on availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Table 4.8: Simple Regression of the relationship unit dose system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
	(Constant)	1.197	.077		15.610	.000	1.046	1.348		
	Unit	.606	.021	.834	28.488	.000	.564	.647	1.000	1.000
R ²	0.696									
AdjR ²	0.695									

Source: Researcher Extract from SPSS Version 26 OUTPUT

See detail in Appendix

Table 4.8 contains the results of the simple regression of the relationship unit dose system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The results in table 4.8 shows that the estimated value of unit dose system is 0.606. This simply means that if unit dose system increases by 1 unit the availability of drugs increases by 60.6 percent. Unit dose system has a positive effect on availability of drugs in hospital rural areas of Jos, Plateau State. There is a positive and significant relationship between unit dose system of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The coefficient of determination (R²) is 0.696 which show that 69.6 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the use of unit dose system drug distribution strategy all things being equal. The remaining 30.4 are variations are expounded by other factors not considered in the model. We can see that the VIF value for unit dose system drug distribution strategy is 1.000. Thus, the VIF value of 1.000 is smaller than 10. We can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the independent variable(unit dose system drug distribution strategy).

HO5: There is no significant relationship between traditional, inpatient services, floor stock system and unit dose system strategies and their effect on the availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Table 4.9: Simple Regression of the relationship traditional, inpatient services, floor stock system and unit dose system strategies and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
		(Constant)	.864	.084				10.227	.000	.697
	Traditional	-1.426	.066	.000	.000	1.000	-.130	.130	.137	7.276
	inpatients	8.412	.175	.000	.000	1.000	-.345	.345	.024	41.088
	Floor	0.720	.224	.790	3.213	.001	.279	1.161	.012	81.075
	Unit	0.051	.109	.070	.470	.639	-.162	.264	.033	29.927
R ²	0.737									
AdjR ²	0.734									

Source: *Researcher Extract from SPSS Version 26 OUTPUT*

Table 4.9 contains the results of the simple regression of the relationship traditional, inpatient services, floor stock system and unit dose system strategies and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The results in table 4.8 shows that the estimated value of Traditional drug distribution method is (-1.426), the inpatients (8.412), floor stock method (0.720) and unit dose (0.051). This simply means that if traditional drug distribution method increases by 1 unit the availability of drugs decreases by 142.6 percent. Similarly, if the inpatients drug distribution method increases by 1 unit the availability of drugs increases by 841.2 percent. Also, if the unit dose drug distribution method increases by 1 unit the availability of drugs increases by 5.1 percent. The coefficient of determination (R²) is 0.737 which show that 73.6 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the use of traditional, inpatient services, floor stock system and unit dose system of distribution strategy all things being equal. The remaining 26.4 are variations are expounded by other factors not considered in the model. We can see that the variance inflation factor (VIF) values for traditional, inpatient services, floor stock system and unit dose system of distribution strategies are; 7.276, 41.088, 81.075 and 29.927. Thus, all except the VIF value of traditional drug distribution method (7.276) is smaller than 10. Therefore, it can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the methods of drug distribution system.

HO6: There is no significant relationship between the total effect of the various distribution strategies and availability of drugs for effective hospital management in the rural areas of Jos, Plateau State

Table 4.10: Simple Regression of the total effect of the various distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State

Goodness of Fit test		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
		(Constant)	0.887	.086				10.360	.000	.719
Total Effect	0.197	.007	.837	28.876	.000	.184	.210	1.000	1.000	
R ²	0.701									
AdjR ²	0.701									

Source: Researcher Extract from SPSS Version 26 OUTPUT

See detail in Appendix

Table 4.10 contains the results of the simple regression of the relationship total effect of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The results in table 4.8 shows that the estimated value of total effect is 0.197. This simply means that if the total effect of drug distribution strategy increases by 1 unit the availability of drugs increases by 19.7 percent. Total effect of drug distribution strategy has a positive effect on availability of drugs in hospital rural areas of Jos, Plateau State. There is a positive and significant relationship between total effect of drug distribution strategy and the availability of drugs in hospitals in the rural areas of Jos, Plateau State. The coefficient of determination (R²) is 0.701 which show that 70.1 percent variations in the availability of drugs in hospitals in the rural areas of Jos, Plateau State are largely attributed to the total effect of drug distribution strategy all things being equal. The remaining 29.9 are variations are expounded by other factors not considered in the model. We can see that the VIF value for total effect of drug distribution strategy is 1.000. Thus, the VIF value of 1.000 is smaller than 10. We can conclude that the VIF value is less than 10, meaning that there is no multicollinearity in the independent variable (total effect).

4.1 Discussion of Findings

The Extent Traditional Drug Distribution Strategy has impact on the availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State.

The findings show that to a high extent traditional drug distribution strategy affect the effective management of hospital in the rural areas of Jos, Plateau state. This simply means that traditional drug distribution strategy enhanced the reduction in the cost of the distribution channel options. Although, it increases internal workload thereby hindering the effective management of hospital in the rural Areas of Jos, Plateau State. It decreases billing and order tracking therefore hindering the effective management of hospital in the rural Areas of Jos, Plateau State. This agree with the hypothesis which says that there is significant difference in the mean response of Inpatients, outpatients and hospital staff on the impact of traditional drug distribution strategy on the effective management of hospital in the rural Areas of Jos, Plateau State

The Extent Inpatient Services Drug System of Drug Distribution has impact on the availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State.

The findings of this study, it shows that the inpatient and outpatient respondents shared similar opinion that to a high extent inpatient services drug system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State whereas the hospital staffs were of the opinion that to a very high extent inpatient services drug system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State. This agree with the test of hypothesis which says that there is significant difference in the mean response of Inpatients, outpatients and hospital staff on the impact of Inpatient Services drug distribution strategy on the effective management of hospital in the rural Areas of Jos, Plateau State. The findings of this study agree with Ogbonna (2016) assertion in his investigation on national drug distribution in Nigeria; implications for the goals of national drug policy. Ogbonna (2016) asserted that the present drug distribution system in Nigeria is chaotic, porous and a serious threat to the National Drug Policy (NDP). Open drug markets abound with charlatans operating freely across the value chain. Out-of-Stock syndrome is very common in government hospitals.

The Extent Floor Stock System of Drug Distribution Strategy has impact on the availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State.

From the analysis of the responses from the respondents, it was found that the inpatients and outpatients shared similar opinion that to a high extent floor stock system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State. While the hospital staffs were of the opinion that to a very high extent floor stock system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State. The findings of this study confirmed Chairun & Andries (2020), assertion. In Chairun & Andries (2020), studied on the effective implementation of marketing management of hospital pharmacy: a study on the impact of hospital service quality improvement in enhancing the of patients' satisfaction and loyalty. It was asserted that in implementing the pharmaceutical marketing functions for all hospital service consumers, staff marketing should be able to provide the best service required by consumers irrespective of their area of residents. This is because the variations in the responses of the respondents could be attributed to factors prevalence in the rural areas of Jos, Plateau State.

The Extent Unit Dose System of drug Distribution Strategy has impact on the availability of drugs in Hospitals in the Rural Areas of Jos, Plateau State.

From the analysis of the responses from the respondents, it was found that the inpatients and outpatients shared similar opinion that to a high extent unit dose system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State. While the hospital staffs were of the opinion that to very high extent unit dose system of drug distribution strategy has impact on the effective management of hospital in the rural areas of Jos, Plateau State. The results of this findings corroborates Gamila (2010), investigations on the dispensing errors of unit dose drug distribution system at central pharmacy of Penang hospital. In Gamila (2010), studied it was found that the incidence of dispensing errors is considered significant at Central Pharmacy of Penang hospital, particularly prescription with many medications as A total of 2,254 cassettes from medication trolleys which filled with 12,283 prescribed medications for inpatients of medical wards were evaluated. Out of 2,254 cassettes evaluated, 560 cassettes (24.8 %) were found to have dispensing errors. These 560 cassettes consisted of 800 medications that have dispensing errors. The incidence of dispensing errors

based on the total number of medications (12,283 medications) was 6.5%. This is mean that the accuracy of filling or dispensing was 93.5%.

5.1 Summary

The study investigated drug distribution strategies and the availability of drugs in hospital in the rural areas of Jos, Plateau State. Specifically, to determine the extent of impact traditional drug distribution strategy, Inpatient Services, Floor Stock System and unit dose system of drug distribution strategies have on the effective management of hospital in the rural Areas of Jos, Plateau State. To achieve these specific objectives four corresponding research questions and hypotheses were set to guide the study. In an attempt to review related literature to this study, the objectives of the study were operationalized under the conceptual framework to this study. Also, stakeholder theory, administrative management theory and management theories were examined. These theories were found to be appropriate for this study since they have applications with respect to distribution strategies and organizational effective management system.

The study therefore adopted the descriptive survey research design with a total population of about 2,875 Inpatients, outpatients and hospital staff as the respondents. The composition is as follows; Inpatients (1,510) which is 52% of the entire respondents, outpatients (960) which is 33% of the entire respondents and hospital staff (405) which makes up the 15% of the respondents. The sample size for the study is 357 and this was determined using Taro Yamene's formulae. Questionnaire was adopted for the study with a reliability coefficient of 0.82, using the test-retest method. The research questions were analyzed using mean (\bar{x}), statistic while the hypotheses were tested with correlation and regression model. All the research questions tested were agreed to a high and very high extent whereas all the null hypotheses were rejected. Based on the data gathered and analyzed, it was found that there is significant difference in the mean response of inpatients, outpatients and hospital staff about the impact of traditional, inpatient services, floor stock system, and unit dose on the effective management of hospital in the rural Areas of Jos, Plateau State.

5.2 Conclusion

Based on the responses of respondents, it is obvious that to an high extent there is a significant difference in the various drugs distribution strategies such as traditional, inpatient services, floor stock and unit dose systems. The variations in the distribution strategies and the availability of drugs in the hospitals in rural could be caused by wrong drug supply strategies, Poor supplier lead-time, supply of drugs with short expiration dates, official complicity, poor handling of drug stocks, poor management of inventory and other human, environmental and financial constraints. However, the situations in hospitals in the rural Areas of Jos, Plateau State did not show any future significant improvement. Therefore, there is need for urgent reforms and drugs distribution strategies to ensure equity devoid of religion, geographic, economic biasedness. Evidence emanating from the study have shown that patriarchy is entrenched in most of the hospitals in the rural Areas of Jos, Plateau State. This is perpetrated in the name of culture or religion; therefore, all these were barriers to traditional, inpatient services, floor stock and unit dose systems in the rural Areas of Jos, Plateau State. These must be averted else non availability of drugs will continue to be a problem in the hospitals in the rural Areas of Jos, Plateau State, Nigeria.

5.3 Recommendations

1. There is need for Government to pay close attention to drugs distribution strategies to ensure the proper things are done. This could be achieved by timely evaluation of the process or Contractual agreements can be reach between the drugs distribution company and government to ensure equitable distribution of drugs using the appropriate methods in hospitals in the rural Areas
2. There must be a mechanism or channel to track or check attitude of the hospital staffs against diverting of drugs distributed to some other areas outside the hospitals.
3. Government and community-based leadership should be put in place to ensure proper and timely distribution of drugs. This can be achieved by Government by taken steps to reduce improper route, traffic jam and extortion problems etc.
4. Employee turnover can be reduced to ensures drugs distribution strategies are properly utilized and facilitated

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