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Assessment of Medicine Supply Management and its Quality Assurance Practice in Health Centers in South West Shoa Zone, Oromia Regional State, Ethiopia

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Abstract

Background: Medicine supply management consist four basic functions of medicine management cycle which are selection, procurement, inventory management and serving customers/use. Poor medicine management practice results shortages of essential medicines, high prices, poor quality, theft, expiration, irrational prescribing, and incorrect use of medicines by patients. In Ethiopia although the medicine supply chain has several problems; studies dedicated to assess these medicine management problems are limited. Therefore, the aim of this study is to assess the medicine supply management and its quality assurance practice in selected health centers of South West Shoa zone, Oromia, Ethiopia.

Methods: A facility based cross-sectional survey through quantitative data collection method was conducted in 10 health centers from March 1 to 12, 2018. Structured-questionnaires and observation check lists were used to collect data. The data was analyzed using SPSS version 23.0.

Results: In most HCs (n=8) selection was not decided by drug and therapeutic committee with the use of essential medicine lists. All HCs reported that items and quantities were sent by suppliers without determining what the specific need. In all HCs there were no a supply planning used for procurement. 9 HCs didn't have facility vehicle/ Car for transportation of medicines. The median percent adequacy of storage conditions in all HC store rooms was found to be 50%. All the HCs reported to use bin cards in store. However, only one of the HC had stock cards and automated recoding systems.

Conclusion: The practice of medicine supply management in health centers of South West Shoa Zone was found poor. Moreover in majority of the surveyed health centers there were deficiencies in medicines selection, quantification, procurement, storage and quality assurance practices. Health centers therefore should work in collaboration with other stakeholders to strengthen/develop a way to have strong medicine supply management and a monitoring and evaluation system.

Abbreviations

DTC: Drug and Therapeutic Committee; HCs: Health Centers; IPLS: Integrated Pharmaceutical Logistic System; LIAT: Logistics Indicators Assessment Tool; LMIS: Logistics Management Information System; NEML: National Essential Medicines List; PFSA: Pharmaceutical Fund and Supply Agency; SD: Standard Deviation; WHO: World Health Organization.

Introduction

Medicine supply management has a key role to ensure that essential medicines are available at affordable cost according to a given budget, they are well managed or controlled and that they are used rationally [1]. Managing medicine supply is summarized as the four basic functions of medicine management cycle which are selection, procurement (including quantification), inventory management (this also includes storage and distribution) and serving customers/use [2]. Product selection is a critical first step in logistics management of medicines. The purpose is to select the most effective and cost-efficient medicines so as to support the goals of a health care system [2]. Once the medicines have been selected, the needs must be quantified. Quantification is referred to as critical logistics management activity that links the quantities of medicines being used and patient or hospital needs on the ground to financing and procurement decisions. It involves estimating the quantities and the costs of products required to meet customer demand and maintain adequate stock levels in the supply pipeline. Quantification must rely upon accurate, up-to-date information on: service provision and consumption/use of medicines, stock levels and funding sources and amounts for medicines procurement [3]. Procurement deals with preparation of tendering processes, choice of reliable suppliers and purchasing of medicines so that they are available for use. An effective medicine procurement process ensures the availability of the right medicines in the right quantities, at the reasonable prices and at recognized standards of quality [2]. After a medicine is selected and procured, it must be stored until use. As the quality of medicines is very dependable on the storage conditions, a medicines supply management system should

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include standard inventory management that provides medicines to be stored and distributed on the right conditions. The goals of inventory management are to protect stored items from loss, damage, theft or wastage, and to manage the reliable movement of supplies from source to user in the least expensive way [2,4]. Effective inventory management is underpinned by a Logistics Management Information System (LMIS). An LMIS is a computerized database for inventory management that records all medicines transactions and connects all levels of the supply chain. The purpose of LMIS is to support the management of all medicines by collecting, organizing and reporting information to other levels in the system [5].

Poor medicine supply management practice results shortages of essential medicines, high prices, poor quality, theft, expiration of medicines, irrational prescribing and incorrect use of medicines by patients cause losses totaling 70% of the original expenditure [3].

Selection and prioritization of medicines without proven tools and techniques result in frequent stock-outs and waste due to expiry. Poor quantification and forecasting of medicines may lead to incorrect ordering, leading to under-stocking or overstocking of the medicines. Overstocking of medicines normally produce high number of expired medicines, high cost of storing excess stock and high incidences of pilferage of high potent medicines and promotion of irrational use of medicines [3,6]. The distribution of medicines through the supply chain involves transportation. Medicines are costly and hence prone to theft or diversion by carriers during transportation. Poor medicine storage conditions such as storage on the floor; lack of systematic arrangement of stock; presence of dust and pests; inadequate protection from direct sunlight; and lack of provision of temperature monitoring charts and facilities to monitor room temperature can lead to degradation of medicines. It can also lead to theft of medicines [7,8]. Medicines may have expired without anyone noticing that the shelf life date was approaching due to poor inventory management. Poor stock control invites accusations of a myriad of abuses, the most common being pilferage (theft). Accumulation of expired medicines without disposal occupied spaces and may lead to waste resources [7]. Lack of adequate quality assurance in the medicine supply chain due to weak monitoring and evaluation capacity, corruption and the lack of financial, technical and other resources to ensure the security of medicines supply chains causes the wastage of limited resources [9].

Although medicines supply management problem seems universal, it is of particular importance in developing countries where many people are deprived of basic primary health care [10]. A study conducted in Ghana revealed that, challenges in managing medicines in the hospitals were; inadequate availability of health commodities due to poor selection and quantification, poor procurement practices, undermined distribution, unavailability of storage facilities, unavailability of skilled labor, internal bureaucracy, lack of funding and logistical problems [11].

Another study done in Uganda on medicine management and procurement practices revealed that there were frequent medicine stock outs and large quantities of expired medicine in the health units due to deficiencies in selection, quantification, procurement and storage of medicines [12].

The Ethiopian situation is not different from the rest of the developing world and the medicine supply chain has several problems including inadequate supply of quality and affordable essential medicines, poor storage conditions, weak stock management, robbery of medicines and medical equipment along the supply chain and forged procurement requests from health facilities resulted in high levels of waste and stock outs [13]. In addition to this, execution of pharmaceutical transactions and services in public health facilities of Ethiopia lacks transparency and accountability; thus vulnerable for theft [14].

Over all, although there are reports that reveal the presence of poor medicine supply management practice in Ethiopia; studies dedicated to assess these medicine management activities are limited. Therefore, the aim of this study is to assess the medicine supply management and its quality assurance practice in selected public health facilities of South West Shoa zone, Oromia Regional State, Ethiopia. This helps policy makers to provide an empirical snapshot of the current medicine management practice situation in the area and provide baseline information to track changes and improvements in medicine supply management performance over time.

Methods

A facility based cross sectional survey was conducted in selected health centers in South West Shoa Zone from March 1 to March 12, 2018. The study used a quantitative method of data collection. The source population for this study was all the health centers (HCs) found in South West Shoa zone. The numbers of health centers to be included in the study were calculated by using the Logistics Indicators Assessment Tool (LIAT) (USAID | DELIVER PROJECT, 2008). As per the tool a total of minimum of 15% of the targeted health facilities would be enough to take as a sample. At the time of survey, a total of 60 HCs were in operation in South West Shoa Zone. Of these, 10 HCs were chosen by using simple random sampling techniques.

All pharmacy heads or persons responsible for medicine supply management and store managers in the selected health facility were selected purposively to participate in the survey made using researcher administered-structured questionnaire. Observation using structured check list was also made at medical stores to gather information about the handling practice of medicines storage in the HCs.

A structured questionnaire which contains questions on back ground information of the facility and pharmacy case team, medicines selection, quantification and procurement practices and monitoring and evaluation activities of the facility were adapted mainly from Logistics Indicator Assessment Tool (LIAT) [15]. Standards such as the National Minimum Standard for Health Center and World Health Organization (WHO) minimum criteria for adequate conservation conditions and handling of medicines were used in the preparation and adaptation of data collection tools [16,17].

In order to assure the data quality; the questionnaire for the survey was pre-tested in two HCs which were not included in the study prior to the actual data collection. Two data collectors were trained for a session of half day on the data collection instruments and processes prior to data collection. Supervision was made by the principal investigator during the data collection process.

After the data was manually checked for completeness and consistencies, it was entered and analyzed by using SPSS version 23 and the results are presented in the form of tables and graphs.

Ethical approval was obtained from the research and community service committee of Pharmacy department, Ambo University. Then, a formal letter was written from the Department of Pharmacy to South West Shoa Zone health department to get permission for conducting the study. Then, the study was conducted in the selected HCs after permission from the relevant body administering the institutions. For the purpose of confidentiality and ethical issues, names of HCs

from which information obtained were recorded and analyzed using uniquely identifying codes.

Results

Background information of the health facilities

Ten (n=10) HCs (Wolisso, Chitu, Teji, Asgori, Tullubolo, Awash bune, Obi, Dilela, Goro, Gurura) were included in this study. The average establishment year of the facilities was 12.1 (SD=15.18). The minimum age of facility was 3 years and the maximum was 55 years.

In all HCs there were operational electricity, water and telephone during the day of assessment. Eight of the HCs did not have functional computer and all of the health centers did not have internet access and generator during the day of assessment.

Regarding the Availability of pharmacy store in the HC, all of the HCs (n=10) had medical store. However, none of the HCs had separate warehouses for supplies and equipment.

Pharmacy case team staffing and its adequacy

All of the health facilities use full-time pharmacy staffs to provide pharmaceutical services. In the ten assessed HCs, the assessment found 7 pharmacist, 8 druggists and 4 clinical nurses as pharmacy case team staff. And all of them had designated Persons for the overall management of the pharmacy section as well as for managing medicines at medical store. In five HCs the store managers were act as head of pharmacy case team as well. In three HCs pharmacists were involved for managing the medical store activities. However, in 2 health centers, clinical nurses run the medical store. Most of the heads of pharmacy 7 (70%) were pharmacists. And Majority of them 7 (70%) were graduated from government universities/colleges whereas, majority of the store managers were graduated from private universities/colleges. The average number of years since graduation for the pharmacy heads was 6.2 (SD= 1.3) and the average number of years at current position in the HC was 3.0 (SD=1.95). The average number of years on store man position in the facility was 2.2 (SD= 2.0). The majority of the professionals earned between 4000-7000 birr per month income.

Concerning adequacy of staffing, all of the HCs believed that the number of pharmacy professionals was not adequate to effectively provide the services in each section. Of the ten health centers studied, 4 health centers reported that they had pharmacy unfilled positions (vacancies). All of them also reported having no dedicated persons for managing warehousing and inventory management activities only and they did not have dedicated supportive staffs/data clerks to assist in LMIS for pharmacy services.

Training

All heads of Pharmacy case team and store managers were asked whether they had received medicine supply management related training or not during their stay in the facility.

Majority, 14 (out of 16) of the respondents had received training on Integrated Pharmaceutical Logistic System (IPLS). However, only two of the respondents reported that they had received Drug and Therapeutic Committee (DTC) training and one respondent reported receiving training on Medicines waste management. Two participants said that they had not received any medicine supply management related training.

Medicine supply management practice

Selection, quantification and procurement of medicines: In all HCs (n=10) there were established DTC, however, only two of the established DTC had annual action plan and function according to the action plan. Eight of the HCs didn't have health facility-specific medicines list developed and approved by the DTC and only two of the HCs had updated copy of National Essential Medicines List (NEML) in place this was proved by physical observation.

And yet all health facilities reported to have a DTC, in most HCs (n=8) selection was decided either jointly by the HCs head and the head of pharmacy section or only by the pharmacy section without the use of NEML or facility specific medicine lists as reference documents. However, all HCs reported that they used the pattern of disease prevalence as selection criteria and they preferred generic names of medicine during their medicines selection and procurement activities.

All of the HCs reported that the HC determine the types and quantities of medicines they need. However, all HCs reported that items and quantities were sent by suppliers without determining what the specific need. None of the health facilities was conducted Stock status analysis before procurement.

All HCs revealed that they procured medicines from both government (Pharmaceutical fund and supply agency: PFSA) and private suppliers and all of them used Performa in procuring medicines from private suppliers. However, in all HCs there were no a supply planning used to decide on the time table of procurement, responsible person for procurement, what to procure, from where and how much to procure.

All of the HCs didn't have schedules (time tables) for procurements and in majority of the facilities (n=8) the whole procurement processes were decided either only by the heads of the pharmacy unit or jointly with the heads of the facilities. In two HCs procurement were being done by pharmacy professionals found outside the facilities. The reason for both health facilities were that shortage of pharmacy professionals.

Concerning transportation, six HCs reported that facilities themselves collect medicines from both PFSA and private suppliers while PFSA or Biftu Adugna trucks were delivered for the remaining four HCs. Except the one, all the HCs didn't have facility vehicle/Car for transportation of medicines and all of them used private vehicle (rented car) to collect medicines from the suppliers.

Storage conditions

In all health facilities there were no a separate store for flammables and non-flammable. Except in one, in 9 HCs the observed medical stores were very small rooms to accommodate the medicines and supplies and they were crowded and it seems they were not designed and built to serve as a medical stores and all the store managers in the HCs reported that the current space and organization of their medical store is not sufficient for existing products and reasonable expansion (i.e. receipt of expected product deliveries for foreseeable future). In half (n=5) of observed medical stores there were wasted medicines which were not separated from the usable stock. None of the HC store had a standard Medicines waste register book and only one of the HC store had a computer software system (Health Commodity Management Information System) used to trace expiry date.

Regarding safe guarding mechanisms, in all HCs security devices such as lock and key were in place. However, none of the HC has fire extinguisher or sand as a fire safety (Table 1).

Percentage and median value were also used to evaluate the adherence of HC stores to these criteria. The median percent adequacy

No.	Description	Frequency (Yes)
1.	Products are arranged systematically (pharmacological/alphabetical).	6
2.	Products are arranged so that identification labels are visible.	6
3.	The products are stored and organized in a manner accessible for first-to-expire, first-out (FEFO) issuing.	3
4.	Cartons and products are in good condition, not crushed due to mishandling.	6
5.	Damaged and/or expired products/ are separate from usable products.	5
6.	Products are protected from direct sunlight.	6
7.	Cartons and products are protected from water during all seasons	6
8.	Storage area is visually free from harmful insects and rodents.	7
9.	Security devices (grilles for windows and doors made of glass, and lock and key) are in place	5
10	Products that need cold temperature are stored in a functional refrigerator.	2
11	Storeroom is maintained in good condition (clean, all trash removed, strong shelves, organized boxes).	7
12	The current space and organization is sufficient for existing products and reasonable expansion (i.e., receipt of expected product deliveries for foreseeable future).	1

Table 1: Storage condition of medicines in HCs, South West Shoa Zone, May 2016 (n=10).

of storage conditions in all HC store rooms was found to be 50%. In one HC store, the adequacy of storage conditions was found to be 83.3%. Four of the health center store rooms met more than 50% of the minimum criteria for adequate storage conditions, while the remaining five health center store rooms met less than half the minimum criteria for adequate storage conditions (Figure 1).

Logistics management information system

Regarding the LMIS, none of the HCs had documented policy or guideline for managing and using the LMIS. All the HCs reported to use bin cards in store. However, only one of the HC had stock cards and automated recoding systems (Figure 2).

Regarding reporting of the stock status of medicines, six of the HCs sent reports to PFSA annually, all of them using similar form ("forecasting format") when requested by PFSA. In all 6 HCs that sent reports, quantity of medicines consumed in the reporting period was reported while stock on hand and loss and adjustments were not part of the report in all cases.

Quality assurance practice

The other variable considered during assessment was monitoring and evaluation (Reporting, Supervisory visit) of the activities of the health facilities.

Concerning reporting, all HCs mentioned that they send medicine reports to the woreda health offices and zonal health desk in the last 12 months as of the study date.

All HCs reported that there is a formal and regular follow up to improve medicines utilization by pharmacy unit from different dispensing unit of the facility. However, none of the HCs was applied a participatory and continuous improvement process such as regular meeting with staffs/management, conducting survey and intervention in-service training, consultations with stakeholders and etc. as a means of improving medicines supply management

All HCs received medicine management supportive supervision from higher levels. Half of the health facilities surveyed (n=5) reported that they had had their most recent supervisory visit within the last three months as of the study date while one HC reported receiving supervisory visit in the previous month and four HC received their last supervisory visit more than three months ago.

Of all HCs that received a supportive supervision, two HCs indicated that the supervision included administrative issues, while the remaining eight HCs reported that their last supervision included medicines management issues other than administrative. Zonal health
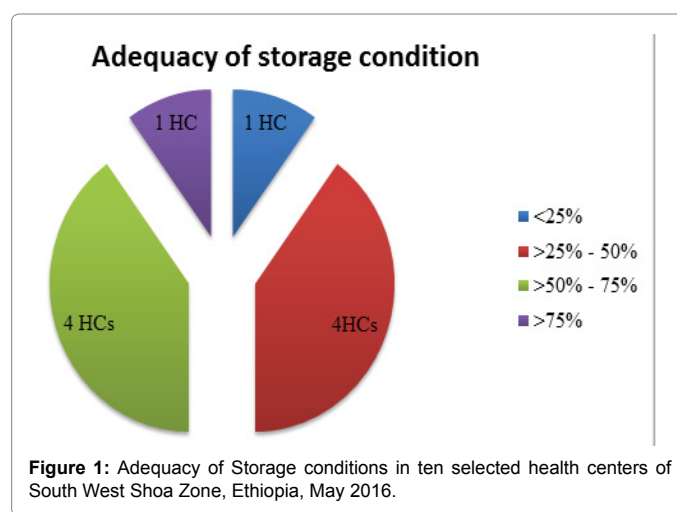
Figure 1: Adequacy of Storage conditions in ten selected health centers of South West Shoa Zone, Ethiopia, May 2016.
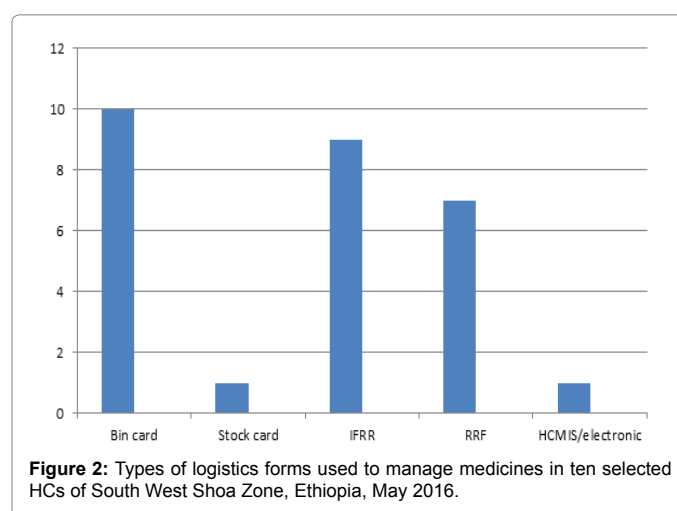
Figure 2: Types of logistics forms used to manage medicines in ten selected HCs of South West Shoa Zone, Ethiopia, May 2016.

desk and woreda health offices were indicated as a direct supervisor of HCs. The assessment showed also that in all HCs Physical inventory of medicines was carried out on a yearly basis. However, only one of the HC was conducted financial auditing on medicines in the previous fiscal year.

Discussion

Ethiopia like many other countries around the world is seeking ways

to improve medicine supply chain management. In recent years, FMOH has made tremendous efforts in improving medicines management to saves the organization money and to ensure that customers receive quality products [5]. However, empirical observation indicates that poor medicine supply management and quality assurance practice in many of the public health facilities of the country.

Shortage of Pharmacy human resource was identified by the result of the background part of the study. All of the HCs believed that the number of pharmacy professionals was not adequate to effectively provide the services in each unit. All of them also reported having no dedicated persons for managing warehousing and inventory management activities only. In two HCs procurement were being done by pharmacy professionals found outside the facilities and in the HCs excluded from the study, the reason for not keeping the record of LMIS was due to lack of pharmacy professionals. In this HCs Pharmacy work is delegated to clinical nurses as additional task. This would indicate that majority of the health institutions in the zone were running their activities without pharmacists and pharmaceutical services in the area is still not well developed & get attention. This finding is similar to the report made in South Africa, which showed the situation of Medicines management in the health facilities is made worse by the inadequate availability of experienced pharmacists in the facilities [18]. Human resources are a key performance driver within medicine supply chains. In the absence of qualified personnel, medicine supply chain functions in pharmacies at health centers are performed by clinical health workers such as medical assistants and nursing aides. This has the distinct disadvantage of diverting these cadres from their core duty of direct patient care and because they lack training in medicines logistics management, inefficiencies occur in supply chain management as well as clinical care [10,19].

Regarding selection, all health facilities reported to have a DTC, in most HCs (n=8) selection was decided either jointly by the HCs head and the head of pharmacy section or only by the pharmacy section without the use of NEML or facility specific medicine lists as reference documents which is not in line with the standard [17]. This finding is comparable with the situation in other Sub-Saharan countries like Tanzania where only 38% of the surveyed health facilities had essential drug list and among them only 52% of the facilities procured medicines within the essential drug list [20].

The study documented that all of the HCs reported that the HC determine the types and quantities of medicines they need. However, all HCs reported that items and quantities were sent by suppliers without determining what the specific need. This non-demand-based approach impairs availability of medicines and increases the volume of expiries [12]. The main dis advantage of push system over pull is that health facilities are not supplied according to their demand. In push system, however, medication needs are processed centrally without direct involvement or active contribution of health facilities [2].

The study also found that only one HC has facility vehicle/Car for transportation of medicines and the remaining 9 HCs used private vehicle (rented car) to collect medicines from the suppliers. One of the important components of logistics system is transportation [21]. Good transport practice demands reliability, efficiency, safety, accountability, timeliness, affordability and sustainability [2].

Concerning the storage condition, none of the HCs' storage condition was complete; even some HCs scored as low as 25% in good storage practice and the median percent adequacy of storage conditions in all HC store rooms was found to be 50%. All HCs reported that the current space and organization of their medical store is not sufficient for existing products and reasonable expansion (i.e. receipt of expected product deliveries for foreseeable future). Inadequate storage space leads to stacking of products one over the other and make FEFO arrangement, easy picking of products and cleaning difficult [22]. Similar inadequate storage conditions were reported in other Sub-Saharan countries such as, Uganda (63.6%) and South Sudan (35%) [23,24]. Fire extinguisher was not available in all of the HCs which are noncompliant to the standard [17].

The Finding also revealed that only one of the HC was using electronic stock management tool (Health commodity management information system) to trace expiry date. Recording system is very important to the inventory management. Medicines may have expired without anyone noticing that the shelf life date was approaching due to poor inventory management, so tracking expiry date of medicines prior to its expiry helps and important to prevent and minimize wastage [7]. Though it is highly recommended to apply the available tools (BIN card and Stock cards), the automation of the logistics system facilitated the medicines supply management system of the health facilities. Therefore emphasis should be made to ensure that the use of electronic tools and other systems of stock recordings are well established and applied effectively.

In general, in the present study, deficiencies in selection, quantification, Procurement, storage, and quality assurance practices were identified in majority of the HCs in South West Shoa Zone. Monitoring and evaluation practices such as regular supervision, reporting, discussion with staffs & stake holders, and financial auditing were not provided routinely in majority of HCs. As pharmaceuticals consume a very significant share of the health facilities 'budgets, this management style is extremely vulnerable to inefficient and ineffective management of Medicines and leading to wastage and the lack of monitoring and evaluation system in managing medicines has exposed the system to theft, pilferage and misappropriations [10,25]. The pharmacy case team in all of the health facility is expected to have strong medicine supply management and a monitoring and evaluation system.

Limitation

This study did not address all components of the drug supply management such as distribution and client serving/drug use.

Conclusion

The study identified deficiencies in medicine selection, quantification, procurement, storage and quality assurance practices in majority of the HCs of South West Shoa Zone. Selection of medicines without the use of NEML by pharmacy section only, quantities of medicines determined by guess, no a supply planning used to decide on the time table of procurement, responsible person for procurement, what to procure, from where and how much to procure; unreliable transportation system, in adequacy of storage spaces and lack of electronic stock management tool were found in majority of the HCs. Monitoring and evaluation practices such as regular supervision, reporting, discussion with staffs & stake holders, and physical inventory were not provided routinely in majority of HCs. It is recommended that the HCs management should reestablish the DTC and ensure the availability of guide line such as NEML; work in collaboration with other stakeholders (PFSA, regional health bureau, and partners) to repair and construct the medicine stores and to upgrade their storage conditions; attempt to use computerized/ electronic stock management

tools and strengthen/develop way of monitoring and evaluation system of medicine supply management performance.

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Competing Interests

The authors of this manuscript declare that they have no competing interests.

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