

Effectiveness of Good Storage Practices Implementation in IMARET Warehouse

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ABSTRACT

Introduction: Good storage practice (GSP) is one of the guidelines that needs to be implemented in a pharmaceutical-based warehouse to ensure the safety, efficacy and quality of pharmaceutical products stored as well as inventory movement. Globally, World Health Organisation (WHO) had established their Annex 9 World Health Organisation Guide to Good Storage Practices for Pharmaceutical Products to be adopted and adapted by local authority of each country. In Malaysia, National Pharmaceutical Regulatory Agency (NPRA) is the local authority under Ministry of Health Malaysia has established local Good Distribution Practice Guidelines that includes the GSP elements based on the guideline from the WHO guideline.

Objective(s): The effectiveness of implementation of GSP in Islamic Medical Association of Malaysia (IMAM) Response and Relief Team (IMARET) warehouse was assessed to indicate the warehouse performance.

Methodologies: The study was done by collecting data from IMARET warehouse and mobile clinics. All the cost incurred was calculated based on the master invoice provided by pharmaceutical products suppliers and national medication essential list Ministry of Health Malaysia.

Results: The total amount of procurement and expenditure of pharmaceutical products was increased while the total wastage of pharmaceutical products reduced in 2017 indicating that even though the demand for pharmaceutical products increase, the warehouse manage to control the inventory and stock movement to reduce the pharmaceutical products wastage.

Conclusion: However, the study is unable to provide enough reflection to the IMARET warehouse performance as this study only cover the mobile clinics for Rohingyas. Further study needs to be conducted to reflect total performance of IMARET warehouse.

Keywords: Good storage practice; GSP; pharmaceutical products; warehouse

INTRODUCTION

Good storage practice (GSP) has been implemented within healthcare supply chain (Mustaffa & Potter, 2009) in order to ensure the safety, efficacy and quality of pharmaceutical products at any point of storage by protecting them from extreme condition such as high temperature, high humidity and direct sunlight exposure (Elhassan et al., 2014; Pedroso & Nakano, 2009; Kumar & Jha, 2015). Establishment of GSP also is to control the inventory movement of pharmaceutical products from the warehouse to the designated receiver such as patients and healthcare centre (Rachmania & Basri, 2013). These were done to ensure that patients received intact pharmaceutical products in term of safety, efficacy and quality of the pharmaceutical products (Kumar & Jha, 2015) as well as good control of inventory movement for

the pharmaceutical warehouse in term of cost incurred for the pharmaceutical products management (Rachmania & Basri, 2013).

Islamic Medical Association of Malaysia (IMAM) Response and Relief Team (IMARET) is a medical based non-profit non-government organisation (NGO) that response to natural or man-made disaster by providing healthcare support alongside with other NGOs. On top of that, IMARET also provides free health care to the marginalised people such as refugees and Orang Asli via setting up of mobile clinics. Currently, IMARET actively send their teams to remote Orang Asli villages and set up three mobile clinics located at Selayang, Seri Kembangan and Cheras for the Rohingyas to provide basic health care (IMARET, 2015).

It is an obligation for IMARET to have a well control pharmaceutical warehouse in order to make their pure intention become a successful plan. In 2016, IMARET warehouse management was not under supervision of qualified personnel such as pharmacist. The staffs who manage the warehouse have no pharmacy background. The warehouse also did not practise GSP thoroughly where there was no proper recording of the warehouse activities such as stock receiving and pharmaceutical products movement. The pharmaceutical procurement also did not correspond to the current warehouse inventory to fulfil the IMARET charity works demand which will further cause wastage and underutilise pharmaceutical products. Hospitals also sometimes faced these kind of problem (Rachmania & Basri, 2013). This caused underutilisation and wastage of pharmaceutical products due to expiration and deterioration. The location of the warehouse which situated in housing areas is also exposed to the risk of thievery.

In 2017, involvement of pharmacist to supervise the warehouse activity helps IMARET to manage their warehouse more efficiently. They also hired staffs that have medical background to help the pharmacist to execute the tasks. IMARET has transferred their warehouse to a new location situated at Bandar Sri Permaisuri, Cheras, Selangor. They had implemented GSP under supervision of a pharmacist such as First In/First Out (FIFO) and First Expired/First Out (FEFO) principles, systematic physical pharmaceutical product recordings coupled with computerised data recording system and standard operating procedures (SOP) to enhance their warehouse management and capability to response to the increasing demands in providing sufficient logistics support to their charity works.

There was no data or study done to report the effectiveness of the improvement done by IMARET as their warehouse performance benchmark. Thus, this study was done to assess the effectiveness of the steps taken by IMARET to improve their warehouse management. Generally, GSP can be divided into two parts which are the storage conditions and inventory management. This study focusses on the inventory management in term of procurement, expenditure and wastage of pharmaceutical products as the baseline data for 2016 was done by the previous researcher. This study can help IMARET in determining their warehouse performance and take further steps in improving their warehouse management correspond to their charity works in the future.

METHODOLOGIES

The research was conducted at the Islamic Medical Association of Malaysia (IMAM) Response and Relief Team (IMARET) warehouse located at Bandar Sri Permaisuri, Cheras, Selangor. IMAM Response and Relief Team (IMARET) administrative had improvised the

management of the warehouse by implementing some strategies. First, they had implemented a computerised system to track all of the product's movement in and out of the warehouse and also to track the dispensed medicines to patients.

Blanket sampling was done in this study. All pharmaceutical products have been included in the study according to inclusion and exclusion criteria. For data in 2016, there was no record for the warehouse activities. A complete list of donated and purchased pharmaceutical products was obtained from the IMARET administration to assist in differentiating all of the pharmaceutical products available in the warehouse according to the inclusion and exclusion criteria.

All pharmaceutical products that were purchased by IMARET were included in the study. Dosage forms other than parenteral usage were also been included in this study. Donated pharmaceutical products and pharmaceutical products that had been expired before year 2016 were excluded from this study.

Cross sectional study was implemented in this study where the duration of this study started from March 2017 until October 2017. Comparison of pharmaceutical products procurement, expenditure, and wastage between year 2016 and 2017 was conducted. Quantitative study was done where the expenditure and wastage of the pharmaceutical products were estimated by calculating the cost with the current market price (2017). The costs for the pharmaceutical products were referred from the master invoice provided by the suppliers to IMARET and national essential medication list from Ministry of Health Malaysia.

RESULTS AND DISCUSSION

A total of 1017 prescriptions was analysed starting from February until October 2017 compared to 1402 prescriptions starting from October 2015 until November 2016 (Table 1).

Table 1: Total number of prescriptions

Year	Total number of prescriptions
October 2015 – November 2016	1402
February – October 2017	1017

The total pharmaceutical products prescribed in 2016 was 2976 and 5774 pharmaceutical products was prescribed in 2017. The comparison of total pharmaceutical products prescribed for 2016 and 2017 shows an increase of 94% of the total pharmaceutical products prescribed recorded in one year period (Table 2).

Table 2: Comparison of Total Pharmaceutical Products Prescribed in year 2016 and 2017

Year	Total Pharmaceutical Products Prescribed	Percentage Change (%)
October 2015 – November 2016	2976	94%
February – October 2017	5774	

The total expenditure of pharmaceutical products for 2016 was RM 7749.25 and in 2017 the total expenditure of pharmaceutical products was RM 9846.45. The comparison of total expenditure of pharmaceutical products prescribed for 2016 and 2017 shows an increase of 27.1% of the total pharmaceutical products prescribed recorded in one year period (Table 3).

Table 3: Comparison of Total Expenditure Pharmaceutical Products Prescribed in year 2016 and 2017

Year	Total Expenditure of Pharmaceutical Product (RM)	Percentage Change (%)
October 2015 – November 2016	RM 7749.25	27.1%
February – October 2017	RM 9846.45	

The total pharmaceutical products wastage in 2016 was RM 2721.32 while in 2017 the total pharmaceutical products wastage was reduced to RM 594.55. A 78.2% of total pharmaceutical products wastage was recorded within one year period (Table 4).

Table 4: Percentage change of pharmaceutical products wastage between year 2016 and 2017

Year	Total Wastage (RM)	Percentage Change (%)
2016	RM 2721.32	78.2%
2017	RM 594.55	

In total, there were 1017 prescriptions were analysed starting from January until October 2017 compared to 1402 prescriptions were analysed starting from October 2015 until October 2016. Selayang mobile clinic site maintained the most mobile clinic site visited by the Rohingya community for both 2016 and 2017.

The total number of prescribed pharmaceutical products in 2017 was 5774 while in 2016 the total number of prescribed pharmaceutical products was 2976. Total expenditure reported was RM 7749.25 and RM 9846.45 for 2016 and 2017 respectively. Out of the total pharmaceutical

product prescribed, analgesic/anti-inflammatory agents' group was the most prescribed pharmaceutical product in both 2016 and 2017 and they also cost the highest expenditure for IMARET in both years. However, increase in total expenditure was not directly proportional to the total prescribed pharmaceutical products or total number of patients visiting the mobile clinics as they had implemented GSP and certain SOP that affects the IMARET expenses. Hence, continuous studies need to be done to study on IMARET warehouse performance.

The total wastage of pharmaceutical products was reduced by 78.2% within one year resulting in reduction from RM 2721.32 in 2016 to RM 594.55 in 2017. The decrease in total wastage was paralleled with other studies that stated the implementation of GSP result in reduction of pharmaceutical products wastage.

IMARET for Rohingya is one of the established missions conducted by IMARET to provide free health care service assess for the Rohingyas community in Malaysia through the set-up of mobile clinics. Previously, starting from December 2015 until October 2016, 1402 prescriptions from IMARET mobile clinics based in Cheras, Selayang and Seri Kembangan had been studied. A total of 1017 prescriptions were analysed starting from February until October 2017. The mobile clinics in 2017 were set up at Selayang, Seri Kembangan and Ampang.

The mobile clinics site was set-up based on the migration pattern of the Rohingya refugees from rural to urban areas. Majority of the Rohingya refugees have migrated from rural areas to urban city in order to obtain a better living condition and services such as health care service access and education. There are significant pull factors for the refugees such as better work opportunities, education, health care service access and better livelihoods in the cities especially in developing countries (Amara et. al., 2014). Malaysia is one of the successful developing countries and has a lot of opportunities in urban cities (Ragayah, 2014).

Pharmaceutical products cause major expenditure for an organisation that if the total expenditure was well controlled, this can give significant cost saving effect to the organisation (Rachmania & Basri, 2013). Thus, it is important to monitor the expenses throughout the period of operation so that the expenditure can be well controlled.

The total expenditure for 2016 was RM 7749.25 and in 2017 the total expenditure was RM 9846.45. There was an increase of 27.1% in total expenditure within one year. It was expected that the pharmaceutical products expenditure to increase annually as the system govern this component becoming more complex and it plays a large portion to healthcare service (Pedroso & Nakano, 2009; (Rachmania & Basri, 2013); WHO, 2010). Even though the

expenditure increases in year 2017, it does not indicate any significant changes because total expenditure is indirectly proportional to the total number of patients visiting the mobile clinics. This is because in year 2016, most of the pharmaceutical products were donated by other entities. Whereas in year 2017, IMARET started to buy pharmaceutical products and received less donation in term of pharmaceutical products.

Organisations that deal with healthcare services tends to have a large amount of pharmaceutical products in their possession to cope with the emergency needs hence, this leads to high operational cost and accumulation of expired pharmaceutical product (Rachmania & Basri, 2013). Thus in 2017, IMARET administration restructured their warehouse management to improve their warehouse performance and capability. These significant steps were implemented to enable them to adapt with the increasing demand to conduct more charity works such as mobile clinics for Rohingya, Orang Asli outreach and disaster relief missions. The main aim in improving their warehouse management is to achieve the lowest cost possible without denying the patients' right to reach a quality, efficacious, and safe pharmaceutical products (Rachmania & Basri, 2013).

The improvement step taken was system reengineering where the organisation structure was reviewed and improvised (Rachmania & Basri, 2013). The first taken was by hiring qualified personnel to lead the warehouse management. At this stage, they appointed an IMARET EXCO who is a pharmacist to play a major roles and responsibilities in managing a pharmaceutical-based warehouse (Kumar & Jha, 2015; Shafaat et. al., 2013). Involvement of pharmacist in IMARET warehouse witnessed a great transformation in the warehouse management where many improvements were introduced for the betterment of the warehouse performance and capability. IMARET also hires two staffs with medical field background to help the pharmacist to execute the tasks. Pharmaceutical products inventory management need to be at the best performance as it affects the whole operation of the organisation (Rachmania & Basri, 2013).

Based on the study conducted, it was reported that the total wastage of pharmaceutical products in year 2016 cost IMARET a value of RM 2721.32 and RM 594.55 in 2017. 78.2% reduction of pharmaceutical products wastage was recorded within one year, reducing the total wastage by RM 2126.77. Implementation of GSP can result in reduction of pharmaceutical products wastage (Elhassan et. al., 2014; UNHCR, 2006). Increase in effectiveness of pharmaceutical products supply chain can cause a marked reduction of cost of healthcare expenditure (Rachmania & Basri, 2013).

Back in year 2016, there was no proper recording for the movement of the warehouse activities. The current

inventory status for year 2016 was undetected and leads to over purchased and wastage. GSP for pharmaceutical warehouse was not practised thoroughly that may lead to loss due to expiration, deterioration and thievery, compromising the pharmaceutical products quality that reach the patients, lack of accurate inventory records, stock movement information and break in continuous supply (UNHCR, 2006).

Due to these problems, in year 2017 IMARET had implemented a thorough GSP under pharmacist supervision and a systematic physical inventory records coupled with computerised inventory records for greater magnitude of warehouse management. These significant steps are known as reengineering of system. Reengineering system is not just implementing an automatic monitoring system. It has a greater scope where reengineering system is about reviewing and improvising the current system and implementing new recording and monitoring system such as computerised inventory records (Rachmania & Basri, 2013). However, computerised inventory records are not meant to replace the physical inventory records totally (NPCB, 2013). By implementing these steps, it eases the recording of the warehouse activities, better expiry date monitoring and stock minimum alert. It also helps in saving the pharmaceutical products related costs (Rachmania & Basri, 2013).

Implementation of First Expired/First Out (FEFO) and First In/First Out (FIFO) principles also help in eliminating these problems. FEFO by definition means any pharmaceutical product that will expired soon in three months period need to be distribute or utilize first (WHO, 2010; NPCB, 2013). Implementation of FEFO will prevent accumulation of near expiry date pharmaceutical products in warehouse. In the other hand, FIFO means any pharmaceutical products receive first need to be distributed or utilised first to ensure that the older stock are not stagnant in the warehouse (WHO, 2010).

Another improvement step taken by IMARET was implementing a standard operating procedure in receiving donation from other entities. Starting from year 2017, IMARET encourages the donors to donate in the form of financial funds for them to manage the warehouse better as they can utilise the financial funds for the general purposes of the warehouse.

For the donors who want to donate pharmaceutical products to the warehouse, they are still able to donate but with some strict conditions that they need to comply with. First of all, they need to submit complete list of all the pharmaceutical products to be donated to IMARET including type of the pharmaceutical products, quantity, brand name, dosage form, and expiry date of each batch of the pharmaceutical product. Next, the list is screened by the pharmacist. The pharmacist would

shortlist the accepted pharmaceutical products that meet the IMARET warehouse qualifications and needs. Then, IMARET produces the accepted pharmaceutical products to the donors for the acknowledgement and to prepare the pharmaceutical products for transportation. Transportation can be done by either two manners which are IMARET pick up the pharmaceutical products from the donors or the donors can send the pharmaceutical products to IMARET warehouse (IMARET, 2015).

Finally, IMARET also provides a list of the current available inventory for each mobile clinic conducted. The purpose is to acknowledge the physicians about pharmaceutical availability (Pedroso & Nakano, 2009) and ease them to select the available pharmaceutical products suitable for the diagnosis. The inventory list will be updated for every mobile clinic conducted. The content of the list includes generic name of the pharmaceutical products, product strength and quantity available. This can significantly increase the utilisation of the pharmaceutical products and avoid untreated condition of the patient. The inventory list is designed not to violate the physicians' freedom in pharmaceutical products selection but is to increase access to the available pharmaceutical products. Physicians can request to the IMARET's pharmacy department to add new pharmaceutical products into the list by providing relevant justification (UNHCR, 2013). The requested pharmaceutical products reviewed by the pharmacist for approval.

CONCLUSION

The total number of prescribed pharmaceutical products in 2017 was 5774 while in 2016 the total number of prescribed pharmaceutical products was 2976. Out of the total pharmaceutical product prescribed, analgesic/anti-inflammatory agents' group was the most prescribed pharmaceutical product in both 2016 and 2017 and they also cost the highest expenditure for IMARET in both years. However, increase in total expenditure was not directly proportional to the total prescribed pharmaceutical products or total number of patients visiting the mobile clinics as they had implemented GSP and certain SOP that affects the IMARET expenses. Hence, continuous studies need to be done to study on IMARET warehouse performance.

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ACKNOWLEDGEMENT

We would like to express our gratitude to the Islamic Medical Association of Malaysia (IMAM) Response and

Relief Team (IMARET) for the approval to conduct this study at their warehouse.

REFERENCES

1. Mustaffa N. Haszlinna and A. Potter (2009). "Healthcare Supply Chain Management in Malaysia: a case study," *Supply Chain Manag. An Int. J* 14 (3): 234–243.
2. Elhassan et al., (2014) "Good Storage Practice in Pharmaceutical Manufacturing Plants in Khartoum State of Good Storage Practice in Pharmaceutical Manufacturing Plants in Khartoum State of Sudan,"
3. Pedroso MC and Nakano D (2009), "Knowledge and Information Flows in Supply Chains: A study on pharmaceutical companies," *Intern. J. Prod. Econ* 122 (1): 376–384.
4. Kumar N and Jha A (2015). "Quality Perspective of 'Good Distribution Practices' in *Indian Pharmaceutical Industry*," 17 (11): 28–32.
5. Rachmania IR and Basri MH (2013), "Pharmaceutical Inventory Management Issues in Hospital Supply Chains," *Management*, 3 (1): 1–5.
6. IMAM Response and Relief Team (IMARET)|2015. [Online]. Available: <http://imamalaysia.org/wp/?p=735>. [Accessed: 22-Feb-2017].
7. Amara A et al. (2014). "Noncommunicable diseases among urban refugees and asylum-seekers in developing countries: a neglected health care need," *Global. Health* 10 (1): 24.
8. Ragayah MZ (2014). "Malaysian Development Experience: Lessons for Developing Countries," *Institutions Econ.* 6 (1): 17–56.
9. "Annex 5 WHO good distribution practices," no. 957, pp. 235–264, 2010.
10. Shafaat K, Hussain A, Kumar B, Hasan R, Yadav VK (2013). "An Overview: Storage of Pharmaceutical Products," *World J. Pharm. Pharm. Sci.*, 2 (5): 2499–2515.
11. UNHCR, "DRUG MANAGEMENT MANUAL 2006," 2006.
12. NPCB, Guidelines on Good Distribution Practice (GDP). 2013.
13. "UNHCR's Essential Medicines and Medical Supplies," 2011.