An Evaluation of Drug Storage Practices in the Pharmacy Warehouse of Parapat Regional General Hospital, Girsang Sipangan Bolon District, Simalungun Regency

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Drug storage is an activity of storing and maintain by placing the drugs received in a place that is considered safe from theft and physical disturbances that can damage the quality of drugs and medical supplies. This study aims to determine the suitability of the drug storage system at the Parapat Regional General Hospital with the standards of the Regulation of the Ministry of Health of the Republic of Indonesia No. 72 of 2016 with storage indicators. Drug storage carried out by pharmacists has various purposes, one of which is to make it easier for officers to find drugs to be used. With organized and neat storage, it can shorten the time to find the medicines you need. This type of research is descriptive observational and the tool used in this study is an observation sheet related to drug storage at Parapat General Hospital as a data collection tool. The results showed that the drug storage requirements did not meet the requirements because APAR is not yet aveilable. The percentage of matched drugs with stock cards and drug storage systems has not met the standard, because the percentage obtained is 99.10% where the standard that must be met is 100%. while the Turn Over Ratio value is 4,38 times, the percentage of expired and damaged drugs is 2,09% . the data still does not meet the existing requirements. Then it was concluded that the storage of drugs at the Parapat Regional General Hospital still does not meet the requirements in accordance with the Regulation of the Ministry of Health of the Republic of Indonesia No. 72 of 2016.
Keywords: Drug storage, Hospital.

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1. Introduction

According to the World Health Organization (WHO), a hospital is an integral part of a social and health organization whose function is to provide comprehensive services, including curative and preventive care, to the community. According to the Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016, a hospital is a health service institution that provides comprehensive individual health services, including inpatient, outpatient, and emergency care. Furthermore, based on Law No. 36 of 2009, health is a fundamental human right that must be fulfilled. Every individual has the right to obtain appropriate and adequate health services aimed at preventing disease and improving the overall level of public health.

Drug management in hospitals is carried out by the Hospital Pharmacy Installation (HPI). The Hospital Pharmacy Installation is one of the hospital units fully responsible for drug management and is a critical factor in delivering equitable health services to the community within the hospital's service area. Poor drug management can result in excess inventory (stagnant stock) or drug shortages (stock-out), which ultimately affect the quality of health services in hospitals. Proper drug management aims to ensure that medicines are always available when needed, in sufficient quantities and with guaranteed quality, to support high-quality healthcare services (Wahyuni, 2007). Drug management includes planning, procurement, storage, distribution, and recording or reporting of medicines.

According to the Regulation of the Minister of Health No. 72 of 2016 concerning Standards of Pharmaceutical Services in Hospitals, these standards serve as benchmarks and guidelines for pharmaceutical personnel in delivering pharmaceutical services. The objectives are to improve the quality of pharmaceutical services, ensure legal certainty for healthcare workers, and protect patients and the community from irrational drug use in the interest of patient safety. Pharmaceutical services are direct and responsible services provided to patients related to pharmaceutical preparations, with the aim of achieving definite outcomes that enhance patients' quality of life. These services constitute integrated activities intended to identify, prevent, and resolve drug-related problems and other health-related issues.

Drug storage is an essential component of pharmaceutical services. Drug storage is defined as an activity of storing and maintaining pharmaceutical supplies by placing received products in locations that are considered safe from theft and physical disturbances that may compromise drug quality (BINFAR, 2010). Storage must ensure the quality and safety of medicines in accordance with pharmaceutical requirements, including stability and safety, sanitation, light exposure, humidity, ventilation, and drug classification, as stipulated in the Regulation of the Minister of Health No. 72 of 2016. In accordance with these requirements, drug storage methods may be organized based on therapeutic class, dosage form, alphabetical order, and the application of FIFO (First In, First Out) or FEFO (First Expired, First Out) principles, as well as the separation of LASA (Look-Alike, Sound-Alike) medicines or drugs with similar names and appearances (BINFAR, 2010).

In addition to storage standards, efficient indicators are required in drug management to measure the effectiveness of storage practices. Indicators for the storage stage include 100% conformity between physical stock and stock cards, a Turn Over Ratio (TOR) value of 8–12 times per period, and a percentage of expired or damaged drugs of less than 1% (Satibi, 2016). The pharmacy installation must be equipped with adequate facilities and a proper drug storage system prior to distribution to ensure that stored medicines maintain their quality and are easy to monitor and control (Ministry of Health Regulation, 2016). Errors in drug storage can lead to a decrease in drug potency or efficacy, resulting in less effective therapy for patients. Drug damage not only negatively affects patients but can also cause financial losses for healthcare facilities due to suboptimal drug turnover (Kurniawati & Mazziyah, 2017).

Based on a preliminary survey conducted at the pharmacy warehouse of Parapat Regional General Hospital, no prior research on drug storage evaluation has been conducted. Drug storage practices in the pharmacy warehouse have not been optimal, as expired medicines are still found. This condition may affect healthcare services and cause losses for Parapat Regional General Hospital. A case study on drug storage conducted by Ardia Rini and Ijianto (2014) at Graha Permata Ibu Hospital, Depok, revealed that the implementation of FIFO and FEFO methods faced obstacles due to limited storage space and shelving, and expired drugs were found as a result of stock accumulation during arrangement.

Furthermore, a study conducted by Muhlis et al. (2019) found that a major issue in drug storage was inadequate handling of LASA medicines, as storage practices did not include proper labeling and separation of drugs with similar names but different dosages. Based on the data obtained, 40.9% of medication errors were caused by similar drug names with different dosages. Another study reported results that did not meet drug storage indicators, including stock card conformity of 97.3%, a TOR value of 3.26 times, and a percentage of expired or damaged drugs of 1.1% (Dewi, 2014).

To achieve effective drug therapy and health objectives, the stability of pharmaceutical preparations must be maintained under appropriate storage conditions. Based on the background described above, this study focuses on the drug storage system in the Pharmacy Warehouse of Parapat Regional General Hospital.

Therefore, the author conducted this research under the title “Evaluation of Drug Storage in the Pharmacy Warehouse of Parapat Regional General Hospital, Girsang Sipangan Bolon District, Simalungun Regency.”.

2. Methods

This study employed a descriptive observational research design. The population of this study consisted of all medicines stored in the pharmacy warehouse of Parapat Regional General Hospital, totaling 334 types of medicines. The sample in this study included the entire population, namely all medicines stored in the pharmacy warehouse of Parapat Regional General Hospital. The sampling technique used was total sampling, in which the entire population of 334 types of medicines was included as research samples.

Data collection in this study was carried out using two methods:

a. Observation
   Observation was conducted through direct observation by assessing the conformity of storage practices for all types of medicines at Parapat Regional General Hospital. Data collection was performed using an existing checklist guideline.
b. Documentation
   Documentation was carried out using a mobile phone to collect evidence and important records related to drug storage practices at Parapat Regional General Hospital.

The research results were organized in the form of percentage tables through several stages, including observing and recording the findings, rechecking the data, and analyzing the results using descriptive analysis by comparing the observed conditions with the applicable standards. The research process began with the preparation of observations, including the development of a research proposal, followed by the issuance of a research permit from the academic institution to conduct the study at Parapat Regional General Hospital. After obtaining official permission, the researcher gathered information related to drug storage practices by identifying appropriate informants. Data collection was then conducted, and the collected data were compared with the drug storage standards stipulated in the Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016 as the reference guideline. Based on the comparison results between drug storage practices at Parapat Regional General Hospital and the applicable standards, a report on the evaluation results was subsequently prepared.

3. Results And Discussion

Storage Requirements

Table 1. Percentage of Compliance with Drug Storage Requirements Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016.

Drug Storage Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards		Remarks
	Yes	No	
Sanitation			
Availability of handwashing facilities	✓		
Availability of waste disposal facilities	✓		
Lighting			
Medicines are protected from direct sunlight	✓		
Stability and Safety			
Availability of CCTV	✓		
Availability of fire extinguishers (APAR)	✓		
Special storage area	✓		

Drug Storage Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards	Remarks
Availability of temperature monitoring devices	✓	
Ventilation		
Availability of air circulation or ventilation system	✓	
Humidity		
Humidity level 45–55%		✓
Total Score		
Maximum Score		
Percentage		

Based on the evaluation conducted in the pharmacy warehouse of Parapat Regional General Hospital, it was found that drug storage practices achieved a compliance percentage of 88.9%, which falls into the good category. However, this result indicates that certain aspects still require improvement. In particular, some medicines were still found to be stored improperly, especially those requiring special storage conditions. In addition, drugs classified as high-alert medications, psychotropic substances, and narcotics had not been fully separated according to storage standards. Furthermore, several storage categories were still grouped together.

High-alert medications include anticoagulants (blood thinners), hypoglycemic agents (blood glucose–lowering drugs), cytotoxic or chemotherapy agents, concentrated electrolytes, anesthetic and sedative drugs, as well as medicines with similar names or packaging (look-alike/sound-alike drugs).

Regarding the storage room, it is equipped with an air conditioner (AC) that functions to regulate room temperature. According to Oktavia (2019), temperature control in drug storage areas is essential to maintain the quality of medicines during storage, as medicines may deteriorate or lose their therapeutic effectiveness when exposed to temperature fluctuations. In terms of lighting, the storage conditions have also complied with the standards, as medicines are not exposed directly to sunlight. Direct sunlight can accelerate drug degradation or cause physical and chemical changes in pharmaceutical products.

However, in terms of safety, the drug storage room at the pharmacy warehouse of Parapat Regional General Hospital has not yet been optimal, as fire extinguishers (APAR) are not available. Fire extinguishers are essential safety equipment in pharmacy warehouses, as they provide initial response to small fires, prevent the spread of fire, and minimize the risk of asset damage and loss of life.

To maintain drug quality, room humidity is one of the important factors that must be considered. High humidity levels can adversely affect the quality of medicines that are not properly sealed. One of the causes of high humidity in a room is poor air circulation, which can also affect drug storage conditions (Retno, 2014). Based on observations conducted in the drug storage room of Parapat Regional General Hospital, the humidity level met the required standards, which range from 45% to 55%. The observed humidity level in the storage room was 49%. This condition is attributed to the good air circulation system in the room. Additionally, medicines were not stored in direct contact with the walls or the floor. According to Devi (2019), one of the parameters to prevent high humidity in drug storage areas is placing medicines on shelves and ensuring that they do not directly touch the walls.

Drug Storage Components

Table 2. Percentage of Drug Storage Component Compliance

Drug Storage Component Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards	Remarks
	Yes	No
Drugs and pharmaceutical materials used for preparing medicines must be clearly labeled, including the date the primary package is opened and the expiration date	✓	
Concentrated electrolytes for storage in inpatient units must be limited and only for clinical needs	✓	
High-concentration electrolytes must be stored in a separate storage area, equipped with safety labeling, provided with special labels, and stored in restricted areas to prevent misuse	✓	
Pharmaceutical preparations brought by patients must be stored separately and clearly identified	✓	
Drug storage areas must not be used for storing other items that may cause contamination	✓	
Total Score		
Maximum Score		
Percentage		

Based on observations conducted on drug storage components in the pharmacy warehouse of Parapat Regional General Hospital, the storage components were categorized as very good, achieving a compliance percentage of 100%. This result indicates that all evaluated drug storage component standards were fully met in accordance with the Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016.

High-concentration electrolyte materials have been provided with special warning labels indicating that they are high-risk medicines. High-alert labeling is applied to medicine packaging. Storage of medicines containing high-concentration electrolytes is carried out in a separate area to prevent errors in drug selection and dispensing. If an error occurs in the administration of these medicines, it may result in fatal consequences. High-concentration electrolytes are not stored in inpatient units unless required for clinical needs.

For cytotoxic drugs that are stored, the storage room is air-conditioned, well-organized, and protected from direct sunlight and excessive humidity. If cytotoxic drugs are required, distribution is carried out according to the physician's instructions, and the remaining medicines are returned to the pharmacy warehouse.

Storage Arrangement

Table 3. Percentage of Compliance with Storage Arrangement Standards

Storage Arrangement Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards	Remarks
	Yes	No
Flammable and explosive materials must be stored in a special room for hazardous materials	✓	
Medical gases must be stored in an upright position, secured, and clearly labeled to avoid errors in gas selection	✓	
Empty medical gas cylinders must be stored separately from filled cylinders	✓	

Storage Arrangement Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards	Remarks
Medical gas storage rooms must be equipped with safety covers	✓	
Total Score		
Maximum Score		
Percentage		

Based on the research findings, flammable and explosive materials were stored in a designated hazardous materials room. This is intended to prevent these materials from entering open storage areas, as improper storage may pose safety risks. The storage arrangement compliance percentage obtained was 100%. Materials classified as flammable and explosive were not stored in the pharmacy warehouse. Medical gases, which may also pose explosion risks, were stored in an upright position, securely fastened, and clearly separated between filled and empty cylinders.

Drug Storage Methods

Table 4. Percentage of Compliance with Drug Storage Methods.

Drug Storage Method Standards Based on MoH Regulation No. 72 of 2016	Compliance with Standards	Remarks
	Yes	No
Drugs are arranged based on therapeutic class, dosage form, and type of pharmaceutical preparation	✓	
Drugs are arranged alphabetically	✓	
Application of the FIFO and FEFO methods	✓	
LASA medicines must not be stored adjacent to each other and must be given special labeling	✓	
Total Score		
Maximum Score		
Percentage		

Based on the research results, the drug storage methods implemented in the pharmacy warehouse of Parapat Regional General Hospital were categorized as very good, achieving a compliance percentage of 100%. Drugs were arranged according to dosage forms such as tablets, syrups, and ampoules, and were also organized alphabetically. The FIFO (First In, First Out) and FEFO (First Expired, First Out) principles were properly applied. In addition, LASA (Look-Alike Sound-Alike) medicines were stored separately and provided with special warning labels to minimize medication errors.

Certain dosage forms, such as ointments, have been stored separately. Based on dosage form classification, including oral, topical, parenteral, rectal, and inhalation preparations, drug storage is intended to facilitate proper storage and retrieval of medicines. This arrangement allows medicines to be stored according to their specific characteristics and enables pharmacy staff to quickly locate required medicines, thereby reducing retrieval time.

Furthermore, drug storage in the pharmacy warehouse has implemented the FIFO (First In, First Out) and FEFO (First Expired, First Out) principles. The FEFO method prioritizes medicines with the nearest expiration date to be distributed first, while the FIFO method ensures that medicines received earlier are distributed before newer stock. When new stock is received, staff must check the expiration date. If the newly received medicines have a later expiration date than the existing stock, the older stock is placed in front to ensure it is used first. Conversely, if the new stock has an earlier expiration date, it must be prioritized for distribution. In addition, medicines with similar names or appearances are arranged carefully to prevent medication

errors. Medicines with similar names and appearances are classified as LASA (Look-Alike Sound-Alike) drugs. LASA warning labels are applied, and such medicines are not stored adjacent to each other to prevent dispensing errors.

Conformity of Medicines with Stock Cards

Table 5. Percentage of Conformity Between Medicines and Stock Cards

Description	Quantity
Total number of samples	334
Number of samples consistent with stock cards	331
Percentage of conformity between medicines and stock cards	(331/334) × 100% = **99.10%**

Based on observations conducted on the conformity between medicines and stock cards at the pharmacy warehouse of Parapat Regional General Hospital, the conformity percentage was 99.10%. During stock card verification, discrepancies were found in three items. This finding indicates that, in general, stock card management in the pharmacy warehouse was well implemented, although minor discrepancies still occurred and require further attention.

The discrepancies found indicate that discipline and accuracy of pharmacy staff in recording drug quantities during issuance and receipt still require improvement. This was evidenced by the presence of three drug items that did not match the stock cards, namely prednisolone tablets 4 mg, vitamin B complex, and Norgesic tablets. This discrepancy occurred due to limited storage space, resulting in inadequate placement of medicines in the pharmacy warehouse. As a result, medicines were sometimes stored in the dispensing area of the pharmacy installation and were not returned to the warehouse. In addition, pharmacy staff occasionally forgot to record or report medicines stored outside the main warehouse.

Turn Over Ratio (TOR)

The Turn Over Ratio (TOR) is used to determine how many times the inventory turns over within one year.
Initial Inventory: Rp 302,623,606
Purchases (B): Rp 1,233,563,916
Ending Inventory (2024): Rp 273,141,375
Average Inventory (C)

$$C = \frac{Initial\ Inventory + Ending\ Inventory}{2}$$

$$C = \frac{02{,}623{,}606 + 273{,}141{,}375}{2} = 287{,}701{,}190.5$$

TOR Formula

$$TOR = \frac{Initial\ Inventory + Purchases - Ending\ Inventory}{Average\ Inventory}$$

$$TOR = \frac{302{,}623{,}606 + 1{,}233{,}563{,}916 - 273{,}141{,}375}{287{,}701{,}190.5}$$

$$TOR = \frac{1{,}262{,}685{,}547}{287{,}701{,}190.5} = 4.38\ times$$

Based on the calculation, the TOR value of Parapat Regional General Hospital was 4.38 times, which indicates that inventory turnover was relatively low. This value is below the recommended standard of 8–12 times per year, suggesting inefficiencies in drug inventory management. The low TOR may lead to losses for the hospital. In contrast, a higher TOR reflects more efficient inventory management and can provide financial benefits for the hospital.

The low TOR value may be influenced by several factors, including changes in disease patterns and a decline in patient visit rates, which may be related to limited communication between pharmacy installation staff and other healthcare personnel regarding drug utilization planning.

Number of Damaged or Expired Drugs

Table 6. Percentage of Damaged or Expired Drugs.

Description	Quantity
Total number of drugs	334
Number of damaged or expired drugs	7
Percentage of damaged or expired drugs	(7/334) × 100% = **2.09%**

Based on observations, the percentage of damaged or expired drugs in the pharmacy warehouse of Parapat Regional General Hospital was 2.09%, which is categorized as poor when compared to the standard indicator, which requires the percentage of expired or damaged drugs to be less than 1%. The high percentage of damaged or expired drugs is influenced by the number of medicines issued being lower than the total stock available in the warehouse. This condition indicates suboptimal inventory control, which can lead to stock accumulation and increased risk of drug expiration. In addition, several factors contribute to drug expiration, including changes in disease patterns, declining patient visits, and ineffective drug planning and procurement processes. The higher the percentage of expired or damaged drugs, the greater the financial loss experienced by the hospital.

4. Conclusion

Based on the results of the study on the evaluation of drug storage in the pharmacy warehouse of Parapat Regional General Hospital, it can be concluded that drug storage practices partially comply with the Regulation of the Minister of Health of the Republic of Indonesia No. 72 of 2016. Compliance was observed in the categories of storage components, storage arrangement, and storage methods. However, non-compliance was identified in several aspects, including storage requirements due to the unavailability of fire extinguishers (APAR). In addition, the conformity between physical stock and stock cards did not fully meet the standard, as discrepancies were found in three types of medicines, resulting in a conformity percentage of 99.10% compared to the required standard of 100%. Furthermore, the Turn Over Ratio (TOR) was relatively low at 4.38 times per year, which is below the recommended standard of 8–12 times, indicating inefficiencies in inventory management. The percentage of expired or damaged medicines was also above the acceptable limit, reaching 2.09%, whereas the standard requires less than 1%. These findings indicate that although several aspects of drug storage management are well implemented, improvements are still needed to ensure full compliance with regulatory standards and to enhance the efficiency and safety of drug storage in the pharmacy warehouse..

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