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Evaluation of The Drug Storage System at The Welahan II Health Center Based on The Minister of Health Regulation No. 74 of 2016

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ABSTRACT

Purpose: This study aimed to evaluate the compliance of the drug storage system at Welahan II Community Health Center with the standards set in the Minister of Health Regulation No. 74 of 2016. It was hypothesized that the storage system would exhibit high compliance, although several aspects of the physical infrastructure might still require improvement.

Research Method: This study used a quantitative descriptive-evaluative design with a cross-sectional approach. Data were collected in February 2026 through direct observation using checklists, structured interviews, and documentation in the pharmaceutical warehouse of Welahan II Community Health Center. The evaluation covered spatial arrangement, stock preparation, separation of special drugs, observation of drug quality, and recording on stock cards. Data were analyzed descriptively by calculating the percentage of compliance with regulatory indicators.

Results and Discussion: The overall average compliance was 93%, categorized as very good. Perfect compliance (100%) was achieved in special drug separation, physical quality observation, and stock card recording. Stock preparation reached 90%, while spatial arrangement had the lowest score (75%) due to limited warehouse space and non-standard room layout.

Implications: The findings indicate that strong administrative and technical discipline can compensate for infrastructure limitations in maintaining drug quality and patient safety. Further studies should assess the effect of storage compliance on service efficiency and medication error prevention.

Keywords: drug storage; community health center; pharmaceutical services; storage compliance; patient safety; Permenkes No. 74/2016.

1. Introduction

The process of managing pharmaceutical preparations that do not follow standard procedures risks triggering a variety of crucial problems, ranging from budget overruns to improper use of drugs. Therefore, effective, efficient, and rational drug management is needed that is carried out on an ongoing basis, where one of the fundamental aspects is the storage system (Hasibuan et al. 2025). Storage is an activity to maintain and maintain pharmaceutical preparations so that they remain safe and quality guaranteed while in health care facilities. The main goal is to maintain the quality of drugs from damage due to environmental factors and to facilitate stock search and supervision (Ranti et al. 2021). Based on the Regulation of the Minister of Health (Permenkes) Number 74 of 2016 concerning Pharmaceutical Service Standards in Health Centers, mandatory storage ensures the safety of pharmaceutical preparations, medical devices, and consumable medical materials (BMHP) in accordance with the requirements of stability, sanitation, light, humidity, and ventilation (Permenkes 2016). Technically, storage methods must be arranged based on therapy class, preparation form, alphabet, and apply the

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principles of First Expired First Out (FEFO) and First In First Out (FIFO) (Pratama et al. 2025). In addition, preparations for the Look Alike Sound Alike (LASA) category must be specially marked and not placed close together to prevent medication errors (Maissy Maula Fitriana et al. 2023).

Non-compliance with storage standards can have fatal impacts, such as the occurrence of overstock that triggers a waste of space to a decrease in drug potential that makes therapy ineffective (Tuda et al. 2020; Lisi et al., 2024). Environmental factors such as inappropriate temperatures are the main causes of the disruption of drug stability (Angelia 2022). Previous research has even shown that drugs are damaged due to leakage or expiration that is not properly managed due to improper storage in the work area (Tetuko et al. 2023). On the other hand, infrastructure constraints such as inadequate warehouse space are often obstacles in achieving ideal standards (Jayadi 2017). The Welahan II Health Center, as a first-level health facility in the border area, is required to always maintain the quality of its pharmaceutical preparations. However, initial observations show that the drug warehouse at this health center only has an area of 2.1 x 2.5m^2, which is significantly below the minimum standard of the drug warehouse area of 3 x 4m^2. This limited space has the potential to disrupt spatial planning and drug quality security.

The effectiveness of the storage system does not only depend on the completeness of physical facilities such as shelves, pallets, and refrigerators, but also on the discipline of implementing Standard Operating Procedures (SOPs) and real-time stock card documentation (Reza Dea Kurnilia, Tri Wijayanti 2024). Good management of High Alert drugs, concentrated electrolytes, and emergency drugs with disposable register seals is an important parameter in ensuring patient safety (Ministry of Health of the Republic of Indonesia, 2019). Until now, an in-depth evaluation of the drug storage system at the Welahan II Health Center based on the Minister of Health Regulation No. 74 of 2016 has never been carried out. Although similar research has been conducted in other areas, this study has novelty because it provides specific and contextual evaluative data on the real infrastructure conditions at the Welahan Health Center. The suitability of storage in this health center is an indicator of the performance of the pharmacy unit in realizing Good Pharmacy Practice (GPP) and ensuring service accountability (Ilahi and Iskandar 2025). The results of this study are expected to be a scientific reference and consideration for the management of the Puskesmas to improve the quality of drug storage for patient safety.

2. Literature Review and Hypothesis Development

2.1 Drug Storage System in Health Centers

The drug storage system at the Puskesmas is part of the pharmaceutical preparation management activities that aim to ensure the availability and quality of drugs until the drugs are used by patients. This system includes the process of receiving, structuring, regulating temperature and humidity, monitoring expiration, and controlling damaged and lost drugs (Hasibuan et al., 2025). Systematic management will help pharmacists in maintaining the efficiency and accuracy of drug dispensing.

According to Y. Andriani et al. (2024), good drug storage must pay attention to physical and administrative aspects. The physical aspect includes maintaining the storage space to keep it clean and meeting temperature requirements, while the administrative aspect includes recording, labeling, and drug rotation based on FEFO/FIFO principles. An inappropriate storage system will increase the risk of drug damage and errors in service to patients.

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In addition to maintaining the quality of drugs, a good storage system also facilitates stock supervision and procurement planning (Friska et al., 2025). With a well-organized storage system, pharmacists can accurately know the availability of drugs and avoid stockpiling or vacancies. Therefore, the implementation of a drug storage system in Puskesmas has an important role in ensuring the quality of pharmaceutical services that are oriented towards patient safety (Akbar et al., 2023).

2.2 Permenkes No. 74 of 2016

Permenkes No. 74 of 2016 is a national guideline that regulates the implementation of pharmaceutical services in health centers, including drug management and storage systems. This regulation emphasizes that all pharmaceutical activities must be carried out in a standardized, systematic, and measurable manner to ensure the quality of service to the community. In the context of drug storage, the Minister of Health emphasizes that drugs must be maintained in conditions that can maintain their stability, safety, and effectiveness until the time of use. This includes the regulation of storage facilities, drug arrangement procedures, and supervision mechanisms carried out by pharmaceutical personnel (Permenkes, 2016)

Storage of Pharmaceutical Preparations and Medical Consumables is an activity to regulate Pharmaceutical Preparations that are received so that they are safe (not lost), avoid physical and chemical damage and their quality is guaranteed, in accordance with the stipulated requirements. The goal is that the quality of Pharmaceutical Preparations available at the health center can be maintained in accordance with the requirements set (Permenkes, 2016)

2.3 Conformity of the Drug Storage System at the Welahan II Health Center with the Minister of Health Regulation No. 74 of 2016

Permenkes No. 74 of 2016 emphasizes that the drug storage system is a fundamental component in the implementation of pharmaceutical services in Puskesmas. The standard includes storage layouts that meet temperature, humidity, ventilation, and hygiene requirements; grouping drugs by form, stability, and category; the application of FEFO/FIFO principles; the separation of special drugs such as LASA, High Alert, narcotics, psychotropics, and drugs that require special safeguards; and documented mechanisms for controlling damaged and expired drugs. The implementation of this standard aims to maintain the quality and stability of drugs during storage, prevent the risk of medication errors, and ensure the continuous availability of drugs through an accurate and integrated stock system (Permenkes, 2016)

According to Reza Dea Kurnilia, Tri Wijayanti in 2024, the effectiveness of the drug storage system does not only depend on the completeness of physical facilities, but also on the discipline of pharmaceutical personnel in implementing storage procedures. Their research shows that health centers that document stock cards in real time, conduct periodic inspections of damaged and expired drugs, and implement a consistent labeling system have a higher level of storage suitability. On the other hand, health facilities that are less consistent in implementing SOPs experience an increased risk of stock inaccuracy, accumulation of drugs near expiration, and budget inefficiencies due to repeated purchases of drugs that are actually still available.

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3. Research Method

This research is a quantitative research with an observational method through an evaluative descriptive approach. The descriptive approach is used to systematically describe the storage process, while the evaluative nature aims to assess whether the ongoing activities are in accordance with the standards listed in the national guidelines (M.P and Fatimah 2022). The research was carried out in the pharmaceutical warehouse of the Welahan II Health Center, Welahan District, Jepara Regency, Central Java Province. This location was chosen deliberately (purposive) because there has never been an evaluation of the drug storage system based on the Minister of Health Regulation No. 74 of 2016 at the location, as well as initial findings related to the limited area of storage space that has the potential to affect the quality of preparations. The research design used is cross-sectional, which is data collection carried out at a certain point in time to describe actual phenomena or problems (Adiputra, et al. 2021). Through this approach, the researcher measured the free and bound variables simultaneously to provide an in-depth picture of the drug storage status during observation without any follow-up.

The data used is primary data obtained through three main techniques. First, direct observation is carried out to conduct in-depth observations of physical conditions and procedures in the pharmaceutical warehouse. Second, the use of checklist sheets as an evaluation instrument prepared based on the indicators of the Minister of Health Regulation No. 74 of 2016. Third, structured interviews were conducted through discussions with the Pharmacist in Charge and Pharmaceutical Vocational Personnel at the Welahan II Health Center to validate administrative and technical data. The data that has been collected through checklist sheets is then analyzed descriptively to calculate the percentage of conformity between the reality in the field and regulatory standards. The results of the analysis are presented in the form of a table or diagram and then discussed in depth to draw conclusions and provide suggestions for improvements that are applicable to the management of the Welahan II Health Center in an effort to optimize pharmaceutical services.

4. Results and Discussion

4.1 Spatial Arrangement

Based on the results of the research that has been carried out at the Welahan II Health Center, it can be seen in the table that the average percentage of spatial arrangement is 75% in the good category of conformity required by Permenkes No. 74 of 2016 concerning pharmaceutical service standards in health centers and those that do not meet it, which is 25%. This percentage shows that spatial arrangements have not received results according to standards. The corner of the floor and wall of the warehouse show a mismatch because the corner of the room is sharp, the warehouse has an area of 2.5× 7m^2. Based on the results of the research, the drug storage warehouse is not an original warehouse so it only uses empty space as a warehouse.

In the theory of good storage practice, the spatial layout of a pharmaceutical warehouse is not only a physical factor, but a component of the quality control system. Qualified storage space will facilitate drug segmentation, stock rotation, risk separation, and temperature and humidity monitoring. Permenkes No. 74 of 2016 and Technical Guidelines for Puskesmas Pharmaceutical Services (Kemenkes RI, 2019) emphasized that drug warehouses must be adequate in size, ventilation, lighting, and access security The limited area of the warehouse found at the Welahan II Health Center has the potential to

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cause several operational consequences, including shelf density, limited storage zoning, and increased possibility of drug accumulation. In logistics risk management theory, storage density correlates with increased chances of mistaking and inhibition of FEFO rotation. Research by Warani et al., (2024) and (Y. Andriani et al., 2024) on health centers and hospitals shows that limited storage space is associated with an increase in the incidence of non-optimally organized stock and the discovery of drugs approaching expiration that are detected late.

Table 1. Suitability of Spatial Arrangement

No.	Permenkes No. 74 of 2016	Compatibility	
		Yes	No
1.	Warehouse area of at least 3x4 m^2		P
2.	Dry or non-humid space	P	
3.	Has ventilation, sufficient air circulation	P	
4.	Has enough light	P	
5.	Corners of the floor and walls are not sharp		P
6.	Drug warehouses are used specifically for storing drugs	P	
7.	The warehouse has a double key		P
8.	A special and separate place is available for storing flammable preparations such as alcohol and chlor ethyl	P	
9.	There is a special place to store narcotics and psychotropic drugs that are always locked	P	
10.	The medicine warehouse has a room hygrometer and a temperature card	P	
11.	Shelves or cabinets of medicines, pallets and bulk are available to store large quantities of medicines	P	
12.	Refrigerators are available for medicines that require cold temperatures such as vaccines, serums etc.	P	
	Acquisition score (S)	9	3
	Maximum score (N)	12	12
	P= × 100%$\frac{S}{N}$	75%	25%

4.2 Drug Stock Preparation

In the results of observations of the preparation of drug stocks at the Welahan II Health Center, almost all indicator standards have been carried out in accordance with the Minister of Health Regulation No. 74 of 2016. Referring to the results of the research in the table of results, the percentage of preparation of drug stocks reached 90%. Which means that the preparation of drug stocks at the Welahan II Health Center is in the very good category.

Indicators of the preparation of drug stocks that have met the requirements include drugs rotated alphabetically, drugs rotated with the FIFO (First In First Out) and FEFO (First Expired First Out) systems (Anggreny et al., 2024). Drugs are stored according to the form of preparations, drugs in large packages are arranged neatly on pallets, using special storage spaces for psychotropics and narcotics, High Alert drugs are stored separately with special markings, drugs with similar appearance and naming

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(LASA: Look Alike Sound Alike) are not placed close together and are specially labeled (Natiti et al., 2025). Expired and damaged drugs are placed separately from drugs that are still good and given special markers.

There are indicators that do not meet the standards of the Minister of Health Regulation No. 74 of 2016 and are not given drug name labeling on storage shelves, indicating that the storage location identification system has not been implemented visually. However, based on the results of observations and information from the officers, drug identification can still be done through the names listed on the primary and secondary packaging which are considered to still be clearly read. The officer also stated that the type and number of available drug items adjusted the drop from IFK, so that the variety of drugs stored was relatively controlled and the placement pattern was recognized by the officer. This condition is a supporting factor in minimizing picking errors even without shelf labels. In the principle of logistics and storage management of pharmaceutical preparations, labeling on storage racks remains an important component of the storage quality control system. Identification that relies solely on labels on the packaging also has the potential to cause errors, especially for drugs with similar names or appearances (F. Andriani & Mardhiyani, 2025). This condition can make it difficult to control stocks and trace processes when monitoring and auditing, thus affecting the quality of pharmaceutical inventory management (Regi Afriyana, 2024).

Table 2. Drug Stock Preparation

No.	Permenkes No. 74 of 2016	Compatibility	
		Yes	No
1.	Drugs are rotated alphabetically.	P	
2.	Drug rotational FIFO system	P	
3.	Medication rotated with FEFO system	P	
4.	The drug is stored in the form of a preparation	P	
5.	Labeled drug names on storage shelves		P
6.	Medicines in large packages are arranged neatly on pallets	P	
7.	Use of special storage rooms for psychotropics and narcotics	P	
8.	Pharmaceutical preparations with high alert or hight alert are stored separately with special marking	P	
9.	Storage of pharmaceutical preparations (LASA, look alike sound alike) is not placed close together and is specially labeled.	P	
10.	Expired and damaged drugs are stored separately with the drugs still good and given special marking	P	
Acquisition score (S)		9	1
Maximum score (N)		10	10
P= × 100%$\frac{S}{N}$		90%	100%

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4.3 Separation of Special Drugs (LASA, High Alert, Narcotics, Psychotropics)

In the separation of special drugs, all storage standards have been carried out in accordance with the Minister of Health Regulation No. 74 of 2016. Referring to the results of the study in table 4.3, the results of the drug storage percentage reached 100%. It shows that the separation of special drugs at the Welahan II Health Center is very good. LASA (Look Alike Sound Alike) medications are labeled or labeled with special labels. According to the 2019 technical manual of Pharmaceutical Standards at Puskesmas, LASA drugs should be stored with special markings and not adjacent to each other (Ministry of Health of the Republic of Indonesia, 2019). High Alert drugs are stored in a special place with warning signs, High Alert drugs are included in special aspects that must be considered in storage, namely stored separately and given clear markings to avoid errors in taking and using them (Ministry of Health of the Republic of Indonesia, 2019). Narcotic drugs are stored in locked safes, psychotropic drugs are stored in separate locked cabinets, there is a list of receipts and dispenses of special drugs, they cannot be entered by other people without the permission of the pharmacist in charge.

This finding has high significance because it is directly related to the aspect of patient safety in pharmaceutical services. Within the framework of medication safety theory, the LASA (Look Alike Sound Alike) and High Alert drug groups are categorized as high-risk drugs because they have a greater probability of error and have the potential for serious clinical consequences if mistakes occur in storage, retrieval, and delivery (Natiti et al., 2025). The implementation of physical separation, special labeling, and locking systems for narcotics and psychotropics shows that risk control mechanisms have been implemented systematically and consistently. The research of Fitria et al. (2023) and Tetuko et al., (2023) reported that the implementation of storage location separation and special labeling for LASA and High Alert drugs contributed significantly to reducing the potential for medication errors in healthcare facilities.

Table 3. Separation of Special Drugs (LASA, High Alert, Narcotics, Psychotropics)

No.	Permenkes No. 74 of 2016	Compatibility	
		Yes	No
1.	LASA (Look Alike Sound Alike) drugs are labeled or marked specifically	P	
2.	High Alert medication is stored in a special place with warning signs	P	
3.	Narcotics Drugs are stored in locked safes	P	
4.	Psychotropic drugs are stored in separate locked cabinets	P	
5.	A list of prescription and prescription drugs is available	P	
6.	Cannot be entered by other persons without the permission of the pharmacist in charge or the designated pharmacist	P	
Acquisition score (S)		6	0
Maximum score (N)		6	6
P= × 100%$\frac{S}{N}$		100%	0%

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4.4 Drug Quality Observation

In the observation of drug quality, all storage standards have been carried out in accordance with the Minister of Health Regulation No. 74 of 2016. Referring to the results of the study in table 4.4, the percentage of drug quality observation results reached 100%. This percentage shows that the observation of drug quality at the Welahan II Health Center is very good. During the observation period, no indication of visual degradation was found, such as physical damage to the packaging, discoloration, leakage, or incompatibility of the shape of the preparation. This indicates that the quality monitoring process in storage has been carried out consistently and the principle of drug storage supervision has been implemented. The preventive quality control approach states that periodic physical monitoring can prevent problematic products from being distributed to patients. Research by Lisi et al., (2024) reported that facilities with scheduled quality inspection programs had significantly lower rates of defective drug findings. The implication of these findings is that the effectiveness of therapy is maintained and the risk of treatment failure due to unstable drug use.

Table 4. Drug Quality Observation

No.	Permenkes No. 74 of 2016	Compatibility	
		Yes	No
1.	No tablets are physically damaged, such as blemishes, freckles, clefts, discoloration, odor, and taste, cracking, cracking, rotten, and moist	P	
2.	The capsule shell is not open, empty, damaged, or attached to each other	P	
3.	The coated tablets are not cracked or colored; they are wet, damp, and sticky to each other	P	
4.	No liquid becomes cloudy or deposits arise, no color or taste changes, and no plastic bottles are damaged or leaking	P	
5.	No ointment has a color consistency, odor, or consistency that changes, or causes the container to leak or be damaged	P	
6.	The injection does not leak from the bottle or ampoule, there are no foreign particles in the injection powder, the supposedly clear solution appears cloudy or deposited, and the color of the solution does not change	P	
Acquisition score (S)		6	0
Maximum score (N)		6	6
P= × 100%$\frac{S}{N}$		100%	0%

4.5 Stock Card Recording

In the recording of stock cards, all storage standards have been carried out in accordance with the Minister of Health Regulation No. 74 of 2016. Referring to the results of the research in table 4.5, the percentage of stock card recording results reached 100%. This percentage shows that the indicators of stock card recording at the Welahan II Health Center are very good. Drug mutations are recorded on

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stock cards (receipt, expense, lost, damaged, or expired), mutation data for one type of drug can only be recorded on one stock card, stock cards are placed near or next to drugs, data on stock cards are used to compile reports, every time drug mutations occur, stock cards are recorded (Permenkes, 2016).

Table 5. Stock Card Recording

No.	Permenkes No. 74 of 2016	Compatibility	
		Yes	No
1.	Drug mutations are recorded on the stock card (receipt, disburse, lost, damaged). or expired)	P	
2.	The mutation data of one type of drug can only be recorded on one sheet of stock card	P	
3.	Stock cards are placed near or next to medications	P	
4.	The data in the stock card is used to compile the report	P	
5.	Whenever a drug mutation occurs, a stock card is recorded	P	
	Acquisition score (S)	5	0
	Maximum score (N)	5	5
	P= × 100%$\frac{S}{N}$	100%	0%

4.6 Evaluation of Drug Storage System

Based on table 6, the results of the evaluation of the drug storage system based on the Minister of Health Regulation No. 74 of 2016 at the Welahan II Health Center were obtained with an average of 93% so that it can be categorized as very good. The drug storage system at the Puskesmas must be in accordance with the standards of pharmaceutical services at the Puskesmas, because the storage of drugs that are not suitable can affect the quality of the drug. Good storage of pharmaceutical preparations must meet the established requirements to maintain guaranteed quality and avoid chemical and physical damage (Tuda et al., 2020). Some considerations in the storage of pharmaceutical preparations in pharmaceutical installations such as the form and type of preparation, stability, whether or not it is easy to explode or burn, as well as narcotics and psychotropics are stored in special cabinets. Drug storage is always accompanied by drug name labeling, stock cards for each type of drug and arranged alphabetically to make it easier to search.

Table 6. Evaluation of Drug Storage System

No.	Evaluation Variables	Results		Remarks
		Yes	No	
1.	Spatial Arrangement	75%	25%	Good
2.	Drug Stock Preparation	90%	10%	Excellent
3.	Separation of Special Drugs (Lasa, High Alert, Narcotics, Psychotropic	100%	0%	Excellent
4.	Drug Quality Observation	100%	0%	Excellent
5.	Stock Card Recording	100%	0%	Excellent
	% Overall	465%	35 %	
	% Average	93%	7%	

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5. Concluding Remarks and Recommendation

This study concluded that the drug storage system at the Welahan II Health Center is included in the Very Good category with an average compliance rate of 93% with Permenkes No. 74 of 2016. In detail, the aspects of special drug separation (LASA, High Alert, narcotics/psychotropics), physical quality observation, and stock card administration have achieved perfect conformity (100%). The aspect of stock preparation based on FEFO/FIFO is considered very good (90%), while the spatial aspect is in the good category (75%) with the main obstacle being the limited area of infrastructure and warehouse design. Overall, the Welahan II Health Center has implemented standardized storage management to ensure drug stability and patient safety.

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