

Overview of Dry and Wet Food Storage Using the FIFO and FEFO Methods at the Nutrition Installation of Datu Beru Regional Hospital, Central Aceh

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ABSTRACT

Hospitals as food providers for patients and staff require standardized food storage systems to maintain quality and safety. This study aims to evaluate the compliance of dry and wet food storage using FIFO (First In First Out) and FEFO (First Expired First Out) methods at the Nutrition Installation of Datu Beru Hospital, Aceh Tengah, based on the Pelayanan Gizi Rumah Sakit Kementerian Kesehatan (PGRS KEMENKES) 2013 guidelines. Quantitative descriptive research with a cross-sectional design was conducted through direct observation and assessment sheets using the Guttman Scale on 5 storage staff. Results showed dry food storage scored 9 out of 12 (meeting requirements), but inconsistencies were found in unscheduled warehouse opening, daily room cleaning (twice a day instead of twice a week), and absence of insecticide spraying. Wet food storage scored 7 out of 7 (meeting requirements), though improvements in storage time management are needed. The conclusion states that FIFO and FEFO methods have been implemented with proper stock recording, but improvements in warehouse schedules, cleaning frequency, and pest control are required. Further research should explore causes of non-compliance and develop localized strategies for enhancing adherence.

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Introduction

Hospitals function as one of the institutions that provide food services for patients and medical staff. In the management of food provision, hospitals have a special unit responsible for the storage of food ingredients. The hospital's nutrition unit divides the storage system into two categories, namely the storage of dry food and wet food, each with different management methods. This process includes a series of stages, starting from ordering, receiving food ingredients, selection based on technical specifications, to the washing process and appropriate storage arrangement (Bakri, et. al., 2018).

The provision of food services in hospitals, which includes the procurement process of food ingredients, storage of raw materials, distribution of cooked meals, storage of ready-to-serve dishes, and their presentation, must always apply strict hygiene and sanitation principles. This is due to the fact that the quality of food greatly depends on the presence or absence of contamination during the

processing (Ratna, 2009). The quality of food and service is the main factor in patient satisfaction (Nafi'a, 2021).

The planning of dry food supplies in hospitals must be based on the nutritional needs of the patients. In order to provide meals that meet nutritional and food safety standards for patients, an effective food planning system is needed to ensure the availability of food ingredients in accordance with the standards set by the hospital's nutrition installation. Ineffective logistics management in the storage of dry food supplies can lead to two main problems: stockouts and overstocks (KEMENKES RI, 2013).

The implementation of an effective storage system for food and medical supplies in hospitals is crucial for maintaining quality and efficiency. Two commonly used methods are First In First Out (FIFO) and First Expired First Out (FEFO) (Nashiroh et al., 2024). These approaches help optimize stock management, prevent shortages and excess stock, and reduce expired items (Alakel et al., 2019). The application of an information system based on FEFO

or FIFO principles can significantly enhance inventory control, reduce manual errors, and improve overall efficiency in hospitals and food service companies (Pratama & Nurani, 2018).

The storage room for dry materials must meet certain standards, including: systematic arrangement of materials based on type and order of use, cool temperature management with optimal air circulation, and conditions of the room that are dry and hygienic. The shelf design must maintain a minimum distance of 15 cm from the wall/floor and 60 cm from the ceiling, using materials that are easy to clean. The stock rotation system must adhere to the FIFO principle, and all ventilation openings must be protected with screens, while any damage caused by pests must be addressed immediately (Leona, 2023).

Dry food storage must adhere to standard principles, including organizing items by type and category (Marsita et al., 2024). Proper food storage in hospitals is crucial to ensure food safety and patient health. Based on field observation results, there are opportunities to improve the dry storage system in the logistics warehouse of the Datu Beru Regional Hospital's Nutrition Installation in Central Aceh. Several areas that can be optimized include: a more systematic arrangement of food items, adjusting the distance of storage shelves from the wall, and more efficient layout organization - especially considering the existing space limitations. This condition presents a valuable opportunity to implement best practices in nutritional logistics management that can enhance storage effectiveness while ensuring food quality for patients.

Method

This research is a type of quantitative descriptive research with a cross-sectional research design, which is a study to examine the correlation between risk factors by collecting data at a single point in time (Ariani, 2014). This will be done by observing the storage of dry and wet food ingredients at the Nutrition Installation of Datu Beru Regional Hospital in Central Aceh. The population in this study consists of all staff or officers working in the nutrition installation at Datu Beru Regional Hospital in Central Aceh. The sampling technique used in this study is proportionate stratified random sampling.

The samples taken in this study are the individuals responsible for food services and the staff in charge of the food storage area at the Nutrition Installation of RSUD Datu Beru Aceh Tengah, totaling 5 people based on the formula described above. This is derived from the total calculation of staff and personnel amounting to 29 people, in accordance with the method mentioned above, which is 20% of the total population. Data collection used an observation sheet containing questions referring to the PGRS Guidelines from the Ministry of Health of the Republic of Indonesia 2013. The determination

of answers was according to the Gutman Scale with an interval of yes or no, valued at 1 for a yes answer and 0 for a no answer.

Results

1. Storage of Dry Food Ingredients

The storage of dry food ingredients at the Nutrition Installation of RSUD Datu Beru has 3 cabinets and 1 wooden pallet. The storage of food ingredients in the Nutrition Installation uses the FIFO and FEFO systems where if new food ingredients come in first, then those ingredients will be used first, and ingredients that are closer to their expiration date compared to previously existing food ingredients will also be used first.

Table 1. Storage of Dry Food Ingredients

No	Storage of Dry Food Ingredients	Type of Food
1.	Storage Cabinet 1	Spices, Cooking oil, Garlic, Red onion, dried red chili, and salt.
2.	Storage Cabinet 2	Sugar, flour, mung beans, pearl sago, Kara coconut milk, srikaya jam, and white bread
3.	Storage Cabinet 3	Biscuits, Syrup, Milk, Agar-agar Powder
4.	Wood Pallet	Rice and eggs

The implementation of an ideal dry material storage system includes arranging items on shelves with sufficient distance from the floor, walls, and ceiling. This distance allows for good air circulation, reduces the risk of pest infestation, and facilitates routine cleaning. Meanwhile, materials that are prone to spilling, such as sugar and oil, should be packaged in secondary containers specially designed to prevent spills and maintain the hygiene of the storage area (Febriani, 2023).

The governance of food inventory requires a strict documentation system, where every receipt of materials (both wet and dry) and distribution from the warehouse must be officially recorded. A monthly reconciliation process is then conducted to ensure data integrity between administrative records and the existing physical stock, thereby creating a transparent and accountable inventory control system.

2. Storage of Wet Food Ingredients

The storage of fresh food ingredients at the Nutrition Installation of RSUD Datu Beru consists of 2 refrigerators with 1 freezer for storing fresh food ingredients, which have been categorized by each refrigerator.

Table 2. Storage of Fresh Food Ingredients.

No	Storage of Raw Food	Temperature (°C)	Used to
1.	Freezer	-10°	store fish, chicken, and food items that need to be frozen.
2.	Refrigerator 1	-5° - 0°	store vegetables and fruits that do

No	Storage of Raw Food	Temperature (°C)	Used to
3.	Refrigerator 2	-5° - 0°	not have a strong odor. store vegetables and fruits that have a strong smell.

Temperature checks on storage are conducted twice a day using a temperature check form. Food items such as chicken that have not been treated for patient enteral feeding are wrapped in white plastic and placed in the freezer. Meanwhile, certain food items like vegetables and fruits that have not been treated are placed in a basket and stored in cold storage, while the vegetables and fruits that will be used on that day are arranged in a basket, and vegetables and fruits that are not easily perishable and will not be used are arranged in a basket and placed on a special rack for vegetables and fruits. The main factors that influence food quality include production date, storage temperature, and sensory attributes such as color, appearance, and texture (Sihotang et al., 2024). Regular maintenance of refrigeration equipment is essential to optimize performance and maintain food quality (Suryaman & Prayogo, 2018).

Discussion

1. Storage of Dry Food Ingredients

Table 3. The Process of Storing Dry Food Ingredients

No	Storage of Dry Food Ingredients	Average score
1.	Placed regularly	1
2.	Establish FIFO system	1
3.	Establish FEFO system	1
4.	Filling of food stock cards is immediately filled without delay, checked and examined	1
5.	Stock cards and expenditures are placed in their place	1
6.	Warehouse opening at the specified time	0
7.	Food is stored in closed containers, wrapped and without holes	1
8.	Warehouse doors are always locked	1
9.	Room temperature ranges from 19-21°C	1
10.	Room cleaning twice a week	0
11.	Insecticide spraying is carried out periodically	0
12.	All holes in the warehouse must be sealed	1
Total		9

Determination of the medium assessment category requirements, namely:

- 1) lowest score x number of questions: $0 \times 12 = 0$
- 2) highest score x number of questions: $1 \times 12 = 12$
- 3) the medium value obtained is: $(0+12) : 2 = 6$

With the assessment category if the score value meets the requirements (if the question score ≥ 6)

and does not meet the requirements (if the medium question score value < 6).

Based on table 3. It can be seen that the storage process of dry food ingredients in the Nutrition Installation has met the storage requirements using 12 assessments. This storage process received an assessment of 9 (which means ≥ 4.5) so that the storage process of dry food ingredients in the Nutrition Installation has met the criteria using the Guttman Scale but there are still some that do not meet the requirements according to the 2013 KEMENKES PGRS Guidelines.

In question 6 table 6 Warehouse opening at a specified time. In the Nutrition Installation, the warehouse opening does not have a fixed time, its opening depends on the arrival time of the storage staff. This statement does not meet the requirements for storing food according to the 2013 Ministry of Health PGRS Guidelines.

In question 10 table 6 Room cleaning twice a week. In the Nutrition Installation, cleaning of the storage room is carried out twice a day, namely in the morning and evening. This statement does not meet the requirements for storing food according to the 2013 Ministry of Health PGRS Guidelines.

In question 11 table 6 Insecticide spraying is carried out periodically. In the Nutrition Installation, insecticide spraying is not carried out which can actually be useful for preventing pest attacks on food. This statement does not meet the requirements for storing food according to the 2013 Ministry of Health PGRS Guidelines.

Routine assessment of storage practices, including stock accuracy, expiration dates, and dead stock, is essential to evaluate and improve the food storage system in hospitals (Oviani & Indraswari, 2020). Implementing these steps can contribute to patient recovery and prevent complications (Amran, 2023). Hygiene and sanitation practices in food preparation areas are very important with some hospitals achieving compliance with these practices up to 90% against their regulatory standards (Azla & Pratiwi, 2023).

2. Storage of Wet Food Ingredients

Table 4. Wet Food Storage Process

No	Storage of Wet Food Ingredients	Average score
1.	Temperature according to the needs of the stored food ingredients	1
2.	Temperature checks are carried out twice a day with daily cleaning of the refrigerator	1
3.	All stored food ingredients should be wrapped in plastic	1
4.	Do not place strong-smelling food ingredients together with odorless food ingredients	1
5.	Storage temperature of vegetables and fruits must be observed	1
6.	Food is stored for no more than 2 or 3 days and has been used	1
7.	Incoming and outgoing food ingredients and various bookkeeping in the wet food	1

No	Storage of Wet Food Ingredients	Average score
	storage section, including food stock cards must be filled in immediately without delay, placed in their place, checked and examined continuously with the FIFO system	
	Total	7

Determination of the medium assessment category requirements, namely:

- 1) lowest score x number of questions: $0 \times 7 = 0$
- 2) highest score x number of questions: $1 \times 7 = 12$
- 3) the medium value obtained is: $(0+7) : 2 = 3.5$

With the assessment category if the score meets the requirements (If the question score ≥ 3.5) and does not meet the requirements (If the medium question score < 3.5).

Based on Table 4, it can be seen that the process of storing wet food ingredients in the Nutrition Installation has met the storage requirements using 7 assessments. The process of storing wet food ingredients in the Nutrition Installation has met the criteria using the Guttman Scale and has met the requirements according to the PGRS KEMENKES 2013 Guidelines.

Proper storage of food ingredients in hospitals is very important to ensure food safety and cleanliness. Important aspects include separating wet and dry ingredients, applying the first-in-first-out (FIFO) system, and maintaining cleanliness in the storage area (Hasnel & Asnur, 2024).

Hospitals must adhere to strict hygiene and sanitation practices in food handling, including the selection, storage, processing, and proper serving of food (Sani, 2021).

Research shows that several hospitals have successfully implemented proper sanitation facilities and food handling procedures (Syamsuddin et al., 2020).

Most hospitals have implemented good standards, but some others face challenges in menu planning, storage, preparation, and distribution of food. To ensure optimal nutrition services, hospitals must comply with the Hospital Nutrition Service Guidelines, addressing issues such as timely food delivery, appropriate storage conditions, and maintaining food quality (Gusriyani et al., 2021; Wati et al., 2020).

Conclusion

The description above has explained the problem according to the formulation that has been determined. The storage in the Nutrition Installation of RSUD Datu Beru Central Aceh uses the FIFO and FEFO methods where every dry or wet food that enters the warehouse or leaves the warehouse will be recorded by officers on the stock card. Based on the observations that have been made on the storage of food materials in the Nutrition Installation, a value of 12 was obtained (which

means it meets the medium value = ≥ 6) with the assessment category meeting the requirements for research observations with the suitability of dry and wet food storage with the 2013 KEMENKES PGRS Guidelines. In the process of storing dry food materials, a value of 9 was obtained (which means it meets the medium value = ≥ 6) with the assessment category meeting the requirements for research observations using the Guttman scale, but there are still some that do not meet the requirements according to the 2013 KEMENKES PGRS Guidelines. In the process of storing wet food materials, a value of 7 was obtained (which means it meets the medium value = ≥ 3.5) with the assessment category meeting the requirements for research observations using the Guttman scale, but there are still some that do not meet the requirements according to the 2013 KEMENKES PGRS Guidelines.

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