Identification and Analysis of Financial Loss Risk Factors in the Drug Management Cycle and its Strategies in Healthcare Facilities: A Literature Review

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Abstract. Effective and efficient drug management is a fundamental pillar in the healthcare system. However, inefficiencies often lead to significant financial losses due to expired drugs and dead stock, which also pose risks to patient safety. This study aims to conduct an in-depth analysis of the factors contributing to expired drug stock in healthcare facilities, particularly hospitals, to formulate targeted improvement strategies. This research was conducted using a qualitative descriptive literature review method. Data were sourced from 11 scientific articles published between 2021 and 2025, selected from Google Scholar based on inclusion criteria. The review reveals that the primary causes of expired drugs and dead stock are consistent across various hospitals, with the most common factors being inaccurate planning, changes in physicians' prescribing patterns, and inefficient storage supervision that fails to properly implement FIFO (First In, First Out) and FEFO (First Expired, First Out) principles. Other significant factors include post-pandemic demand shifts, donated drugs not matching facility needs, and mandatory stock for rare cases. Key recommended strategies focus on enhancing coordination between pharmacists and doctors, implementing improved planning methods, and optimizing inventory control through regular stocktakes and monitoring of slow-moving drugs.

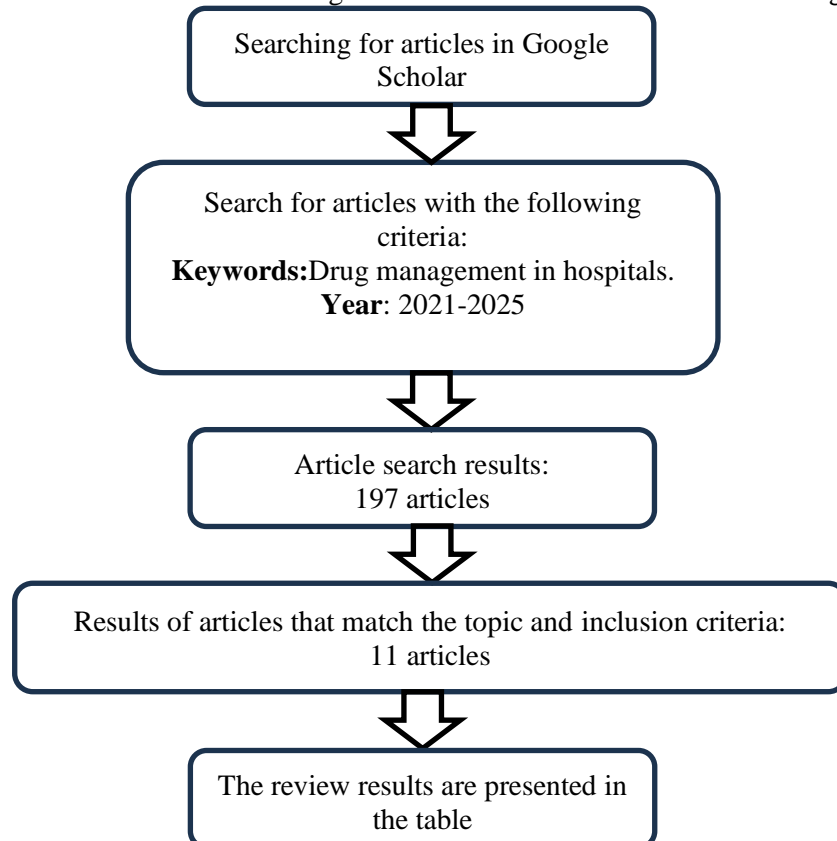**Key words:** Expired date, Death Stock, Hospital

INTRODUCTION

Effective and efficient medication management is a fundamental pillar of the healthcare system, both in hospitals and community health centers (Puskesmas). The primary goal of medication management is to ensure the availability of high-quality, safe pharmaceutical preparations in sufficient quantities to meet patient needs, thereby supporting quality healthcare services and improving public health (NH Akbar *et al*., 2016). Good management encompasses various stages, from selection, planning, procurement, receiving, storage, to distribution and control.

Various problems in the medication management cycle still frequently occur. One important indicator of inefficiency in medication management is the high number of expired, damaged, and dead stock medications. These problems not only cause significant financial losses for healthcare facilities due to capital constraints and disposal costs, but also have negative medical and social impacts. Medications approaching or past their expiration date are at risk of reduced stability and efficacy, and even potentially cause toxic effects that endanger patient safety (Nurcahyani *et al*., 2023). In addition, the accumulation of stagnant stock can lead to shortages of other essential medications, thus disrupting the continuity of patient therapy.The availability of medications in service units significantly impacts the quality of healthcare services. This demonstrates the need for proper medication management to ensure the availability and affordability of medications effectively, efficiently, and rationally (Mangindara, 2012).

Given the complexity and significant impact of this problem, ongoing evaluation of the factors contributing to expired drugs is crucial. Therefore, this study was conducted to analyze in-depth the factors influencing expired drug stocks in healthcare facilities, particularly hospitals. The results are expected to form the basis for formulating policy recommendations and targeted improvement strategies to increase the efficiency of drug management, reduce financial losses, and most importantly, ensure the quality and safety of patient care.

METHODS

The method used in this research is a literature review with a qualitative descriptive approach. The research data are sourced from relevant scientific articles published between 2021 and 2025. The article search was conducted through Google Scholar. The search results yielded 197 articles. The articles were further selected, adjusted to the inclusion and exclusion criteria. The inclusion criteria for this literature review were articles on medication management in healthcare facilities that discussed the percentage of expired stock and dead stock along with their causes. The exclusion criteria included articles discussing medication management without including the percentage of expired stock and dead stock, and research conducted before 2021. Based on the article selection process, 11 articles were obtained that met the inclusion criteria and the topics of the literature review. The results obtained from the review process are presented in tabular form. The following is a schematic of the literature review stages:

Searching for articles in Google Scholar

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Search for articles with the following criteria:
Keywords: Drug management in hospitals.
Year: 2021-2025

⬇

Article search results:
197 articles

⬇

Results of articles that match the topic and inclusion criteria:
11 articles

⬇

The review results are presented in the table

RESULTS AND DISCUSSION

Efficient inventory is inventory accompanied by efficiency in the use of working capital and inventory that is effective if it can meet the needs of the health service unit in its working area (Arief & Kartikasari, 2021). One of the most important aspects of a hospital is medication management. A lack of efficiency can negatively impact hospital operations, as it is a major cause of budget waste (Rumagit *et al*., 2024). In drug management, several indicators used as benchmarks are the percentage of expired stock and the percentage of dead stock. Expired stock is defined as a drug whose concentration has decreased from its initial concentration and has passed the recommended usage date stated on the drug packaging. Dead stock is defined as a drug that has not been used for 3 months or has not been traded for 3 months (Mediawati *et al*., 2024). The value of expired and dead stock medications significantly impacts efficiency and causes losses to hospitals. The percentage of damaged medications is calculated by dividing the total value of expired medications by the inventory value and multiplying by 100%. The percentage of dead stock is calculated by dividing the value of medications that have not been traded for more than three months by the inventory value and multiplying by 100% (Lisni *et al*., 2021). Based on Pudjianingsing (1996) the standard value for the percentage of expired drugs and dead stock is 0-0.25% (Hidayati *et al*., 2013).

Table 1. Causes and Strategies for Handling Expired Dates and Dead Stock

No.	Research Title	Researchers, Year of Publication and Type of Research	Percentage Results of Drug Expired Date (%)	Dead Stock Percentage Results (%)	Reason		Handling Strategy	
					Expired Date	Dead Stock	*Expired Date*	Dead Stock
1.	Drug Management Control in the Pharmacy Installation of a Private Hospital in Bandung City	Lisni et al., 2021 Descriptive observational non-experimental with retrospective data	0.085	3.81	Inappropriate planning, changes in disease patterns, varying doctor prescriptions, lack of supervision in storage, drugs experiencing dead stock	Improper planning and procurement; doctors do not prescribe certain medications.	Evaluation of the implementation of storage and improvement of the skills of pharmacists in monitoring drugs approaching expiration.	Returning medication to the distributor; active communication between the pharmacist and the doctor through the Pharmacy and Therapeutics Team (TFT).
2.	Evaluation of Pharmaceutical Inventory Management and Medical Consumables in a Pharmacy Installation of a Private Dental and Oral Hospital in Jakarta City	Arief & Kartikasari, 2021 Descriptive observational non-experimental with retrospective data	0.89	1.87	Improper planning, lack of stock monitoring, and varying prescribing patterns, stagnant inventory/dead stock	The planning process was not appropriate and the doctor chose to prescribe another type/brand of medication.	Evaluate stock planning, storage, and improve collaboration between pharmacy, nursing, and doctor teams.	Exchanging or returning drugs to distributors and active communication between pharmacists and doctors via TFT.
3.	Evaluation of Drug Management at the Storage and Use Stage of Drugs in Hospital Pharmacies	DO Akbar et al., 2022 Descriptive observational non-experimental with retrospective and concurrent data	2.17	3.89	Supervision of the storage system is not yet efficient and there is a lack of coordination with doctors.	Doctors' prescribing patterns have changed and are not in accordance with FORNAS/DOEN	Improve coordination between doctors and pharmacists so that doctors can adjust prescriptions to drug availability.	Improve coordination between doctors and pharmacists so that doctors can adjust prescriptions to drug availability.
4.	Profile of Drug Management at the Ideal Regional Hospital in Banjarbaru	Aisyah et al., 2022 Descriptive observational non-	0.04	2.80	Drugs not being re-prescribed by the doctor and receiving drugs with an expiration date that is too short.	It is rare for a disease to occur that is in accordance with the drug indications and inappropriate planning.	Improve coordination between doctors and pharmacists so that doctors can adjust prescriptions to drug availability.	Return the medicine to the distributor.

		experimental with retrospective data						
5.	Causes of Expired Drugs, Damaged Drugs and Dead Stock in the Pharmaceutical Supply Warehouse of Hospital X Surabaya	Nurcahyani et al., 2023 Descriptive with retrospective data	0.002	0	Changes in prescribing patterns and checking of expiration dates in the unit are less than optimal.	Doctors are no longer prescribing readily available drugs and procurement is inadequate.	Optimization of FIFO & FEFO systems; monthly stock monitoring; good coordination between pharmacy, procurement department, and doctors; combination of planning methods (morbidity and consumption).	Optimization of FIFO & FEFO systems; monthly stock monitoring; good coordination between pharmacy, procurement, and doctors; combination of planning methods (morbidity and consumption).
6.	Overview of Drug Storage and Distribution in the Pharmacy Warehouse of HL Manambai Abdul Kadir Hospital	Yurdiansyah & Andriani, 2023 Descriptive with observation	8.45	9.86	Lack of supervision, poor distribution system, manual recording, and rejection of returns from PBF, not having a driver's license, overstocked drugs	Many drugs have expired dates, the planning and procurement process is less than optimal, and there are changes in prescribing patterns and disease prevalence.	Planning analysis using the ABC-VEN-FNS method, inventory control with Minimum-Maximum Stock Level, and periodic stocktaking, separation of drugs approaching their expiry date	Identify fast and slow moving drugs for procurement priority and improve pharmacist-doctor communication on drugs approaching dead stock.
7.	Analysis of Drug Management and Improvement Strategy Using the Hanlon Method in the Pharmacy Installation of Budi Setia Hospital, Minahasa Regency, North Sulawesi Province	Rumagit et al., 2024 Qualitative and qualitative descriptive with retrospective and concurrent data	1.16	0.6	Slow-moving drugs and the presence of drugs donated by the government that are approaching their expiration date.	The availability of slow-moving drugs and urgent drugs must be provided even though they are rarely used.	Increased control and recording of drugs approaching expiration and providing special marking.	Controlling doctor's prescriptions to ensure drug availability and coordinating with doctors to prescribe slow-moving drugs.
8.	Analysis of Expired Drugs, Dead Stock, and Damaged Drugs in the Pharmacy Warehouse of Hidayah General Hospital,	(Mediawati et al., 2024) Qualitative descriptive with retrospective observation	27.11	3.5	Decrease in patient numbers, over-procurement, changes in doctor prescribing patterns, slow-moving drugs, drugs used only for certain conditions, drugs with certain preparations that are rarely	Changes in prescribing patterns, inappropriate procurement, and requests for drugs by doctors that are not prescribed again, use of drugs for certain conditions	Coordinate with doctors regarding changes in prescribing patterns and evaluate procurement to suit needs.	Coordinate with doctors regarding changes in prescribing patterns and evaluate procurement to suit needs.

	Purwokerto				used, decrease in drug use after the COVID-19 pandemic.		
9.	Evaluation of Drug Management in the Pharmacy Installation of the Regional General Hospital (RSUD) K	Ansagita et al., 2024 Non-experimental descriptive with retrospective and concurrent data	0.37	1.88	Improper planning, poor distribution systems, and changing disease patterns.	Inappropriate planning and declining COVID-19 cases.	Create SOPs for pharmaceutical preparation management systems according to labeling and classification of expiration dates.	Supervise and monitor dead stock every month.
10.	Percentage of Damaged, Expired, Dead Stock Drugs and Drug Management at the Pharmacy Installation of Hospital X, Bekasi Regency	Ningrum et al., 2024 Descriptive analysis and qualitative descriptive approach with retrospective data	6.24	0.81	Lack of oversight (no drug returns near the ED), poor stock management, changes in prescribing patterns, and post-pandemic drugs becoming slow-moving.	Medications are rarely prescribed or only for certain cases (e.g.: Anti-Snake Venom Serum).	Returning slow-moving or near-ED medications to medical logistics and routine checks.	Provide special labeling, provide information to the doctor, and use internal memos to remind the doctor to prescribe the medication.

CONCLUSION

Based on a literature review of 11 articles from 2021 to 2025, it was concluded that the main factors causing financial losses due to expired drugs and dead stock in various healthcare facilities, particularly hospitals, are multifactorial. The most frequently identified causes are inaccurate planning and procurement, changes in physician prescribing patterns that are not aligned with drug availability, and a lack of oversight in storage systems that do not optimally implement the FIFO (First In, First Out) and FEFO (First Expired, First Out) methods. Other contributing factors include changing disease patterns, receiving donated drugs that do not meet needs, and the need to stock rarely used emergency drugs. To address these issues, recommended improvement strategies center on improving coordination between pharmacists, physicians, and procurement through forums such as the Pharmacy and Therapeutics Team (TFT), evaluating and improving procurement planning methods, and optimizing warehouse management through regular stocktaking, special labeling for drugs approaching expiration, and routine monitoring of slow-moving drugs. Comprehensive implementation of these strategies is crucial to reduce financial losses, improve drug management efficiency, and ensure patient quality and safety.

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