



DRUG MANAGEMENT EVALUATION WITH HANLON METHOD AND FISHBONE DIAGRAM

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ABSTRACT

Pharmaceutical management at primary health centers plays an important role in ensuring the availability, affordability, and quality of healthcare services. However, many primary health centers still face challenges in the planning, procurement, and evaluation of medicines, which potentially lowers the quality of services. This study aims to evaluate the quality of pharmaceutical management at Puskesmas X in Karanganyar Regency, determine priority problems using the Hanlon method, and analyze root causes with a Fishbone diagram. The study used an observational design with a qualitative descriptive and analytical approach. Data were collected through observation, interviews with pharmaceutical personnel, and document reviews of medicine management for the period December 2023–December 2024. The collected data were systematically examined through content analysis to identify key themes and patterns related to pharmaceutical management practices. Quantitative scoring of issues was performed using the Hanlon method to prioritize problem areas based on criteria such as magnitude, seriousness, and feasibility. Root cause analysis was conducted by categorizing identified problems into groups using the Fishbone diagram framework, facilitating the identification of underlying factors. The results show that the aspects of planning, procurement, stock, and evaluation did not meet standards, while the aspects of storage and medicine use were in accordance with standards. Hanlon method analysis identified medicine proposals based on FORNAS as the main priority issue, followed by the appropriateness of medicines with FORNAS, DOEN, fund allocation, and disease patterns. Fishbone analysis revealed the main causes as limitations in human resources, absence of SOPs, weak cross-sector coordination, and minimal technological support. The study concludes that improving human resource capacity, developing SOPs, forming proposal teams, strengthening coordination, and utilizing information technology are necessary to improve the quality of pharmaceutical management and ensure medicine availability according to community needs.

Keywords: community health center; drug management; fishbone diagram; fornas; hanlon method

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INTRODUCTION

A primary health center (Puskesmas) is a healthcare facility that plays an important role in delivering public health services at the primary level. The main task of a Puskesmas includes maintaining the health of the community within its working area. In this context, pharmaceutical services at the Puskesmas function as the implementers of health programs initiated by the government to improve the quality of healthcare services for the community. The community's need for healthcare services to enhance health status is carried out both individually and collectively within organizations in maintaining bodily health and preventing the contraction of diseases (Tawalujan et al., 2019).

Pharmaceutical services at primary health centers (Puskesmas) must support the three main functions of the Puskesmas, namely as the primary level healthcare provider covering individual and community health services, as a driving center for health-based development, and as a center for community empowerment. In this context, pharmaceutical services serve as the implementers of government health programs aimed at improving the quality of healthcare services for the

community. Within the scope of pharmaceutical services at the Puskesmas, there are two main types of services: medicine management and management of consumable medical supplies, which include activities such as needs planning, requisition, storage, distribution, control, recording, reporting, archiving, monitoring, and evaluation of management; as well as clinical pharmacy services that encompass prescription assessment, medicine dispensing, provision of drug information, Drug Information Services (PIO), counseling, patient rounds or visits (specifically at inpatient Puskesmas), monitoring and reporting of adverse drug reactions, drug therapy monitoring, and evaluation of drug use (Ministry of Health Regulation No. 74, 2016).

Good medicine management must refer to Ministry of Health Regulation No. 74 of 2016 concerning Pharmaceutical Service Standards at Primary Health Centers. Compliance with these standards can serve as a guideline for medicine managers at primary health centers to improve the quality of pharmaceutical services (Rintanantasari et al., 2021). The aspects of medicine management, which include selection, planning, procurement, storage, distribution, control, monitoring, and evaluation of medicines, when optimally managed, can ensure the accuracy of the quantity and types of medicines and consumable medical supplies in pharmaceutical services and healthcare subunits within the primary health center environment (Ministry of Health Regulation No. 74, 2016). Quality healthcare services are efforts made to meet patient expectations so that patients feel satisfied because their desired expectations align with their needs. The quality of healthcare services is a key factor in achieving the goals of an optimal health system. Efforts to improve the quality of healthcare services continue to be carried out at various levels, including at the primary health center level as the frontline in the primary health system (Putri et al., 2022).

Medicine management and healthcare maintenance at the district/city level play a crucial role in ensuring the availability, supervision, and affordability of medicines as part of healthcare services to prevent medicine stockouts (Asi et al., 2019). The goal of medicine management at primary health centers is to guarantee the availability and accessibility of effective and efficient medicine services, so that medicine needs can be calculated accurately and medicines are obtainable at the appropriate time. Effectiveness in planning and procurement serves as the primary indicator to measure the extent to which the output or process objectives are achieved; in other words, the better the achievement level, the more effective the process is considered. Meanwhile, efficiency in planning and procurement is a measure of resource utilization in a process, where more economical use of resources indicates a more efficient process (Azha'rah et al., 2024).

Medicine management will be effective when supported by the available resources within the system. The primary goal of medicine management at the district/city level is to ensure the availability of quality medicines, equitable distribution, and the appropriate types and quantities of medicines needed for basic healthcare services in health service units. This is supported by research conducted by Hananto et al. (2022), which states that the main factor influencing the quality of medicine management is the quality of human resources, including both pharmaceutical personnel and staff responsible for prescription writing.

The study titled "Analysis of the Quality of Medicine Management Services at Puskesmas X and Puskesmas Y in Sukoharjo Regency in 2022" showed that the average percentage achievement of several medicine management indicators were as follows: planning accuracy of 121.09% and 227.64% respectively; conformity of items with the National Formulary (FORNAS) reaching 29.37% and 32.66%; funding adequacy recorded at 121.09% and 233.83%; item receipt conformity at 75.94% and 72.61%; and receipt quantity conformity at 85.01% and 115.41%. Additionally, the Inventory Turn Over Ratio (ITOR) was recorded at 3.05 times per year for Puskesmas X and 2.60 times per year for Puskesmas Y. Stock indicators showed 0% for both item stockouts and insufficient medicines, with safe stock reaching 81.90% and 88.88%, whereas overstocked items were 7.53% and 11.11% respectively. The percentage of non-prescribed medicine items was

25.62% at Puskesmas X and 16.65% at Puskesmas Y. Expired medicines were very low at 0.01% and 0.03%, and no damaged medicines were found (Hananto et al., 2024). These findings indicate that several aspects of medicine management at both health centers have yet to fully meet established standards, influenced by factors related to management and the quality of human resources.

The 2023 health profile of Puskesmas X in Karanganyar Regency explains that there were essential medicine items unavailable in 2023, namely Dihydroartemisinin-Piperaquine (DHP) and Primaquine. The availability of essential medicines at Puskesmas X plays a vital role in ensuring public access to the necessary healthcare services. The shortage of medicines such as DHP and Primaquine indicates that some primary health centers in Karanganyar Regency have not yet met the standards for medicine availability. Therefore, evaluation and improvements are needed in the medicine procurement and distribution systems to effectively meet community needs. Efforts to enhance the availability of essential medicines involve collaboration with various parties and better management of distribution, though further attention is still required to meet the established standards (Wasir et al., 2023).

The latest data from the Central Statistics Agency (BPS) of Karanganyar Regency, Central Java, shows that there are 21 primary health center (Puskesmas) units, including 16 inpatient Puskesmas and 5 non-inpatient Puskesmas. Additionally, there are auxiliary Puskesmas and other health facilities distributed across various sub-districts within the region (BPS.go.id). Observations conducted by researchers at the Karanganyar Health Office identified several problems in medicine management at the Puskesmas in Karanganyar Regency, Central Java, covering key aspects such as inaccurate medicine planning in some Puskesmas, with needs submissions not reflecting actual consumption. This situation leads to medicine stock accumulation, shortages, or expired medicines, all of which negatively affect public health services. Furthermore, challenges exist in the e-purchasing system, which is designed to improve transparency and efficiency, including suppliers' inability to meet demand, causing delays or stock shortages at the Puskesmas. Limited budgets and a shortage of trained pharmaceutical staff also hinder ensuring medicines are available in adequate quantity and quality. Policy changes can also impact medicine availability at health facilities. To address these issues, better coordination among the Health Office, Puskesmas, and medicine suppliers is necessary, along with strengthening monitoring and evaluation systems to make medicine management more efficient and aligned with community needs. The objective of this study is to evaluate medicine management at the Inpatient Puskesmas X, determine priority issues using the Hanlon method, and analyze root causes and follow-up improvements using the Fishbone diagram in 2024. This evaluation was conducted because in 2023, there were primary health centers in Karanganyar Regency that did not meet the standards for medicine availability, making improvements in the procurement and distribution system highly necessary.

METHOD

This study used an observational design with a qualitative descriptive and analytical approach to evaluate the quality of medicine management at Puskesmas X. Primary data were collected through observations and interviews with the head of the Puskesmas, pharmacists, pharmaceutical technical staff, and administrative personnel, while secondary data consisted of retrospective document reviews of medicine needs planning (RKO), procurement reports, distribution, availability, and medicine usage from December 2023 to December 2024. The sample was selected purposively based on the criteria of inpatient Puskesmas that have a responsible pharmacist and are willing to provide data. The study variables included medicine management quality indicators as the dependent variable, and management factors, human resources, infrastructure, and environment as independent variables. Data analysis was conducted using the Ministry of Health's standard indicators with instruments including questionnaires, observation sheets, and interview guidelines, and processed using Microsoft Excel. To ensure validity, the instruments were adapted from

established Ministry of Health standards and pre-tested in a comparable setting, and content validity was confirmed by expert review. For reliability, data collection procedures were standardized, and inter-rater consistency was assessed during observations and interviews to minimize bias and enhance data accuracy.

RESULT

Table 1.
Compliance of Medicine Management

Aspects of Management	Indicator	X (number & %)	Note
Planning	Compliance of items with the National Formulary (FORNAS)	120/184 = 65,22%	NC
	Compliance of items with disease patterns	41/64 = 64,06%	NC
	Sufficiency of procurement funds	Rp169.243.600 / (Rp169.243.600+Rp33.392.200) = 83,52%	NC
	Accuracy of planning	21.329/18.572 = 114,84%	C
	Allocation of funds for medicines	169.243.600 / 3.271.192.123 = 5,17%	NC
	Value of essential medicine procurement	97.110.905 / 169.243.600 = 57,38%	NC
	Value of generic medicine procurement	137.095.449 / 169.243.600 = 81,00%	NC
	Compliance of items with the Essential Medicine List (DOEN)	100/184 = 54,35%	NC
Procurement	Compliance of requested items	146/184 = 79,35%	NC
	Compliance of quantity received	137/146 = 93,84%	NC
Storage	Proper form of dosage forms	184/184 = 100%	C
	Appropriate temperature	184/184 = 100%	C
	Narcotics storage in accordance with regulations	none = 100%	C
	Free from contamination	9/9 = 100%	C
Stok	Medicine stockouts	Available → -	C
	Expired medicines	Available → -	NC
Usage	Prescriptions in accordance with formulary	100%	C
	Usage according to indications	100%	C
Evaluation	Routine evaluation	not yet performed → -	NC
	Follow-up on evaluation	Not available → -	NC

Note: C = Compliant; NC = Not Compliant

Table 2.
Hanlon Method Calculation

No	Indicator	A	B	C	BPR	D	OPR	Rank
1	Drug Proposal	9	18	8	69,33	1	69,33	1
2	Compliance of Drug Items with National Formulary (FORNAS)	9	18	7	63,00	1	63,00	2
3	Compliance of Drug Availability with Disease Patterns	8	16	6	48,00	1	48,00	5
4	Compliance of Drug Procurement Funds	7	16	7	51,33	1	51,33	4
5	Value of Essential Drug Procurement	7	16	6	46,00	1	46,00	6
6	Value of Generic Drug Procurement	7	14	6	42,00	1	42,00	7
7	Compliance of Available Drug Items with Essential Drug List (DOEN)	8	16	7	53,57	1	53,67	3
8	Compliance of Requested Quantity	6	12	6	36,00	1	36,00	10
9	Compliance of Received Quantity	6	13	6	38,00	1	38,00	9
10	Deviation in Distributed Drug Quantity	5	10	5	25,00	1	25,00	16
11	Average Drug Stockout Duration	7	13	6	40,00	1	40,00	8
12	Inventory Turn Over Ratio (ITOR)	6	11	6	34,00	1	34,00	11
13	Percentage of Stockouts (less than 1 month)	6	10	6	32,00	1	32,00	12
14	Percentage of Safe Stock (12-18 months)	5	10	6	30,00	1	30,00	13
15	Percentage of Excess Stock (more than 18 months)	5	8	6	26,00	1	26,00	15
16	Non-prescribed Drugs (more than 3 months)	5	9	6	28,00	1	28,00	14
17	Percentage of Expired Drug Value (ED)	5	10	4	20,00	1	20,00	17

The results of the medicine management evaluation at Puskesmas X show varied outcomes in 2024. Most aspects of planning were non-compliant, particularly concerning alignment with FORNAS, DOEN, disease patterns, as well as allocation and procurement value of medicines. Medicine procurement is still suboptimal, despite high quantities received. Medicine storage is rated good as all indicators meet standards. However, stock shortages and expired medicines were still found. Medicine use has followed the formulary and indications, but evaluations have not been properly conducted. Overall, the main weaknesses lie in planning, stock, and evaluation, while strengths are seen in storage and medicine usage.

Based on the analysis using the Hanlon method, five indicators with the highest scores were obtained, becoming the main priorities in efforts to improve the quality of medicine management at the health center. These five indicators were chosen because they have the highest Basic Priority Rating (BPR) and Overall Priority Rating (OPR) values, reflecting the magnitude of the problem, the effectiveness of interventions, and the feasibility of implementation.

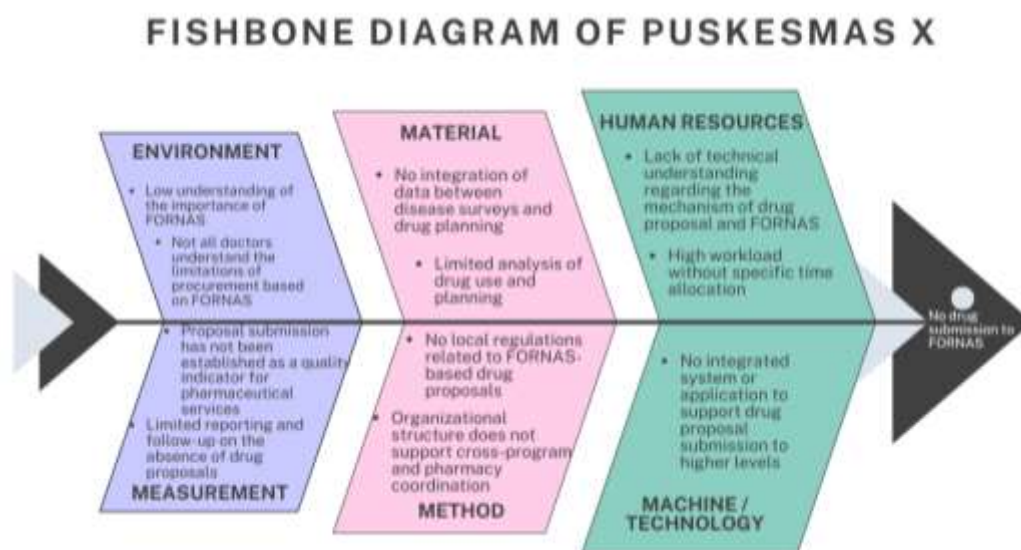


Figure 1. Fishbone Diagram of Puskesmas X

Drug proposal based on FORNAS is a strategic step in ensuring efficiency, effectiveness, and compliance in public drug management. However, based on the Hanlon method analysis, the issue of not submitting drug proposals to FORNAS at Puskesmas X became the highest priority issue with the highest OPR score (162.00). To comprehensively understand the root cause, an analysis was conducted using the Fishbone Diagram or cause-and-effect diagram approach.

DISCUSSION

Based on the results of the medicine management evaluation at Puskesmas X in 2024, it appears that most indicators in the planning aspect do not meet the standards. The compliance of drug items with FORNAS only reached 65.22% and with disease patterns 64.06%, indicating that drug selection is not fully based on national standards or actual field needs. Similar research in Tasikmalaya Regency showed that planning was not in accordance with FORNAS and DOEN (Nurpitriani, 2022). Furthermore, the allocation of funds for medicines was only 5.17% of the total budget, the value of essential drug procurement was 57.38%, and compliance with DOEN was 54.35%, all of which were deemed non-compliant. Only the planning accuracy indicator met the standard with an achievement of 114.84%. This indicates an imbalance in setting drug priorities, which impacts the overall planning effectiveness.

In the procurement aspect, although the quantity of drugs received is quite high with a compliance rate of 93.84%, the indicator for compliance of requested items only reached 79.35%, so it is still considered non-compliant. This condition indicates that the procurement process has not fully been

able to meet actual needs based on the prepared plan. The storage aspect shows very good results because all indicators are stated as compliant, namely compliance with the form of dosage, temperature, narcotics storage according to regulations, and contamination-free conditions, all reaching 100%. This illustrates that Puskesmas X has an organized drug storage system that meets technical standards. In the stock aspect, problems are still found in the form of drug shortages and expired drugs, where shortages are stated as an issue and expired drugs are categorized as non-compliant. This situation indicates weak monitoring of drug availability, which can affect the continuity of services to patients. These results are in accordance with research at Puskesmas in Pekalongan Regency, which showed that drug storage met technical standards (Khasanah et al., 2023).

The usage aspect shows optimal achievement, as prescriptions comply with the formulary and drug use according to indications both recorded at 100% and meet the standards. This condition indicates that health workers have used therapy guidelines properly and provided rational drug use. However, there are significant weaknesses in the evaluation aspect. Routine evaluations have not been conducted, and follow-up actions on evaluation results are also unavailable, so both are declared non-compliant. The absence of an evaluation and follow-up system has the potential to hinder continuous improvement efforts in drug management at Puskesmas X. Overall, these results show that drug management at Puskesmas X in 2024 still faces various challenges, particularly in the planning, procurement, stock, and evaluation stages. Nevertheless, there are positive achievements in the storage and drug usage aspects that meet standards.

Data in Table 2 shows the results of the priority problem assessment analysis for drug management at Puskesmas X in 2024 using the Hanlon method. It can be seen that the drug proposal indicator ranks first with the highest OPR score of 69.33. This indicates that the drug proposal process is still a major issue that needs to be addressed immediately because it directly affects the availability of drugs at the health facility. Next, the compliance of drug items with FORNAS scored 63.00 and ranked second. This condition indicates that the available drugs are not fully in accordance with the national standard list, potentially causing inefficiency in drug services. The indicator for compliance of available drug items with DOEN ranks third with a score of 53.67, which shows that there is still a gap between available drugs and the national essential drug list.

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The indicators with the lowest scores are the percentage of expired drug value, which only reached 20.00, as well as the deviation in the quantity of drugs distributed with a score of 25.00. The low

scores indicate that the issues of drug expiration and distribution are not the main priorities, although they still require attention to prevent losses and inefficiencies in drug management. Overall, this analysis shows that the main priority problems in drug management at Puskesmas X lie in the selection and planning stages, particularly drug proposals, compliance with national standards, and budget planning. Meanwhile, procurement, distribution, and stock management aspects, although important, are secondary priorities. Out of 34 indicators referring to the Ministry of Health & JICA (2010) guidelines, Puskesmas X met 16 indicators. These results align with the research on Pharmaceutical Service Quality at Puskesmas in Cilacap Regency and Influencing Factors, which showed that Puskesmas in Cilacap had not met half of the indicators (Sofiah et al., 2022). Similarly, the study by Cholilah et al. (2021) in Tegal City gave comparable results. This indicates that planning and compliance with FORNAS/DOEN issues often emerge in various regions (Sulistiyowati et al., 2020).

Drug proposal based on FORNAS is a strategic step to ensure efficiency, effectiveness, and compliance in public drug management. Based on the Hanlon method analysis, the issue of not submitting drug proposals to FORNAS at Puskesmas X emerged as the highest priority issue with the highest OPR score. Further analysis using the Fishbone Diagram approach shows that this problem is influenced by various interrelated factors, ranging from human resources, technology, materials, methods, environment, to measurement aspects. From the human resources aspect, pharmacy staff and program managers have never received technical training regarding FORNAS, and there is no officially formed drug proposal team, resulting in unclear responsibilities in the drug selection and proposal process. This situation is exacerbated by the absence of specific task delegation related to drug proposals. Meanwhile, from the machine or technology aspect, there is no specific module available in the application to support the FORNAS-based proposal process. As a result, proposals must be made manually and are often not done at all. This indicates the need for the development of an integrated application system from the Puskesmas to the Health Office. This is due to the lack of software/applications used in the Puskesmas, where the recording and reporting systems at the Puskesmas are not integrated and still manual (Widyaningsih et al., 2022).

Problems also arise from the material and method aspects. Although the proposal format has been provided by the central authority, many Puskesmas, including Puskesmas X, do not use it due to lack of socialization and guidance. On the other hand, the absence of SOP regarding the procedure for drug proposals makes the process unsystematic and undocumented. This condition underscores the need for comprehensive distribution of official formats and the formulation of SOP for drug proposals referring to FORNAS and DOEN, along with the establishment of a cross-sector drug planning team at the Puskesmas level. The environmental and measurement aspects also contribute to obstacles in drug proposals. Weak coordination between the Health Office, District Pharmacy Installation, and Puskesmas results in no communication forum or regular supervision to oversee the proposal process. Additionally, there are no specific performance indicators to assess the implementation of drug proposals, so management does not pay attention to it. Therefore, revitalization of inter-agency coordination, preparation of relevant performance indicators, and socialization of FORNAS policies to heads of Puskesmas, doctors, and pharmacy staff are required, so that the drug proposal list is more aligned with national standards and can improve the quality of drug management at Puskesmas X.

CONCLUSION

Drug management at Puskesmas X in 2024 was not yet optimal, especially in the aspects of planning, procurement, stock, and evaluation, although storage and drug use already met standards. The Hanlon method showed that drug proposals to FORNAS were the main priority issue that must be addressed immediately, followed by compliance with FORNAS, DOEN, fund allocation, and disease patterns. Fishbone analysis confirmed that these problems were influenced by factors such as human resources, technology, methods, coordination, and policies. Therefore, improvement

strategies are needed, including enhancing the competence of pharmaceutical staff, forming a drug proposal team, developing SOP based on national standards, strengthening coordination with the Health Office, and utilizing information technology systems to support FORNAS-based drug proposals. These efforts are expected to improve the quality of drug management so that the availability of essential drugs can be guaranteed according to community needs.

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