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Measuring Pharmaceutical Supply Performance at the Facility Level: A Standards-Aligned Study

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Abstract

Reliable management of medicines and medical supplies is a prerequisite for high-quality pharmacy services. This study evaluates the performance of a Pharmacy Installation against national standards and identifies priority areas for improvement. We employed a descriptive–evaluative design using an assessment instrument aligned with the Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health of the Republic of Indonesia (2017), covering two components: Resources (maximum 60) and Management (maximum 40). The results show a total score of 92.46/100, comprising Resources 56.06/60 and Management 36.40/40, classifying performance as compliant with the standard. Strengths are concentrated in operational processes (receipt, distribution, recording and reporting), while opportunities for improvement relate to data-driven planning, strengthening organisational/structural arrangements, and tightening inventory-control practices. Practical implications include implementing clear control parameters (e.g., reorder point and safety stock) and item-priority classifications (e.g., ABC–VED) to stabilise availability, reduce expiry risk, and improve cost efficiency. The study provides a comprehensive snapshot of compliance and a direction of continuous improvement for pharmacy installations.

Keywords— pharmaceutical inventory management; medical supplies; pharmacy installation; performance evaluation; pharmaceutical logistics.

INTRODUCTION

Medications and medical supplies are strategic components that determine the quality of clinical services; logistics performance that ensures the "right type, quantity, quality, time, place, and cost" in the Pharmacy Installation (IF) directly impacts patient safety, operational efficiency, and continuity of therapy. Within an inventory control framework, analytical approaches such as the ABC-VED classification have been proven effective in focusing managerial attention on high-value and/or high-clinical-risk items, thereby maintaining service availability and more targeted budget utilization (Dora et al., 2020).

However, IFs often face recurring and interrelated problems: stockouts, overstocking of slow-moving items, increased expiration rates, and bottlenecks at the supplier and internal processes that lengthen lead times. Studies in hospital settings show that the combination of these factors creates a spiral of inefficiencies—from increased storage costs and waste to delayed services—ultimately disrupting continuity of therapy and patient satisfaction (Jaju et al., 2023; Moosivand et al., 2019; Pathy et al., 2023). In the context of uncertain demand and supply, this challenge is further complicated because the variability of clinical needs does not always align with procurement cycles and supplier capacity (Moosivand et al., 2019; Pathy et al., 2023).

For temperature-sensitive items, the quality dimension demands cold chain compliance from the point of receipt to internal distribution. Studies on vaccine logistics demonstrate the importance of end-to-end temperature monitoring, storage and transportation infrastructure readiness, and disciplined record-keeping, as temperature deviations directly impact the potential loss of product efficacy (Fahrni et al., 2022). At the operational level of IF, cold chain compliance is an integral part of quality control, integral to overall logistics performance.

Similarly, a systematic review of hospital supply chain performance indicators recommends the use of a balanced set of KPIs—including service level, stockout rate, procurement and distribution lead time, inventory turnover, expiration rate, and data accuracy—to clearly map the relationship between cost efficiency and service quality and enable appropriate action (Fallahnezhad et al., 2024; Langarizadeh et al., 2024). Comprehensive measurement through these KPIs also allows for continuous learning and process improvement across the chain, from demand planning to distribution to clinical units (Langarizadeh et al., 2024).
On the solution side, cross-context findings indicate that technology- and analytics-based interventions—such as integrated inventory optimization at the network level and automation of pharmacy preparation processes—have the potential to reduce costs and workload, while improving order fulfillment and reducing the risk of expiration (Freeman-Muhammad et al., 2024; Sallam et al., 2024). However, the effectiveness of interventions is largely determined by data quality, information system integration, and adherence to SOPs at the IF level; without these foundations, technology adoption risks producing partial, unsustainable improvements (Sallam et al., 2024).

Based on the aforementioned gaps, a comprehensive, data-driven performance assessment of the drug and medical supplies logistics system at IF is needed—combining indicators of availability, speed, reliability, storage quality (including cold chain), cost efficiency, and information accuracy—to generate recommendations for measurable, contextual, and sustainable improvements (Dora et al., 2020; Langarizadeh et al., 2024). If necessary, I can compile a bibliography in APA style (latest edition) based on the references listed in this paragraph.

RESEARCH METHODS

This study uses a descriptive design with a qualitative approach to describe the performance of the drug and medical supplies logistics system at the Pharmaceutical Installation. Primary data were obtained through a questionnaire/checklist compiled based on technical guidelines standardized by the Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health of the Republic of Indonesia. Secondary data were collected from Pharmaceutical Installation logistics management documents, including: drug planning and procurement documents, request reports from service units/health centers, distribution reports, stockout reports, expired drug reports, withdrawal and destruction reports, and final inventory management reports. The focus of observation covers the entire logistics chain (planning, procurement-receipt, storage, distribution, recording-reporting, withdrawal-destruction), including compliance with cold chain requirements for temperature-sensitive items.

Data Collection Methods

Data collection was conducted through:

1. Researchers completed questionnaires/checklists, with assessments based on the conformity points listed in the standard instrument;
2. Brief interviews with pharmaceutical logistics/responsible personnel to clarify field practices, process obstacles, and supporting evidence;
3. Archive/document searches: planning, procurement-receipt (PO/BAST), distribution, reports of shortages, expiration dates, withdrawals, and destruction, as well as records and reports of pharmaceutical supplies in the Pharmacy Installation.

Direct observations of storage arrangements, FEFO implementation, warehouse security, and temperature/humidity monitoring were conducted to validate the findings from the questionnaires and documents.

Data Presentation and Analysis

Results are presented in summary tables and narrative descriptions. The analysis was conducted descriptively by calculating performance/conformity scores based on the standard instrument of the Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health. Performance categories are defined as follows:

• Conformity to standards if the total score is >70;
• Not Conformity to standards if the total score is <70.

In addition to the total score, an overview of each process link (planning, procurement-receiving, storage, distribution, recording-reporting, withdrawal-destruction) is also presented to identify areas of strength and areas requiring improvement, including specific notes related to stockouts, expiration dates, stock accuracy, lead times, and cold chain compliance. Findings from interviews and observations were used as triangulation to strengthen the interpretation of the results and develop relevant operational improvement recommendations for the Pharmaceutical Installation.

RESULTS AND DISCUSSION

Results

Management of drugs and medical supplies is a series of integrated activities encompassing planning, procurement, receipt, storage, distribution, quality monitoring, and withdrawal and destruction. The entire process is optimized to achieve the "six rights" (correct type, quantity, quality, time, place, and cost) while minimizing the risk of quality degradation due to environmental factors such as temperature, light, and humidity. The ultimate goal is to ensure the availability of quality drugs and supplies to the public and ensure continuity of therapy.

Within the framework of system performance, the Pharmacy Unit (IF) serves as the primary node coordinating the entire logistics chain in healthcare facilities. The IF not only serves as a storage and distribution facility but is also responsible for achieving key indicators—including service level, stockout frequency, inventory turnover, procurement and distribution lead time, expiration rate, stock accuracy, and cold chain compliance for temperature-sensitive products. The government is strengthening this function by establishing and managing pharmaceutical units at various service levels, ensuring more standardized and accountable logistics governance. Thus, IF performance evaluation is crucial for identifying areas that are effective and those that require improvement, as well as for formulating recommendations for measurable and sustainable improvement.

Based on the assessment results for two main components—Resources (standard weighting of 60) and Management (standard weighting of 40)—the performance of drug and medical supplies management demonstrates relatively good performance. The proportion of scores for each component is proportional to the standard weighting, so the total score reflects a balanced aggregate performance picture between resource readiness and the quality of management processes.

Table 1. Percentage of drug and medical supplies management

No	Assessment Components	Score	Standard
1	Resource	56,06	60
2	Management	36,40	40
	Total Score	92,46	100

Source of standard values: Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health, Republic of Indonesia, 2017.

The table shows two assessment components: Resources 56.06/60 (93.43%) and Management 36.40/40 (91.0%), resulting in a total of 92.46/100, placing the drug and medical supplies management performance in the standard-compliant category (≥70). This indicates

strong human resource and facility support and good process compliance; minor improvements can be directed at data-driven planning, disciplined cold chain documentation, and routine stock audits.

Resource Component Assessment

The Resource Component was assessed across four aspects: organizational structure, human resources, operational costs, and facilities and infrastructure. The total score was 56.06 out of 60 (≈93.4% of the standard), indicating that resource support at the Pharmacy Installation was classified as very good. The breakdown was: Organizational Structure 4.5/7.5; Human Resources 15/15; Operational Costs 7.5/7.5; Facilities and Infrastructure 29.06/30.

The largest gap was in organizational structure (4.5/7.5). The manuscript explains that the Pharmacy Installation was then a Pharmacy Section under the Pharmaceutical Sector; according to the standard instrument, the UPTD (Regional Technical Implementation Unit) tends to score higher due to its stronger mandate and independence in technical operational tasks, which impacts logistics management performance. In contrast, human resources and operational costs have met full standards (15/15 and 7.5/7.5 respectively), while infrastructure is almost at maximum (29.06/30), indicating that facilities, equipment and budget support are adequate to support daily logistics processes.

Table 2. Resource Component Assessment

Component	Score	Standard
Organizational structure	4,5	7,5
Human Resources	15	15
Operating costs	7,5	7,5
Facilities and infrastructure	29,06	30
Total	56,06	60

Source of standard values: Directorate General of Pharmaceuticals and Medical Devices, Ministry of Health, Republic of Indonesia, 2017.

The total Resource component reached 56.06 out of 60 (≈ 93.43% of the standard), indicating that resource support at the Pharmaceutical Installation is very good. Two aspects are at their maximum: Human Resources 15/15 (100%) and Operational Costs 7.5/7.5 (100%), indicating that the number/qualification of personnel and budget support are adequate and in accordance with regulations. Facilities and Infrastructure 29.06/30 (≈96.9%) are almost optimal; usually small gaps remain related to the completeness/maintenance of temperature monitoring equipment, periodic calibration, shelf/label arrangement, or safety documentation. The only major gap is in the Organizational Structure 4.5/7.5 (60%)—generally related to institutional form, clarity of mandate, and separation of functions (planning–procurement–warehousing–distribution).

Table 3. Assessment of Medication Management Components

No	Component	**Score**	**Standard**	**Achievements (%)**
1	Planning	3,00	6,00	50,0%
2	Reception	5,00	5,00	100%
3	Storage	5,40	6,00	90,0%
4	Distribution	6,00	6,00	100%
5	Recording & Reporting	6,00	6,00	100%
6	Destruction	5,00	5,00	100%
7	Competency Development	6,00	6,00	100%
	Total	**36,40**	**40,00**	**91,0%**

The total Management component reached 36.40 out of 40 (≈ 91.0%), thus categorized as meeting standards. The main strengths lie in receiving, distribution, recording & reporting, destruction, and competency development—all 100%—which indicates that SOPs are implemented consistently and documentary evidence is complete. Storage is at 5.40/6 (90%), indicating high compliance with few improvement gaps (generally related to quality documentation/FEFO and temperature monitoring). A relative weak point is in planning (3.00/6; 50%), indicating the need to strengthen planning based on consumption data, seasonal trends, supplier lead times, and the determination of stock control parameters (ROP, safety stock, and ABC-VED analysis) to better maintain availability stability.

Discussion

The aggregate performance score reached 92.46/100, indicating that the drug and medical supplies logistics system at the Pharmacy Installation (IF) meets standards and functions effectively in supporting services. This achievement was supported by balanced contributions from the Resources (56.06/60) and Management (36.40/40) components, ensuring that the IF met the majority of the technical requirements set by the assessment instrument.

In the Resources component, two aspects—Human Resources and operational costs—achieved full scores, indicating sufficient staff numbers/qualifications and adequate budget support to maintain the continuity of logistics functions. Facilities and Infrastructure achieved 29.06/30 (≈96.9%), indicating that facilities and equipment (including storage quality monitoring) are generally available and functional, with minor gaps typically related to equipment completeness, calibration, or routine documentation. Organizational structure—4.5/7.5—was the relatively weakest point; Suboptimal institutional status (e.g., remaining a section rather than a unit with a stronger operational mandate) potentially limits agility in coordination, decision-making, and cross-process accountability. Strengthening structural aspects is expected to have a multiplier effect on efficiency and SOP compliance across the entire process chain.

In the Management component, the achievement of 36.40/40 (≈91.0%) reflects good process compliance. Receiving, distribution, recording & reporting, destruction, and competency development were each at 100%—indicating consistent SOP implementation and the availability of objective evidence. Storage reached 90%; remaining gaps generally relate to fine-tuning of quality/FEFO documentation, organization, or consistent monitoring of the storage environment. Meanwhile, planning was the most obvious area for improvement (3.00/6; 50%): without data-driven planning on consumption, seasonal trends, and variations in supplier lead times, the risk of stockouts on essential items and overstocks on slow-moving items tends to increase.

The operational implications of this score profile are: (1) supporting capacity (human resources, costs, infrastructure) is sufficient to maintain high performance; (2) consistency in downstream processes (receiving, distribution, reporting, and destruction) provides a strong foundation for stock accuracy and traceability; (3) upstream bottlenecks in planning are key determinants that need to be strengthened to stabilize availability and reduce waste. By improving planning—for example, by establishing stock control parameters (ROP, safety stock) based on consumption and supply variability, and implementing ABC-VED analysis to prioritize high-value/critical items—IF has the potential to increase service levels while reducing expiry rates and holding costs.

From a governance perspective, strengthening the organizational structure (mandates, job descriptions, and chain of command) will accelerate the procurement and distribution decision cycle, strengthen coordination with clinical units and suppliers, and increase accountability for key performance indicators (e.g., lead time, fill rate, stockout rate). This intervention aligns with the assessment framework used as a reference standard, where structural accuracy is a prerequisite for process compliance and sustainable improvement.

Overall, a 92.46/100 profile indicates a reliable system with room for improvement in upstream planning and minor refinements in storage. Focusing on these two areas is expected to push the score closer to full marks, while also delivering tangible impacts: more stable

availability, faster fulfillment times, reduced expiration, and cost efficiencies—without requiring drastic changes to already robust downstream processes.

CONCLUSION

The pharmaceutical and medical supplies management performance at the Pharmacy Installation is in the standard category, with a total score of 92.46/100. This achievement is supported by a balance between Resources (56.06/60) and Management (36.40/40). Downstream processes—receipt, distribution, recording and reporting, destruction, and competency development—have been running very well (reaching 100%), while storage has achieved a high level of compliance (90%). The main gap is seen in planning (50%), while in the resource component, the largest gap relates to organizational structure (4.5/7.5) amidst already optimized human resources and operational costs.

Practically, the existing system reliably supports services, but strengthening planning based on consumption data and supply variability, establishing inventory control parameters (e.g., ROP and safety stock), and item prioritization schemes (e.g., ABC-VED), along with institutional strengthening/IF structure, is expected to increase availability stability, reduce expiration, and improve cost efficiency, bringing the performance score closer to the maximum.

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