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Business Process Improvement Analysis of Outpatient BPJS Pharmacy Service using Lean Healthcare Approach: A Case Study at RS Jantung Matraman Jakarta

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Abstract

Prolonged prescription waiting times remain an operational challenge in outpatient pharmacies, particularly in hospitals serving patients covered by Indonesia's National Health Insurance program. This study aimed to identify process inefficiencies and formulate improvement recommendations for outpatient BPJS pharmacy services at JHC Matraman Hospital using a Lean Healthcare approach. A mixed-methods approach combining observation, interviews, and document review was employed. Current-state Value Stream Mapping (VSM) was used to measure processing and waiting times, while activity classification, Pareto analysis, the DOWNTIME framework, fishbone diagrams, and the 5 Whys technique were applied to identify waste and investigate its root causes. The results showed that total lead times reached 40.4 minutes for noncompounded prescriptions and 82.8 minutes for compounded prescriptions, exceeding the respective benchmarks of 30 and 60 minutes. Waiting time accounted for 77.8% and 83.7% of the total lead time, whereas value-added activities accounted for only 10.8% and 9.8%, respectively. Prescription queues within the hospital information system and delays between workstations emerged as priority areas for improvement. These findings indicate that inefficient prescription flow and coordination contributed substantially to prolonged service times. Lean Healthcare provided a structured framework for developing targeted workflow redesign and performance-monitoring recommendations. However, implementation and prospective evaluation are required to determine whether the proposed improvements can sustainably reduce waiting times while maintaining medication safety.

INTRODUCTION

Indonesia's National Health Insurance program (Jaminan Kesehatan Nasional, JKN), administered by BPJS Kesehatan and introduced in 2014, has fundamentally changed the operating environment of hospitals across the country (Rahmawati & Hsieh, 2024). By 2023, the program had extended coverage to more than 267 million Indonesians, creating a large and relatively stable patient base for BPJS-partnered hospitals while simultaneously imposing service quality standards that partner hospitals are required to meet (Kartika, 2025). For hospitals serving predominantly JKN participants, compliance with these standards is not merely a clinical objective but also an important aspect of institutional sustainability because

noncompliance may expose hospitals to sanctions that can ultimately affect their cooperation with BPJS Kesehatan and the patient base associated with that partnership.

Within this institutional context, pharmacy services occupy a position of particular operational and financial significance. Pharmaceutical services account for 40%–50% of total hospital revenue and are involved in more than 90% of hospital service episodes, making the pharmacy installation one of the most critical units within a hospital. In outpatient settings, the pharmacy is typically the final point of service contact during a patient visit, meaning that its performance is among the most visible and directly experienced aspects of service quality. Despite this operational and financial importance, outpatient pharmacy installations across Indonesia continue to experience difficulties in meeting service standards, with prolonged waiting times consistently identified as one of the most frequently reported service complaints (Ibrahim et al., 2022; Mumtaz et al., 2025).

To address pharmacy service quality, the Ministry of Health established minimum service requirements for hospital pharmaceutical services through Peraturan Menteri Kesehatan Republik Indonesia Nomor 72 Tahun 2016 (Regulation of the Minister of Health of the Republic of Indonesia Number 72 of 2016) (Kementerian Kesehatan RI, 2016). The applicable service benchmarks require noncompounded prescriptions to be dispensed within 30 minutes and compounded prescriptions within 60 minutes (Mumtaz et al., 2025). These service indicators are also relevant to the quality requirements applied to hospitals cooperating with BPJS Kesehatan. Previous studies have identified waiting time as one of the most frequently reported concerns in outpatient pharmacy services, with prolonged waiting associated with lower patient satisfaction (Sari et al., 2025), although this association has not been consistent across hospital settings (Sinta Maharani et al., 2026). The persistence of prolonged waiting times across different hospital settings indicates the need to examine not only staffing and resources but also how pharmacy workflows are structured, coordinated, and managed.

In cardiac specialty hospitals, the implications of inefficient pharmacy services are particularly important because of the characteristics of the patient population. Cardiovascular disease remains a major health burden in Indonesia, affecting approximately 4.2 million people, while hypertension affects 34.1% of the adult population (Kementerian Kesehatan RI, 2018). Because many cardiovascular conditions require long-term treatment, patients depend on continuous and reliable access to medication and may return to the hospital repeatedly throughout their course of care. Consequently, outpatient pharmacy performance can have a cumulative effect on patients' experiences and continuity of care. For patients who rely on JKN coverage administered by BPJS Kesehatan, repeated delays in medication dispensing may therefore represent more than an isolated inconvenience and may affect the overall efficiency and continuity of outpatient services.

Moreover, the consequences of noncompliance with service requirements in a BPJS-partnered cardiac hospital extend beyond individual patient encounters. BPJS Kesehatan has indicated that hospitals that fail to comply with the terms of their cooperation agreements may be subject to a structured sanctioning process, ranging from warnings to possible termination of the partnership. Service quality indicators are also considered during credentialing and recredentialing processes through which BPJS Kesehatan assesses partner hospitals. For hospitals in which JKN participants constitute a substantial proportion of the outpatient

population, maintaining service quality is therefore important not only for patient experience but also for operational and institutional sustainability.

Previous research has highlighted the importance of spatial organization, administrative processes, and staff feedback in understanding dispensing delays. Yulianto et al. (2024) combined behavior mapping with Value Stream Mapping (VSM) and found that non-value-added activities accounted for 78.5% of the observed outpatient pharmacy process, with prolonged intervals before medication rechecking and inefficient spatial arrangements contributing to delays. Beyond pharmacy-specific investigations, Muna et al. (2023) examined JKN outpatient flow and proposed a future-state design that reduced the estimated waiting time from 99.21 to 58.16 minutes through administrative process improvements. Meanwhile, Leemanza and Kristin (2024) employed a single-group interrupted time-series design and identified significant changes in average waiting times for both compounded and noncompounded prescription services following the introduction of waiting-time targets and patient satisfaction feedback. These findings suggest that pharmacy delays should be investigated across multiple operational dimensions rather than attributed solely to staffing levels (Ibrahim et al., 2022; Tohaga et al., 2025).

Although these studies establish the relevance of Lean and related process-improvement approaches (Sallam, 2024; Wang et al., 2025), they do not explain the specific mechanisms underlying delays at JHC Matraman Hospital. Existing evidence addresses general outpatient administration, pharmacy layout, staff feedback, and dispensing improvements in other hospital settings (Hermawati et al., 2024; Irham & Basabih, 2025; Wahyunengsih & Hartayu, 2025). Its applicability to a cardiac specialty hospital serving JKN participants must therefore be empirically examined rather than assumed. The research gap addressed in this study concerns the absence of an integrated local assessment connecting separate compounded and noncompounded prescription pathways with measured waiting points, waste priorities, and underlying operational causes. Addressing this gap requires more than documenting total waiting time; it requires tracing prescriptions throughout the workflow and integrating time measurements with staff perspectives to determine how information-system queues, workstation handoffs, and task allocation influence service performance.

The urgency of this investigation arises from recurring delays documented in the hospital's internal records and the need to translate monitoring data into practical management decisions. Without identifying the specific stages responsible for excessive waiting, improvement initiatives may address visible symptoms while leaving the principal sources of delay unresolved. In a cardiac specialty hospital, repeated outpatient visits further increase the importance of reliable and efficient medication dispensing. The novelty of this study lies in the contextual integration of separate prescription-pathway mapping, the DOWNTIME waste framework, Pareto prioritization, and root cause analysis using fishbone diagrams and the 5 Whys technique. Rather than proposing a new Lean methodology, the study applies established Lean Healthcare tools (Alogla, 2025; Wang et al., 2024) within an integrated analysis of the hospital's outpatient BPJS pharmacy workflow, linking proposed improvements to documented process problems.

Accordingly, this study aimed to examine the existing dispensing process at JHC Matraman Hospital's outpatient BPJS pharmacy and develop evidence-informed recommendations for business process improvement using a Lean Healthcare approach.

Specifically, it sought to map the existing workflows for compounded and noncompounded prescriptions, measure processing and waiting times, classify value-added and supporting activities, identify and prioritize avoidable waste, and investigate the operational causes of the principal delays. Quantitative observations were integrated with qualitative information obtained through interviews and document review to support interpretation of the measured workflow. The findings provided the basis for developing a future-state Value Stream Map and feasible process-improvement recommendations. The study therefore focused on process diagnosis and improvement design; any estimated improvements represented projected outcomes that would require subsequent implementation and evaluation before being considered demonstrated effects.

The anticipated contribution of this study is a context-specific explanation of how prescription characteristics, information flow, and coordination among pharmacy workstations interact to produce delays in an outpatient pharmacy serving JKN participants at a cardiac specialty hospital. Academically, the study contributes evidence regarding the application of established Lean Healthcare tools to distinct prescription pathways while distinguishing essential clinical activities from avoidable waiting and duplication. Managerially, the findings can support decisions regarding queue management, task allocation, prescription processing, workstation coordination, and stage-level performance monitoring. Patients may benefit from more predictable medication collection if the recommendations are successfully implemented, while pharmacy personnel may benefit from clearer workflows and responsibilities. More broadly, the analytical approach may inform similar hospitals seeking to improve dispensing efficiency, provided that differences in local demand, available resources, and prescription complexity are considered. These benefits remain intended outcomes and should be assessed through subsequent implementation and service evaluation.

METHOD

The study employed a systematic methodological framework to guide data collection, analysis, and interpretation. The research procedures were clearly specified to enhance transparency, consistency, and the credibility of the findings while minimizing potential bias throughout the research process.

Research Design

This research will be based on a mixed method approach, which combines both quantitative and qualitative research methods in order to obtain the root cause of problems and impacts on service delivery. The quantitative approaches will assist in the measuring of the extent to which the system improvements are influencing the performance. Although the qualitative approach is applied to learn more in depth about what users issue, views and recommendation

Mixed methods research is used in used in unison of a twofold method (qualitative and quantitative) to reach a more profound and comprehensive insight into a case. Such a combination of the two approaches will enable the study to not only examine quantifiable relations between the variables but also the meaning behind the numbers, experiences, and context. By combining qualitative and quantitative results, the investigator is able to justify findings by using triangulation, discover insights that otherwise may not be realized using a single approach and, to create deeper interpretations (Castro et al., 2010).

To study the interaction between the current pharmacy dispensing process and the operational efficiency of the outpatient pharmacy unit at JHC Matraman Hospital, outlines of the methods are drawn to gather and provide the analysis of data. The research process starts with defining the business issue where the objective involves identifying the major challenges the pharmacy unit encounters in delivering its services within the time standards required by Permenkes No. 72/2016 and the BPJS cooperation agreement.

That is the next step of the research where the research questions and objectives are to be clearly identified. At this point, one draws certain questions that will be used to evaluate the dispensing process performance, which include the extent to which waste exists in the current process, what the root causes of the excessive waiting time are, and what improvements can be proposed to bring the service within the required standard. The objectives define what the research will set to accomplish, an example being to map the current state of the dispensing process, identify all forms of waste, analyze root causes, and design a Future State VSM as the basis for improvement recommendations.

Data Analysis Method

To analyze the collected data, both quantitative measurement techniques and qualitative interpretive approaches are applied. The analysis follows the five-step Lean Healthcare process described in the conceptual framework in Chapter II: Current State Value Stream Mapping, process classification and efficiency measurement using the formulas outlined in Chapter II, waste identification using the DOWNTIME framework, root cause analysis using the Fishbone Diagram and 5 Whys technique, and Future State VSM and improvement design. The quantitative steps apply the formulas described in Chapter II to measure process performance objectively, while the qualitative steps use thematic methods to interpret the human and contextual factors contributing to the problem.

RESULTS AND DISCUSSION

The chapter will present the obtained research results and a detailed analysis of the findings. This chapter's main goal is to provide a thorough understanding of the research findings in relation to the given research question. The identified results will be subjected to a critical analysis and linked to well-established theories and earlier studies in the same field in an effort to generate new insights and advance understanding in this area of research. The main objective of this entire chapter is to provide a thorough representation and analysis of the research result, allowing for the advancement of science in this particular area of inquiry.

Current State Mapping

Pharmacy Staff Shift and Schedule

The outpatient BPJS pharmacy unit at RS JHC operates in two shifts each working day, consisting of a morning shift and an afternoon shift. This shift arrangement allows the pharmacy unit to provide dispensing services throughout the operating hours while distributing the workload between two groups of staff. The available working time for each shift is presented in Table 1.

Table 1. Pharmacy Staff Shift and Schedule

Shift	Working Days	Time	Work Duration (hrs)	Briefing (min)	Break (min)	Staff on Duty	Available Time (min/day)
Morning	Monday-Saturday	08:00-14:00	7	15	30	5	375
Afternoon	Monday-Saturday	14:00-21:00	7	15	30	5	375

The pharmacy unit operates for seven hours in each shift. However, not all of this time is available for dispensing activities because part of the shift is allocated for a daily briefing and a scheduled break. The briefing is conducted before patient services begin and allows the supervisor and pharmacy staff to discuss operational information, medicine availability, and any issues carried over from the previous shift. These activities support daily operations but do not contribute directly to the dispensing process. After deducting the briefing and break time, each shift provides 375 minutes of available working time.

The pharmacy unit is staffed by four personnel in both the morning and afternoon shifts. During the available working time, staff are responsible for all dispensing activities, including prescription screening, medication preparation, checking, dispensing, and handing medicines to patients. The available working time represents the maximum productive capacity of the pharmacy unit during one shift.

Dispensing Process Route

Based on the observations conducted during the study, prescriptions processed in the outpatient BPJS pharmacy do not move directly from receipt to medicine handover. Instead, each prescription passes through a series of interconnected process stages involving different pharmacy personnel before the medicine can be delivered to the patient. Figure 1 illustrates the overall dispensing process identified during the observations.

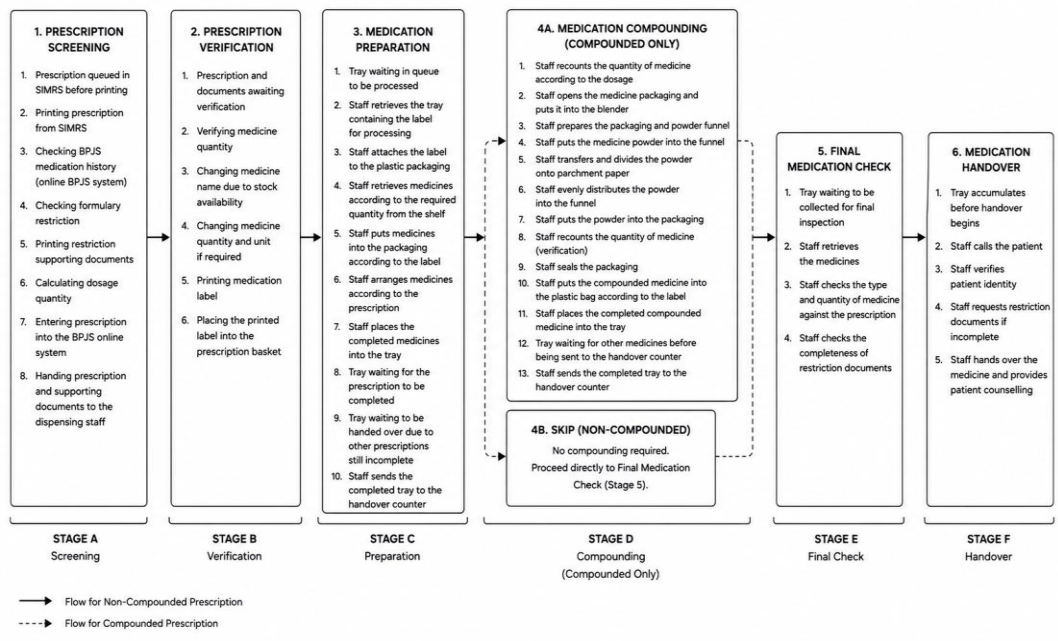


Figure 1. Dispensing Process Flow of the JHC Outpatient BPJS Pharmacy

As shown in Figure 1 both prescription types begin with Prescription Screening, where the prescription is reviewed and BPJS requirements are verified. The process then continues to Prescription Verification, which includes checking the prescribed medicines, making adjustments when necessary, and preparing the prescription for dispensing. Next Medication Preparation & Labeling involves retrieving the medicines, attaching the labels, packaging the medicines, and preparing them for the final verification process. For compounded prescriptions require an additional Medication Compounding process before the final medication check is performed.

Although medication compounding is handled by designated pharmacy staff, the assignment is flexible depending on the daily workload. Based on field observations and interviews with pharmacy staff, non-compounded prescriptions are usually processed first because they represent most of the daily workload. Later in the day usually after 7:00 p.m. or 8:00 p.m. when there are no more non-compounded prescriptions waiting to be processed and most administrative dispensing activities have been completed, staff who were previously assigned to non-compounded prescriptions may assist with medication compounding. This flexible allocation helps the pharmacy unit complete the remaining compounded prescriptions before the end of the shift.

The figure shows that non-compounded prescriptions require a Total Lead Time of 40.4 minutes, while compounded prescriptions require 82.8 minutes. The longer lead time of compounded prescriptions is expected because the process includes an additional Medication Compounding stage that is not present in the non-compounded route.

However, figures 1 and 2 also indicate that the majority of the lead time is not spent on active processing activities. For non-compounded prescriptions, only 8.98 minutes (22.2%) are used for active work, whereas 31.45 minutes (77.8%) are spent on waiting between activities. A similar pattern is observed in compounded prescriptions where only 13.51 minutes (16.3%) are dedicated to processing activities and 69.32 minutes (83.7%) are waiting. In other words, prescriptions spend most of the time waiting to be rather than being actively worked on.

Another finding is the relatively small proportion of Value-Added time in both processes. Only 4.35 minutes (10.8%) of the non-compounded process and 8.08 minutes (9.8%) of the compounded process are spent on activities that directly prepare medicines for patients. The remaining time is spent on waiting and supporting activities that are necessary for the process but do not directly add value to the patient.

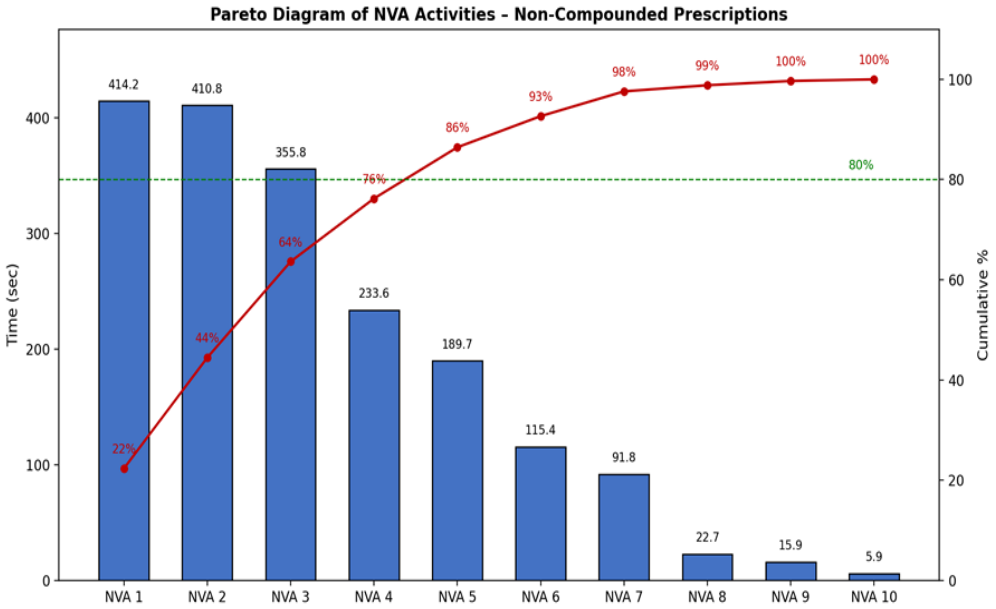


Figure 2. Pareto Analysis of Non-Value-Added Activities in Non-Compounded Prescription Dispensing

Based on Figure 2, the NVA activities that contribute most to non-compounded prescriptions are tray awaiting its turn to be processed (NVA 1) and prescription queued in SIMRS before printing (NVA 2), with a cumulative value of 44.45%. Adding trays accumulating before Handover (NVA 3) raises the cumulative value to 63.62%, and adding tray awaiting the prescription to be completed (NVA 4) raises it further to 76.21%, close to the 80% line commonly used to identify the vital few causes. The remaining six activities together contribute less than 24% of total NVA time. So, lean intervention for non-compounded prescriptions should be focused on these first four activities, since fixing them would remove more than three-quarters of all NVA time in this route.

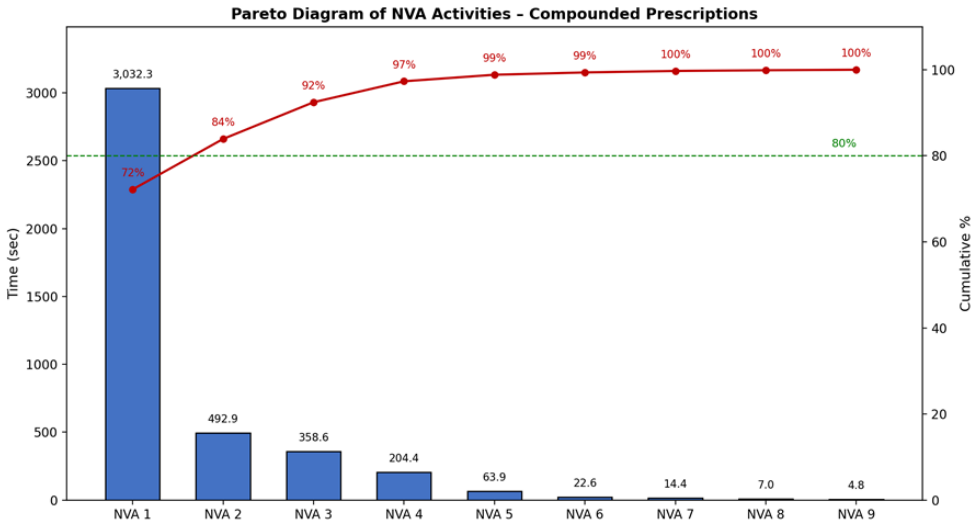


Figure 3. Pareto Analysis of NVA Activities – Compounded Prescriptions

Based on Figure 3, prescription queued in SIMRS before printing (NVA 1) alone contributes 72.18% of NVA time for compounded prescriptions, already well past the 80% line on its own once the second activity is added. Adding a tray awaiting other medicines before delivery (NVA 2) raises the cumulative value to 83.91%. This is a sharper concentration than

in the non-compounded route, where four activities were needed to reach a similar cumulative value. The remaining seven activities together contribute only 16.1% of total NVA time. So, lean intervention for compounded prescriptions can be focused mainly on these two activities, since almost every improvement effort spent elsewhere would address only a small share of total waste.

Root cause analysis

Based on the observations, interviews, Value Stream Mapping (VSM), and waste analysis conducted in the outpatient BPJS pharmacy unit, several Non-Value-Added (NVA) activities were identified as major contributors to prolonged prescription lead time. The largest source of waste was associated with waiting activities, particularly when prescriptions remained queued in SIMRS before being printed and when completed medicines waited to be collected for Final Medication Check. Additional NVA activities were also observed in the form of prescription baskets waiting between workstations, unnecessary physical movements related to handling prescription baskets and labels, and administrative activities such as printing documents that already existed in digital form.

Therefore, a more detailed investigation is required to identify the factors contributing to prolonged waiting time and queue accumulation throughout the pharmacy process. To systematically identify and validate these underlying causes, root cause analysis was conducted using a combination of the Fishbone Diagram (Ishikawa Diagram) and the 5 Whys technique (Kumah et al., 2024).

Fishbone Analysis

The previous analyses indicate that waiting is the dominant source of waste in the outpatient BPJS pharmacy process. However, the waiting activities are not concentrated at a single point in the process. Instead, the current-state VSM shows that delays occur at several stages of the prescription flow, suggesting that different operational factors may contribute to different forms of queue accumulation. Therefore, each major waiting point identified in the VSM was investigated separately using the Fishbone Diagram to systematically identify the potential factors contributing to process interruptions and prolonged lead time.

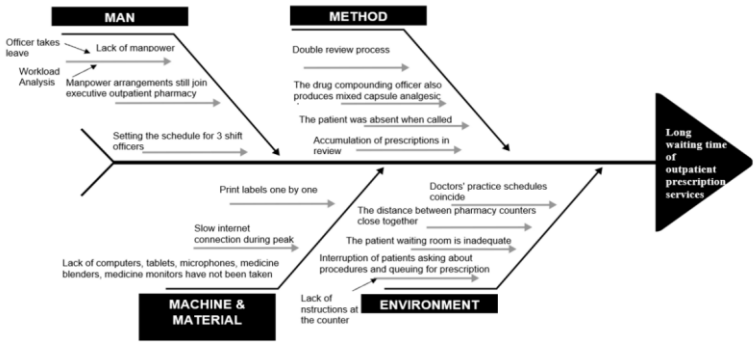


Figure 4. Fishbone Diagram of Factors Contributing to Prolonged Waiting Times in Outpatient Prescription Services

CONCLUSION

This study identified waiting between dispensing stages as the principal source of inefficiency in the outpatient BPJS pharmacy at JHC Matraman Hospital. Current-state Value Stream Mapping (VSM) showed total lead times of approximately 40.4 minutes for noncompounded prescriptions and 82.8 minutes for compounded prescriptions, exceeding the respective benchmarks of 30 and 60 minutes. Waiting time accounted for 77.8% and 83.7% of the total lead time, whereas value-added activities accounted for only 10.8% and 9.8%, respectively. Pareto analysis identified prescription queues within the hospital information system and delays between workstations as priority areas for improvement. These findings indicate that improving prescription flow and coordination across dispensing stages represents an important strategy for reducing service delays. Lean Healthcare provided a structured framework for identifying waste and developing targeted process-improvement recommendations; however, the effectiveness of the proposed improvements remains to be established through subsequent implementation and evaluation.

Future research should implement and evaluate the proposed workflow improvements using a prospective design, such as an interrupted time-series study, while analyzing compounded and noncompounded prescription pathways separately. The evaluation should assess total lead time, stage-specific waiting times, compliance with service benchmarks, workload distribution, dispensing errors, and patient satisfaction to determine whether improvements in efficiency can be sustained without compromising medication safety. Future analyses should also account for prescription complexity, patient arrival patterns, staffing availability, and hospital information system performance. Extending the investigation to other cardiac specialty hospitals and BPJS-partnered facilities would help determine the transferability of the proposed recommendations. Longer-term follow-up could further evaluate their operational feasibility, resource requirements, and sustainability.

REFERENCES

Alogla, A. (2025). Revisiting lean healthcare: Adopting value stream mapping from manufacturing. *Frontiers in Health Services, 5*, Article 1613756. https://doi.org/10.3389/frhs.2025.1613756

Castro, F. G., Kellison, J. G., Boyd, S. J., & Kopak, A. (2010). A methodology for conducting integrative mixed methods research and data analyses. *Journal of Mixed Methods Research, 4*(4), 342–360. https://doi.org/10.1177/1558689810382916

Hermawati, A. K., Kristin, E., & Firman. (2024). The impact of lean management implementation on inpatient discharge prescription services at Pertamina Central Hospital. *Jurnal Kesehatan Masyarakat Indonesia, 19*(3), 25–31.

Ibrahim, N. H., Mafauzy, N. M., Ismail, W. N. A. W., & Rusli, S. S. M. (2022). Factors affecting waiting time in outpatient pharmacy at Hospital Raja Perempuan Zainab II (HRPZ II). *Journal of Pharmacy, 2*(1).

Irham, H., & Basabih, M. (2025). Effect of establishing a separate outpatient pharmacy counter on reducing waiting time in Mayapada Hospital. *Jurnal ARSI: Administrasi Rumah Sakit Indonesia, 11*(3), Article 1. https://doi.org/10.7454/arsi.v11i3.1218

Kartika, R. (2025). Determinants of National Health Insurance (JKN) coverage in Indonesia: Evidence from the 2023 health profile. *JMMR (Jurnal Medicoeticolegal dan Manajemen Rumah Sakit), 14*(3), 365–381. https://doi.org/10.18196/jmmr.v14i3.614

Kementerian Kesehatan RI. (2016). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 72 Tahun 2016 tentang Standar Pelayanan Kefarmasian di Rumah Sakit*. Kementerian Kesehatan Republik Indonesia.

Kementerian Kesehatan RI. (2018). *Hasil utama Riskesdas 2018*. Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia.

Kumah, A., Nwogu, C. N., Issah, A.-R., Obot, E., Kanamitie, D. T., Sifa, J. S., & Aidoo, L. A. (2024). Cause-and-effect (fishbone) diagram: A tool for generating and organizing quality improvement ideas. *Global Journal on Quality and Safety in Healthcare, 7*(2), 85–87. https://doi.org/10.36401/JQSH-23-42

Leemanza, Y., & Kristin, E. (2024). Effectiveness of wait time targets and patient satisfaction feedback in decreasing wait times for prescription services in an outpatient pharmacy. *Canadian Journal of Hospital Pharmacy, 77*(1), Article e3438. https://doi.org/10.4212/cjhp.3438

Mumtaz, A. R. F., Annisaa', E., & Dini, I. R. E. (2025). Waktu tunggu pelayanan resep obat dan faktor yang memengaruhi di Instalasi Farmasi Rawat Jalan Rumah Sakit Nasional Diponegoro. *Generics: Journal of Research in Pharmacy, 5*(1), 63–73.

Muna, N., Saputra, M. G., Ummah, F., Rahmawati, N. V., Kusdiyana, A., & Nuriyati, N. (2023). Implementation of lean healthcare for reducing national health insurance outpatient waiting time using value stream mapping method. *Jurnal Manajemen Kesehatan Indonesia, 11*(2), 143–154. https://doi.org/10.14710/jmki.11.2.2023.143-154

Rahmawati, T., & Hsieh, H.-M. (2024). Appraisal of universal health insurance and maternal health services utilization: Pre- and post-context of the Jaminan Kesehatan Nasional implementation in Indonesia. *Frontiers in Public Health, 12*, Article 1301421. https://doi.org/10.3389/fpubh.2024.1301421

Sallam, M. (2024). Enhancing hospital pharmacy operations through lean and six sigma strategies: A systematic review. *Cureus, 16*(3), Article e57176. https://doi.org/10.7759/cureus.57176

Sari, N., Theo, D., & Sari, M. (2025). The effect of service quality on BPJS patient satisfaction in the outpatient installation at RSU Sinar Husni Medan. *Journal of Health Management, Administration and Public Health Policies, 3*(2), 88–99. https://doi.org/10.52060/healthmaps.v3i2.3655

Sinta Maharani, N. G. A. M., Suci, R. P., Faida, E. W., Hermawati, A., & Survival, S. (2026). Analysis of the effects of waiting time for medication dispensing and service quality on patient loyalty with patient satisfaction as a mediator at the Pharmacy Department of Sanjiwani General Hospital Gianyar. *Journal of World Future Medicine, Health and Nursing, 4*(3), 257–267. https://doi.org/10.70177/health.v4i3.3915

Tohaga, E., Arini, M., & Widiatmoko, D. (2025). Effectiveness of lean management to reduce waiting time for medicines at hospital outpatient pharmacy. *JMMR (Jurnal Medicoeticolegal dan Manajemen Rumah Sakit), 14*(3), 310–321. https://doi.org/10.18196/jmmr.v14i3.560

Wahyunengsih, C. T., & Hartayu, T. S. (2025). Reducing dispensing time by applying the lean hospital approach in the outpatient pharmacy department of SMC Telogorejo Hospital in Semarang Indonesia. *Jurnal Farmasi Sains dan Komunitas, 22*(2), 329–335. https://doi.org/10.24071/jpsc.0010115

Wang, J., Lv, H., Jiang, H., & Ren, W. (2024). A systematic review of lean practice in healthcare settings. *Journal of Infrastructure, Policy and Development, 8*(9), Article 7868. https://doi.org/10.24294/jipd.v8i9.7868

Wang, J., Lv, H., Chen, M., Liu, C., Ren, W., Jiang, H., & Zhang, L. (2025). A systematic review of lean implementation in hospitals: Impact on efficiency, quality, cost, and

satisfaction. *International Journal of Health Policy and Management, 14*(1), 1–17. https://doi.org/10.34172/ijhpm.8974

Yulianto, W., Zuhriyah, L., & Haripradiantoi, T. (2024). Behavior mapping study of the layout of drug service room in outpatient pharmacy of X Hospital. *JMMR (Jurnal Medicoeticolegal dan Manajemen Rumah Sakit), 13*(2), 199–210. https://doi.org/10.18196/jmmr.v13i2.145