

Research Article

Applying Lean Hospital Strategies to Minimise Waiting Times in the Internal Medicine Clinic

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Abstract: Prolonged outpatient waiting time remains a major challenge in public hospitals and reflects inefficiencies in service process management. Internal medicine clinics are characterised by high service complexity and patient volume, making them particularly vulnerable to process waste that contributes to extended waiting times. Objective: This study aimed to develop an outpatient service flow model based on the Lean Hospital approach to reduce waiting time in the internal medicine clinic of RSUD Balaraja. Methods: A qualitative case study design was employed. Data were collected through direct observation of outpatient service processes, document review, and Focus Group Discussions (FGD) with relevant stakeholders. Process analysis was conducted using Value Stream Mapping (VSM) to identify value-added and non-value-added activities, while Fishbone Diagram analysis was applied to explore the root causes of process inefficiencies. All findings were integrated to develop a future-state outpatient service flow model. Results: The findings indicate that prolonged outpatient waiting time is primarily influenced by inefficient service flow design, repetitive administrative processes, and weak coordination among service units. The proposed service flow model demonstrates a more streamlined, integrated, and patient-centred process, with potential reductions in waiting time through systematic waste elimination and process improvement. Conclusion: The Lean Hospital approach provides an effective framework for developing outpatient service flow models in public hospitals. The proposed model offers a practical basis for improving outpatient service efficiency in complex clinical settings such as internal medicine clinics.

Keywords: Lean Hospital; Process Improvement; Public Hospital; Service Flow; Waiting Time.

1. Introduction

Outpatient services are a fundamental component of hospital healthcare systems, as they represent the initial and most frequently accessed point of contact for patients. The quality and efficiency of outpatient services play a crucial role in shaping patient perceptions and overall hospital performance. In public hospitals, particularly class B hospitals, outpatient services are strategically important due to the high volume of patient visits, most of whom are covered by the National Health Insurance (JKN). However, increased access following JKN implementation has not always been accompanied by adequate system readiness, resulting in issues such as overcrowding and prolonged waiting times.

Waiting time problems cannot be attributed solely to high patient volumes but are also linked to mismatches between service structure, processes, and patient needs. From a healthcare quality perspective, such misalignment directly affects service outcomes, including efficiency and waiting times (Donabedian, 2002). Furthermore, queuing theory suggests that prolonged waiting times arise from imbalances between patient arrival rates and service capacity, variability in workflow, and suboptimal scheduling systems (Hall et al., 2013). These conditions indicate that waiting time is a systemic issue related to service design and process management.

Received: January 27, 2026

Revised: February 28, 2026

Accepted: March 31, 2026

Published: April 30, 2026

Curr. Ver.: April 30, 2026



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Previous studies have shown that long waiting times are often associated with process inefficiencies, including non-value-added activities, repetitive administrative procedures, and suboptimal inter-unit coordination (Toussaint & Berry, 2013). In addition, mismatches between service schedules and resource availability, as well as the complexity of patient pathways, contribute significantly to bottlenecks in outpatient services (Hall et al., 2013; Marynissen & Demeulemeester, 2019). These findings are consistent with studies in Indonesia, which emphasize that waiting time issues are not only due to limited resources but also to poorly designed service processes (Pohan, 2019; Wijono, 2000).

RSUD Balaraja, a public referral hospital in Tangerang Regency, faces these challenges, particularly in the Internal Medicine Outpatient Clinic, which has a high patient load and serves patients with chronic and comorbid conditions. The complexity of care requires multiple interconnected administrative, clinical, and diagnostic processes. Inefficiencies in any stage can lead to accumulated delays and extended waiting times. Existing improvement efforts tend to be partial and operational, such as adjusting physician schedules or adding staff, which often fail to address root causes and ensure sustainable improvements (Radnor et al., 2012).

Therefore, a comprehensive approach is needed through the Lean Hospital framework, which emphasizes process improvement and waste reduction from a patient-centered perspective. This approach utilizes Value Stream Mapping (VSM) to visualize end-to-end service processes and identify value-added activities (Jimmerson, 2007; Rother et al., 2003). Root cause analysis is further conducted using Fishbone Diagram to systematically identify contributing factors (Ishikawa, 1985), while Focus Group Discussion (FGD) is employed to develop context-appropriate solutions collaboratively. This study aims to develop a Lean-based outpatient service model that is efficient, patient-centered, and sustainable (Graban, 2018; Womack & Jones, 1997).

2. Literature Review

Waiting Time for Outpatient Services

Outpatient waiting time is a key indicator in assessing healthcare service performance and quality, particularly in outpatient settings characterized by high patient volumes and complex service flows. In Indonesia, outpatient waiting time is regulated as a performance indicator with a standard of ≤ 60 minutes, as stated in the Decree of the Minister of Health No. 129/Menkes/SK/II/2008 on Minimum Service Standards for Hospitals. Waiting time is generally defined as the duration from when a patient enters the service system until receiving medical care, typically measured from the completion of administrative registration to the start of physician examination. It reflects service efficiency and the hospital's ability to manage patient flow and service capacity effectively (Green, 2006; Hall et al., 2013; WHO, 2016).

From a theoretical perspective, waiting time is explained through queuing theory, introduced by Agner Krarup Erlang, which conceptualizes healthcare services as systems influenced by arrival patterns, service capacity, service mechanisms, and queue discipline. Imbalances between patient demand and service capacity result in queues and prolonged waiting times (Green, 2006; Hall et al., 2013). Additionally, within Donabedian's quality framework, waiting time is categorized as a process indicator, reflecting how care is delivered and experienced by patients. Prolonged waiting times indicate inefficiencies in service processes that may negatively affect outcomes such as patient satisfaction and perceived quality (Donabedian, 1988; Pohan, 2019; WHO, 2016).

Waiting time in outpatient services is influenced by multiple interconnected factors within the healthcare system. Key determinants include physician scheduling, human resources, service systems and workflows, and supporting infrastructure. Ineffective physician scheduling, mismatches between patient arrival patterns and service availability, and delays in physician attendance can increase service variability and waiting times (Green, 2006; Hall et al., 2013; Naiker et al., 2018). Similarly, insufficient or poorly distributed human resources, along with weak coordination and non-compliance with standard procedures, can disrupt service flow and reduce efficiency (Pohan, 2019; Vanberkel et al., 2011).

In addition, complex and fragmented service processes, inadequate facilities, and patient characteristics further contribute to prolonged waiting times. Inefficient workflows, repeated procedures, and poor inter-unit coordination create bottlenecks in service delivery (Hall et al., 2013; Wijono, 2000). Physical layout and service environment also affect movement efficiency and interaction within the system (Bitner, 1992). Moreover, variability in patient conditions,

case complexity, and uneven arrival patterns significantly influence service duration and queue formation (Green, 2006; Hall et al., 2013). From a Lean Healthcare perspective, waiting time is considered a form of waste that does not add value to patients and should be minimized through systematic process improvement and better alignment between demand and service capacity (Graban, 2018).

Lean Hospital

The concept of Lean originated from early industrial practices introduced by Henry Ford in 1913 through flow production, which emphasized standardization and efficiency in manufacturing processes. This approach was later refined by Kiichiro Toyoda and Taichi Ohno into the Toyota Production System (TPS), which integrated efficiency with flexibility to meet varying customer demands. TPS introduced key principles such as waste reduction, continuous flow, and built-in quality, forming the foundation of modern Lean management (Liker, 2020; Womack & Jones, 1997). Over time, Lean evolved from a set of operational techniques into a comprehensive management philosophy known as the Toyota Way, emphasizing continuous improvement (kaizen), long-term thinking, and organizational learning (Graban, 2018).

Lean has since expanded beyond manufacturing into service industries, including healthcare, leading to the development of Lean Hospital. In this context, Lean is defined as a management approach that focuses on creating value for patients by eliminating waste, improving process efficiency, and enhancing service quality and safety (Graban, 2018; Lawal et al., 2014). Lean in healthcare emphasizes understanding value from the patient's perspective, streamlining service processes, and engaging healthcare workers in continuous improvement. It is not merely the application of tools but a systemic transformation that integrates culture, leadership, and daily practices to improve patient-centered care.

The core principles of Lean, as formulated by Womack & Jones (1997), include defining value, mapping the value stream, ensuring continuous flow, implementing a pull system, and pursuing perfection through continuous improvement. In healthcare settings, these principles are adapted to focus on patient value, integrated care pathways, smooth service flow, demand-driven services, and sustainable quality improvement (Graban, 2018). A central concept in Lean is waste (*muda*), which refers to any activity that consumes resources without adding value to the patient. This is complemented by the concepts of *mura* (unevenness) and *muri* (overburden), which together describe systemic inefficiencies. Common types of waste in healthcare include waiting time, unnecessary movement, overprocessing, defects, and underutilization of staff potential.

To implement Lean in hospitals, various tools are used to analyze and improve service processes. Key tools include Value Stream Mapping (VSM), which visualizes end-to-end patient flow and identifies value-added and non-value-added activities (Rother et al., 2003); Kanban systems for managing workflow and inventory; 5S for workplace organization; Visual Management for transparent communication; Standard Work for process consistency; and Kaizen for continuous, incremental improvement. These tools support hospitals in reducing waiting times, improving coordination, and enhancing overall service efficiency. Therefore, Lean Hospital provides a comprehensive framework for improving outpatient services by addressing process inefficiencies and fostering a culture of continuous improvement.

Lean Hospital Approach to Service Flow Improvement

Lean Hospital is used in this study as an analytical framework to comprehensively examine outpatient service processes, particularly in relation to patient waiting time. Developed by Mark Graban, Lean Hospital views healthcare delivery as an interconnected set of processes in which every activity should create value for patients. Activities that do not add value are considered waste and must be systematically identified and reduced. In outpatient services, this approach emphasizes patient-centered care, where long waiting times are seen as a primary form of waste reflecting inefficiencies in service flow, imbalances in capacity, and weak inter-unit coordination.

As an analytical approach, Lean Hospital utilizes tools such as Value Stream Mapping to map end-to-end service activities and distinguish between value-added and non-value-added processes. This enables the identification of bottlenecks, redundant steps, idle time, and misalignment between physician scheduling, human resources, and supporting facilities. Furthermore, Lean emphasizes process flow and continuous improvement, allowing not only the analysis of current conditions (current state) but also the design of improved processes (future state) that are more efficient, integrated, and patient-focused. Through this framework, the study provides a systemic and practical basis for reducing waiting times while maintaining service quality and patient safety.

Value Stream Mapping, Fishbone Diagram, and Focus Group Discussion

Value Stream Mapping (VSM) is a core Lean tool used to visualise end-to-end service flow and identify value-added and non-value-added activities in outpatient care. Mapping the current state enables identification of time waste and process barriers that contribute to extended waiting times.

However, service flow mapping alone is insufficient to explain the causes of inefficiency. Root cause analysis is required to explore factors affecting process performance. Fishbone Diagram analysis is used to identify causes across multiple dimensions, including human resources, work methods, facilities, and support systems, enabling a more comprehensive understanding of service problems.

In healthcare environments involving multiple professions and service units, Focus Group Discussion (FGD) serves as a mechanism for validating and deepening process analysis findings. Through FGD, mapped processes and identified root causes are discussed with stakeholders to develop realistic and context-appropriate improvement alternatives.

Previous studies have demonstrated the potential of Lean Hospital to improve outpatient service efficiency. However, many studies focus on performance evaluation or partial application of Lean tools. Accordingly, this study focuses on developing a Lean-based outpatient service flow model through the integration of process mapping, root cause analysis, and participatory discussion in the context of a secondary-level public hospital internal medicine clinic.

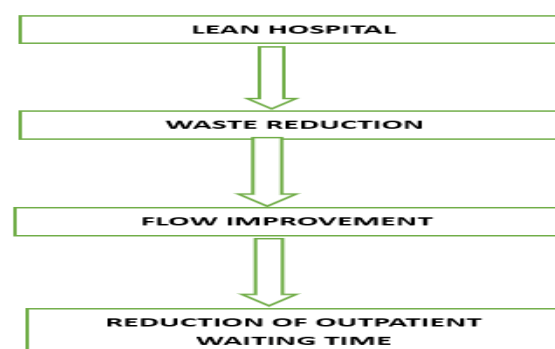


Figure 1. Research Framework

3. Methode

This study employs a descriptive qualitative design with a service process analysis approach to gain an in-depth understanding of outpatient service flow, identify waste, and develop an improved service process model based on real conditions. The Lean Hospital framework is used as the main analytical lens, focusing on process mapping and root cause analysis rather than full-scale implementation. The research was conducted in November 2025 at the Internal Medicine Outpatient Clinic of RSUD Balaraja, selected due to its high patient volume and service complexity. The study involved purposively selected participants, including patients, specialist physicians, nurses, registration staff, and hospital management, all of whom are directly involved in the outpatient service process.

Data consisted of qualitative information (observations, interviews, and Focus Group Discussions) and supporting quantitative descriptive data (service and waiting times). Data were collected through direct observation, time measurement from SEP issuance to physician consultation, in-depth interviews, and FGD for validation and consensus building. Analysis was conducted in stages, including descriptive analysis of service flow, process mapping using Value Stream Mapping (current state), root cause analysis using Fishbone Diagram, thematic analysis of interview and FGD data, and development of a future state service model. Data validity was ensured through triangulation of sources and methods, member checking, and maintaining an audit trail to enhance the credibility and reliability of the findings.

4. Results and Discussion

General Description of Research Respondents

The study involved two groups of respondents: outpatients from the Internal Medicine Clinic and healthcare personnel directly engaged in service delivery. Patient respondents included all individuals who completed the full outpatient process from registration to physician consultation during November 1–30, 2025. The patients were predominantly aged 18–82 years (mean 51 years), mostly female (60%), with a majority having secondary-level education and being unemployed, homemakers, informal workers, or retirees. Most patients were BPJS participants with chronic conditions requiring regular monthly visits. Peak arrival times occurred between 07:30–10:00, leading to congestion in registration and initial screening stages. Nearly all patients followed a similar service pathway: registration, BPJS verification, nurse screening, waiting for the physician, consultation, and prescription collection, with some requiring additional diagnostic services. These characteristics highlight repeated exposure to service processes and provide a strong basis for analyzing process variation and waste within the value stream.

Healthcare respondents included key managerial and clinical staff such as the Head of Insurance Unit, Head of Outpatient Installation, Head of Internal Medicine Specialist Group, specialist physicians (1–13 years of experience), nurses (7–14 years of experience), and a senior head nurse. Overall, the findings indicate that outpatient services are characterized by high patient volumes, particularly during morning peak hours, and substantial workload demands on healthcare staff. The combination of frequent patient visits, uneven arrival patterns, and limited human resources creates a complex service environment. These respondent characteristics provide an empirical foundation for analyzing service flow, identifying inefficiencies (waste), and developing a more effective and sustainable outpatient service model at the Internal Medicine Clinic of RSUD Balaraja.

Current-State Outpatient Service Flow

Observation results indicate that outpatient service flow in the internal medicine clinic of RSUD Balaraja consists of multiple interdependent stages, including registration, administrative processing, nursing services, and physician consultation.

The current-state service flow is not fully linear or integrated, resulting in prolonged waiting times at several service points.

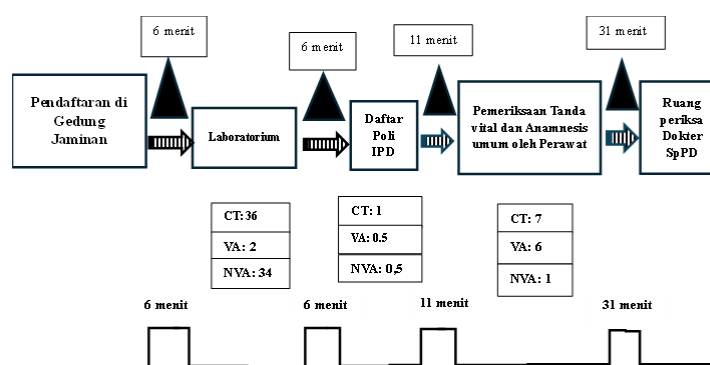


Figure 2. Current-State Outpatient Service Flow in the Internal Medicine Clinic

In the current situation, patient waiting times occur not only before the doctor's examination, but also during administrative stages and transitions between service units. Patient transfers between service stages are often accompanied by non-value-added waiting times, which cumulatively extend the total outpatient care time.

Identifying Waste in Service Flow

Value Stream Mapping revealed several non-value-added activities contributing to outpatient service inefficiency. Dominant forms of waste included waiting time, repetitive administrative processes, and misalignment between resource readiness and patient arrival patterns.

Root Cause Analysis

Fishbone Diagram analysis shows that prolonged outpatient waiting time is influenced by interrelated factors. From a human resource perspective, uneven workload distribution and staff availability contribute to service delays. From a methodological perspective, suboptimal standardisation and repeated processes extend service duration.

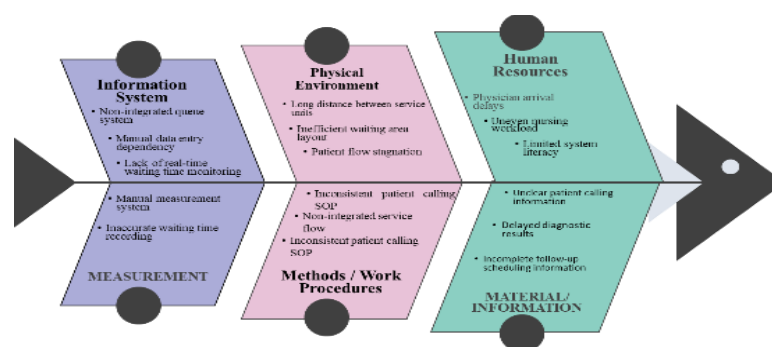


Figure 3. Fishbone Diagram of Factors Contributing to Prolonged Outpatient Waiting Time

Focus Group Discussion (FGD)

The Focus Group Discussion (FGD) was conducted to explore in depth the various forms of waste and problems occurring in outpatient services at the Internal Medicine Clinic of RSUD Balaraja, while also validating the findings from observations and the current state Value Stream Mapping (VSM). The participants consisted of healthcare workers and hospital management directly involved in the service process, including specialist doctors, nurses, registration staff, and relevant unit leaders. The discussion was carried out interactively using a semi-structured guide, allowing participants to share their experiences and perspectives regarding factors contributing to prolonged patient waiting times.

The FGD results on the current service flow revealed several key issues, including delays in the start of doctor consultations due to inpatient rounds, patient congestion during morning peak hours, and irregular patient calling systems caused by limitations in the queue management system. These conditions led to stagnation in patient flow, particularly in waiting areas, resulting in prolonged waiting times before examination. The findings indicate that inefficiencies arise not from a single point but from multiple interconnected bottlenecks within the service process.

Based on the fishbone analysis, the contributing factors were categorized into several aspects. In terms of human resources, issues included a shortage of nurses, limited proficiency in using service applications, and delays in doctor attendance. From the material and information perspective, delays in diagnostic test results and suboptimal queue information systems were identified. Physical environment factors included long distances between service units and waiting room designs that hindered smooth patient flow. Additionally, from the method and system perspective, inconsistent implementation of standard operating procedures, the use of two non-integrated applications, and reliance on manual input affected the accuracy of waiting time measurements.

Overall, the FGD findings demonstrate that prolonged waiting times are the result of multiple interrelated factors rather than a single cause. Therefore, a comprehensive and integrated improvement approach is required through redesigning the service flow. These findings serve as the basis for developing the future state Value Stream Mapping (VSM), which is expected to reduce non-value-added activities, improve process flow, and sustainably decrease patient waiting times.

Value Stream Mapping (VSM) After Model Development (Future State)

The Value Stream Mapping (VSM) future state was developed based on identified issues from the current state VSM, Fishbone Diagram analysis, and findings from the Focus Group Discussion (FGD). This future state illustrates the redesigned outpatient service flow at the Internal Medicine Clinic of RSUD Balaraja after process improvements. The service begins with patient registration at the insurance building, followed by a transfer time of approximately 6 minutes to the clinic registration area. In the improved model, patients are no longer required to undergo supporting examinations within the same outpatient flow, simplifying the overall process.

Subsequently, clinic registration has a cycle time of 1 minute (0.5 minutes value-added and 0.5 minutes non-value-added), followed by initial assessment by nurses, which takes 7 minutes (6 minutes value-added and 1 minute non-value-added). Afterward, patients wait to be called into the specialist consultation room, with a recorded waiting time of 31 minutes.

The waiting time measurement ends once the patient enters the doctor's examination room. Overall, the future state VSM reflects a more streamlined and linear process consisting of insurance registration, clinic registration, nurse assessment, and specialist consultation, aimed at improving efficiency and reducing waiting time.

Discussion

This chapter discusses the meaning and implications of the research findings based on Value Stream Mapping (VSM), Fishbone Diagram analysis, and Focus Group Discussion (FGD). These three approaches are integrated to comprehensively understand the dynamics of outpatient service flow and the factors influencing patient waiting time in the Internal Medicine Polyclinic of RSUD Balaraja. The analysis goes beyond time duration and emphasizes the interaction among components within the healthcare service system, in line with the system-based approach to healthcare quality that highlights the relationship between structure, process, and outcomes (Donabedian, 2002).

The VSM results indicate that prolonged waiting time is primarily driven by the dominance of non-value-added activities such as waiting, transportation, and process delays rather than the duration of clinical services themselves. In the current state, the service flow is fragmented and non-linear, mainly due to supporting examinations being conducted *באמצעות* the service process, which interrupts the flow and extends waiting time. This finding is consistent with Lean Healthcare principles, which emphasize that waste in the form of waiting and unnecessary movement arises from poorly designed processes that lack continuous flow (Graban, 2018; Rother et al., 2003).

The development of the VSM future state focuses on simplifying and restructuring the service flow into a more linear and continuous process without adding resources. Key improvements include eliminating process interruptions, reducing waiting points, and enhancing the stability of patient flow. This approach demonstrates that process redesign is more effective than merely increasing service capacity, as highlighted in Lean literature, which prioritizes flow improvement and waste elimination as core strategies for enhancing efficiency (Toussaint & Berry, 2013).

The Fishbone Diagram analysis reveals that waiting time is the result of interactions among multiple systemic factors, including human resources, work methods, information systems, physical environment, information flow, and performance measurement mechanisms. These factors collectively contribute to process variability and instability in service flow, ultimately leading to accumulated waiting time. From a Lean perspective, process variation is a major source of inefficiency because it disrupts standardization and continuous flow (Graban, 2018; Womack & Jones, 1997).

The FGD findings further support the VSM and Fishbone results by providing insights into actual operational conditions. Issues such as physician delays, high nursing workload, improper use of queue management systems, limited facilities, and unclear service information were identified as significant contributors to prolonged waiting time. These findings are consistent with previous studies indicating that operational and behavioral factors play a critical role in determining outpatient service performance (Giovanis et al., 2018).

The integration of these three approaches confirms that outpatient waiting time is a systemic issue that cannot be addressed through partial or isolated interventions. Therefore, improvement efforts should focus on comprehensive process redesign, control of major sources of waste, and enhancement of consistency and accuracy in service delivery. This aligns with Lean philosophy, which emphasizes holistic, data-driven, and continuous process improvement (Graban, 2018; Womack & Jones, 1997).

The VSM future state demonstrates the potential to reduce waiting time from approximately 98 minutes to less than 60 minutes by eliminating major sources of waste, such as mid-process supporting examinations, waiting before physician consultation, and unnecessary patient movement between service units. This estimation reflects the conceptual impact of process improvement rather than actual implementation outcomes, consistent with Lean studies that use process simulations to project performance improvements prior to full implementation.

The implementation strategy is structured into three phases: short-term, medium-term, and long-term. Short-term strategies focus on quick improvements such as staff training and enforcement of standard operating procedures (SOPs), medium-term strategies emphasize system strengthening and workload redistribution, while long-term strategies involve system integration, workforce planning, and the development of a continuous improvement culture. This phased approach ensures that improvements are effective, feasible, and sustainable,

while supporting the transformation toward a more efficient, patient-centered healthcare service system (Grabau, 2018; Lawal et al., 2014).

5. Conclusions

This study aimed to analyze the outpatient service process at the Internal Medicine Polyclinic of RSUD Balaraja in relation to patient waiting time and to develop a process improvement model based on the Lean Hospital approach. The Value Stream Mapping (VSM) current state revealed that the total waiting time from patient registration (SEP issuance) to entering the doctor's examination room reached 98 minutes, with the majority of time spent on non-value-added activities such as waiting and unnecessary movement between service units. This finding indicates that the existing service process is inefficient, fragmented, and not yet aligned with a continuous patient flow.

Further analysis using Fishbone Diagram and Focus Group Discussion (FGD) showed that prolonged waiting time is not merely caused by high patient volume, but is primarily influenced by systemic inefficiencies and variations in service delivery. Contributing factors include human resources, work procedures, information systems, and discipline in service implementation, all of which interact to disrupt the continuity of service flow. These findings confirm that outpatient waiting time is a multidimensional and systemic issue that requires an integrated improvement approach rather than isolated interventions.

Based on the synthesis of VSM, Fishbone, and FGD findings, this study developed a Lean-based outpatient service model focused on eliminating non-value-added activities, simplifying service flow, reducing process interruptions, and optimizing existing resources. The conceptual simulation of the VSM future state indicates that the model has the potential to reduce waiting time significantly from 98 minutes to less than 60 minutes. Overall, the study concludes that a Lean Hospital-based process redesign, grounded in empirical data and actual operational conditions, is a strategic and sustainable approach to improving service efficiency and reducing outpatient waiting time.

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