

Analysis of Waiting Time for Patient Service Using Lean Concept in Outstanding Installations Stella Maris Hospital

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Abstract. Hospitals worldwide are increasingly concerned about the performance of outpatient services, which contribute significantly to their revenue and are projected to surpass inpatient services in importance. As the demand for medical care continues to grow, outpatient services could generate even greater financial returns for hospitals. This study aims to evaluate patient service wait times at Stella Maris Hospital Makassar's outpatient department using the lean methodology. A mixed-methods approach was employed, involving the measurement of wait times for 100 patients and interviews with eight informants, including the head of the outpatient department (1 person), admission officers (3 individuals), the hospital director (1 person), and nurses (3 individuals). The interview data were analyzed through processes of data reduction, visualization, and conclusion formulation. A patient care process flowchart was created to assess data quality. Findings indicate the absence of an integrated hospital information system (SIMRS), leading to issues such as long queues at the pick-up counter, delays in doctor availability, and inefficiencies in order processing. Recommendations include integrating SIMRS across the hospital, implementing system improvements, and quantifying outcomes for effective decision-making.

Keywords : Lean Hospital, Outpatient, Patient Service, Waiting Time

1. INTRODUCTION

Minimum Service Standards (SPM) include quality indicators such as the waiting time for patient care, which must meet a minimum threshold of 60 minutes for outpatient services, as stipulated in Kepmenkes No. 129 of 2008 on Hospital Minimum Service Standards. Globally, healthcare facilities face challenges in optimizing outpatient service delivery. It is anticipated that outpatient revenue will soon surpass inpatient revenue, as the volume of outpatient visits continues to exceed that of inpatient stays, thereby contributing positively to hospital finances. Additional information can be found in Law No. 44 of 2009.

Outpatients' perceptions serve as a critical measure of healthcare service quality. A 2003 study by Ryan, G. et al. highlights common challenges in hospital outpatient services, including lengthy wait times, administrative inefficiencies, and limited access to information. Patient satisfaction is significantly impacted by their experiences with wait times for medical procedures, which, in turn, influence the overall quality of healthcare services (Maxwell RJ, 1984).

A multiple regression analysis conducted by Torry et al. (2016) in the study titled *Factors Affecting Waiting Time for Health Services in Relation to Outpatient Satisfaction in the Internal Medicine Clinic at Dr. Iskak Tulungagung* ($P < 0.05$) revealed that patient satisfaction is significantly influenced by perceptions of waiting time and service speed. The

study identified a shortage of on-duty doctors as the primary cause of extended service delays and reduced patient satisfaction.

Similarly, research by Kurnia Widyaningrum et al. (2015), titled *Variables Affecting the Optimization of the Outpatient Unit at Hospital X*, found inefficiencies in space utilization and staff productivity. While room utilization was only 22.4%, doctor optimization rates were notably high at 141.6%, 172.9%, and 68.75%. A fishbone diagram identified key issues, such as insufficient staffing and cramped spaces, as the main contributors to underperformance. Further investigation using the 5 Whys method revealed that an ineffective monitoring and evaluation (monev) system was the root cause. To address this, the monev team was revitalized through targeted training, resulting in improved optimization.

Additionally, a case study as part of an MBA program in Lean Supply Chain Management in Vijayawada, India, demonstrated the practical application of lean principles. Collaborating with Help Hospital, the program reduced outpatient wait times from over an hour to just 15 minutes and boosted staff productivity by 114%. This example by Miller & Chalapati (2015) illustrates that even individuals with minimal knowledge of lean concepts can achieve remarkable outcomes when equipped with proper resources and training.

According to research by Elisabeth (2017), 90% of time spent in customer service involves non-value-added activities. By applying lean methodologies, such as 5S, Kanban Inventory, and visual management in a simulated environment, non-value-added activities were reduced to 78%, leaving 21% of activities as value-added. Implementing sustainable Lean hospital concepts is an effective strategy for minimizing waste and non-value-added processes while improving patient safety and satisfaction (Poksinska, 2010). Countries like the United States, the United Kingdom, and Australia have demonstrated success with this approach (Kinsman et al., 2017).

Research by Shortell et al. (2021) highlights the success of Lean management in reducing prescription service wait times, with the proportion of prescriptions completed in under 30 minutes increasing from 83.2% to 90.3% through the use of Value Stream Mapping (VSM) and fishbone diagrams. Similarly, a study by Suryana (2018) at the Outpatient Pharmacy Installation of Atma Jaya Hospital found that of 106 minutes spent on prescription services, 34 minutes (32%) were value-added activities, while 72 minutes (68%) were non-value-added. For total waiting times of 88 minutes, only 13 minutes (14.7%) were value-added, compared to 75 minutes (85.3%) of non-value-added activities.

At Stella Maris Hospital Makassar, a Class B private hospital, data from 2017 to 2019 show prolonged outpatient care wait times of 100 minutes (2017), 120 minutes (2018), and 99 minutes (2019). These extended wait times have caused dissatisfaction among patients and their families, who frequently report delays at the hospital's outpatient department.

2. METHODS

This study was conducted at the Outpatient Installation of Stella Maris Hospital Makassar in April 2022. Eight informants were interviewed, including the hospital director, the head of the outpatient department, admission officers, and nurses. The research utilized a combination of interviews and observation as its primary methodologies. Data reduction techniques were applied to organize, filter, simplify, abstract, and refine the raw data collected during the study. This process also involved selecting and structuring relevant data while eliminating redundant information.

As part of the investigation, the research team engaged with the eight participants and used tools such as timers, observation sheets, and interview guidelines to document patient service wait times. The reduced data were then presented through concise explanations, visual charts, and connections among various categories for clarity and analysis.

3. RESULTS AND DISCUSSION

Table 1 provides an overview of the distribution of informants among the staff at Stella Maris Hospital in Makassar. The researcher mapped out each stage of the patient service process using flowcharts, starting from the assignment of a queue number to the final consultation with a physician. Patients obtain their queue number by pressing a button on the machine at the counter. Afterward, they must cross the corridor to reach the counter where their queue number is logged. However, the hospital's queue numbering system is known to be inconsistent, contributing to inefficiencies in the process.

Table 1. The distribution of informants among personnel

No	Activity	Type of Activity	Average time (minutes)	Highest time (minutes)	Lowest time (minutes)
1	The patient comes	VAIN	0,1	1	0
2	Patients walk through a distant corridor leading to a queue number retrieval machine	NGOES	1	2	0,2
3	Patients queue up to pick up queue numbers	NVA	0,2	1	0,5
4	The patient takes the queue number	VAIN	0,6	2	0,3
5	Patient to front of registration counter to wait for queue turn	NVA	5	30	1

"When a patient enters the hospital via the main door, he or she is directed to the officer/security officer stationed in the hospital lobby in front of the queuing machine counter to the poly." (I.1)

"The queue number retrieval mechanism here often malfunctions; at times, we admission officers get overwhelmed when the queue number malfunctions, since it disrupts our service" (I.2)

In order to register as a patient at the hospital, patients must first stand in line at the patient registration counter, where they are met by a member of staff who takes their information and records it into their medical record file at the hospital.

Table 2. The service at the patient registration counter

No	Activity	Type of Activity	Average time (minutes)	Highest time (minutes)	Lowest time (minutes)
1	The patient sits in a chair to wait for his turn to be called according to his queue number	VAIN	18	60	1
2	Patient hands queue paper to admissions officer	VAIN	0,1	10	1
3	The patient provides a referral file to the admissions officer	VAIN	0,1	3	1
4	Officers bypass ktp, kk, and kertu patient guarantee to match data	VAIN	0,1	3	1
5	The officer inputs patient data	VAIN	2	7	1
6	Officers make SEP patients	VAIN	2	8	1
7	Officers await confirmation in the central part of bpjs	NVA	2	6	2
8	Officer prints patient SEP	VAIN	2	3	1
9	Admissions officer gives patient files to medical records officer	NVA	0,5	2	1
10	Medical records officer records patient's medical records file	VAIN	1	5	1
11	Medical records officer searches for patient's medical records	NVA	2	3	1
12	Admissions officer confirms doctor's schedule to poly nurse	NVA	3	2	1
13	The admissions officer informs the passivity about the doctor on duty coming at such an hour.	VAIN	0,1	2	1
14	Admissions officer gives queue paper to patient to get to poly	VAIN	1	2	1
15	The patient is directed to go to the poly	VAIN	0,3	2	1

Data on patient wait times for services indicate that outpatient care begins when patients are called to the registration counter using the number assigned from the queue system. Issues frequently arise during the SEP process for BPJS members, including internet connectivity problems, printing errors, and mistakes in the storage of patient medical records (human error).

Before patients are called into the examination room, their medical record files must first be sent to the doctor's office. Delays often occur because doctors arrive late, resulting in extended waiting times for patients. Once the registration and queue number processes are completed, patient numbers or names are announced for examination.

Table 3. The process of waiting for the patient

No	Activity	Type of Activity	Average time (minutes)	Highest time (minutes)	Lowest time (minutes)
1	Medical records officer brings medical records of patients to nurses	NVA	4	18	2
2	Nurse standing at nurse's post checks patient's medical records file	VAIN	1	3	0,5
3	Nurses take rm patient files into the doctor's room	NVA	0,7	0,3	1
4	Patient hands nurse post patient queue paper	NGOES	1	1	0,4
5	Nurses take patient queue paper and are taken into the doctor's room	NVA	3	8	1
6	The nurse standing at the nurse's post directs the patient to perform initial examinations such as measuring weight, blood pressure and asking the patient's complaints.	VAIN	1	0,3	0,1
7	The patient waits for the doctor to come and is called in for an examination.	NVA	72	134	13

Discussion

The lean concept emphasizes that any activity failing to add value for the customer is considered waste and should be minimized or eliminated. Before applying lean management, the first step is to identify problems by examining the overall process, assessing the presence of non-value-added (NVA) activities, and identifying waste. Tools used in lean analysis include Value Stream Mapping (VSM), Visual Management, waste identification, and root cause analysis (Lawal & Elegunde, 2020). Highlighting issues is a key aspect of lean management, as bringing problems to the surface ensures they are visible and addressed promptly.

Value Stream Mapping (VSM) is a systematic technique used to map the flow of information and actions within a system, providing a comprehensive overview. The objective of lean manufacturing is to eliminate waste and improve the efficiency and effectiveness of processes. Field observations are one of the tools used to map the value stream of patient care activities, identifying both value-added and non-value-added actions.

The application of VSM in outpatient services at Stella Maris Hospital Makassar demonstrates reductions in process times. For instance, the cycle time for taking a queue number decreased to an average of 2.1 minutes, while the transfer process took just 0.1 minutes on average. Waiting times in this phase ranged from 5 to 30 minutes, with a minimum of 5 minutes. Registering a queue number at the counter required an average of 16 minutes,

followed by a transfer process of 0.1 minutes. Maximum waiting time reached 1.5 hours, while the shortest was just 1 minute.

Examination times ranged from 4 to 30 minutes, with an average cycle of 9 minutes. Patients spent an average of 72 minutes waiting for examinations, with the longest recorded wait lasting 134 minutes and the shortest only 13 seconds. On average, outpatient care took 122.2 minutes, with 27.2 minutes (22.3%) attributed to value-added activities and 95 minutes (77.7%) to non-value-added activities.

This research aims to analyze outpatient waiting times at Stella Maris Hospital using the lean approach. It covers various stages of the service process, from assigning queue numbers to patient registration and entry into the examination room. By identifying NVAs and using tools like VSM, Visual Management, and root cause analysis, the study highlights areas for improving efficiency and reducing waste in outpatient services (Lawal et al., 2014).

Lean emphasizes the importance of highlighting problems as they arise. By making issues visible, immediate action can be taken to address them. Materials, processes, and resources are arranged in a continuous flow so that when a problem occurs, operations are paused to find solutions (Agustianingsih, 2011).

At Stella Maris Hospital in Makassar, the value stream mapping (VSM) process is used to identify which patient care activities add value and which do not. This research focuses on the entire medical care process, from the collection of patient queue numbers to registration and entry into the examination room. These elements are closely interconnected in the hospital's workflow.

Recognizing the problem itself is crucial in identifying the root cause of non-value-added activities or waste. Fishbone diagrams, which provide a visual breakdown of the issue, help researchers pinpoint the underlying causes. Factors such as manpower, materials, methods, environment, and machinery have been identified as key contributors to difficulties in pharmaceutical supply management.

Outpatient pharmacies can benefit from physical improvements like enhanced visual management, improved scheduling, better queue number retrieval machines, and the implementation of SIMRS (Hospital Information Management System). Additionally, creating patient flowcharts based on root cause analysis could improve outpatient facilities. Once a patient arrives and obtains their queue number, they are considered to have entered the doctor's examination room, with an average wait time of 60 minutes.

Sulistiyorini et al. (2012) identified four types of queue disciplines:

1. FCFS (First-Come, First-Served), also known as FIFO (First In, First Out),
2. LCFS (Last-Come, First-Served), or LIFO (Last In, First Out), where the last person to arrive is the first to be served,
3. A priority service (PS) system, where those with higher priority are served before those with lower priority, even if the latter arrived earlier in the queue.

The patient care process at Stella Maris Hospital Makassar, based on the observation of researchers, involves obtaining a queue number and waiting for the doctor. However, long queues and registration counter issues lead to significant wait times before patients can be seen. Additionally, problems with the queue number retrieval system and internet connectivity exacerbate these delays.

(Suryana, 2018) explains that one approach to lean management in evaluating and depicting waiting times for pharmaceutical services is the use of Value Stream Mapping (VSM). This tool helps describe the entire system and its value streams. According to (Lawal & Elegunde, 2020), it includes details on patient flow, inventory, and information movement throughout the patient's journey, mapping all the processes necessary to deliver healthcare services. Observations during the study categorized two types of drug services ready-made and compounded with each having two forms: cash and insurance-based.

Research by (Rochimah, S. F., & Mudayana, 2020) demonstrates that Lean Management has identified key areas causing waste in outpatient pharmacy services. Research by (Fauziyah, 2023) points out that excessive drug production, which does not align with patient needs, leads to wasted time and resources. Patients often experience long waits for medications, caused by an inefficient process flow. Implementing Lean Management can help hospitals identify various waste sources hindering outpatient pharmacy service efficiency and offer solutions for waste reduction.

In (Usman, 2020), research shows that Lean implementation in hospitals has successfully reduced waste in service processes, such as waiting times, inventory management, and resource use. Hospitals that adopt Lean principles observe improvements in service quality, faster waiting times, and increased patient satisfaction. (Argiyantari, B., Simatupang, T. M., & Basri, 2020) identify several Lean techniques in the literature, including Just-in-Time (JIT), Kanban, and Value Stream Mapping (VSM), which help accelerate distribution and ensure timely availability of the correct drugs. Transforming the pharmaceutical supply chain with Lean principles reduces waste and boosts efficiency. By employing tools like JIT and VSM, hospitals and pharmacies can optimize the drug distribution process.

Research by (Meila, O., Pontoan, J., & Illian, 2020) concludes that the waiting time for compounded drug services can be improved through workflow optimization, increasing staffing levels, and enhancing information technology. (Faramita, N. I., & Wiyanto, 2016) suggests that operational system improvements and efficiency measures in pharmacy management are essential for achieving waiting times that meet service standards. Additionally, (Jaya, M. K. A., & Apsari, 2018) finds that the average waiting time for non-compounded prescription services is 25 minutes, while compounded prescriptions take up to 62 minutes, exceeding established standards. Several factors influence waiting times, including patient volume, health center workflow, human resource availability, and drug stock management.

4. CONCLUSION AND LIMITATION

Conclusion

According to the research findings, Value Stream Mapping (VSM) was employed to identify value-generating activities and eliminate non-value-added ones. Based on the VSM data for the patient service process at the outpatient facilities, the total average time for the process was 131 minutes. Of this, 27 minutes (21%) were attributed to value-added activities, while the remaining 104 minutes (79%) were non-value-added activities. The process of obtaining a patient queue number contributed 28% value, with 72% of the process adding no value. In patient registration at the admission counter, 47% of the time was spent on valuable tasks, while 53% was wasted. The time spent in the doctor's waiting room accounted for only 10% of value-added activities, with 90% considered waste.

The study identified four types of waste in non-value-added activities at Stella Maris Hospital in Makassar: at the Queue Number Collection Counter (waste due to waiting and motion), the patient registration counter (waste due to waiting, motion, and overproduction), and in the doctor's waiting room (waste due to waiting, motion, overproduction, and human resource inefficiency). A fishbone analysis revealed that the root causes of patient service delays were linked to four factors: human (doctor's delay), machine (non-operational hospital management information system, frequently malfunctioning queue machines, internet connection failures, absence of monitor screens, and lack of queue numbers at the registration counter), and environmental (the long distance from the patient entrance to the distant queue number collection counter).

The proposed improvements, using lean tools, include the integration of a hospital management information system, repairing the queue number collection machine, redesigning the layout of the queue counter, improving the doctor's scheduling, and ensuring the availability of necessary resources during the doctor's arrival hours.

Limitation

The time to fill out the questionnaire and the level of respondent participation were less efficient, because of the service time so that some questionnaires were not filled out immediately and took longer.

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