

Waste Analysis Using Lean Management on Inpatient Discharge Waiting Time at RSI Siti Hajar Mataram

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ABSTRACT

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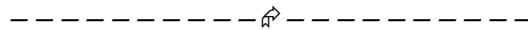


The inpatient discharge process is a key indicator of hospital service quality and is closely related to patient satisfaction. Research on inpatient discharge waiting time has largely not categorized the waiting time based on the type of payment guarantor, such as BPJS Kesehatan (standard class or upgraded class), private insurance, and out-of-pocket payment. RSI Siti Hajar Mataram is facing an issue with patient discharge waiting times, which exceed 2 hours (the standard set by the Ministry of Health of the Republic of Indonesia). This study aims to analyze inefficiencies (waste) in the discharge process using Lean Management principles, in order to identify the root causes of delays. A qualitative analytic approach was employed, involving direct observation and in-depth interviews. The findings revealed that the average inpatient discharge time was 147.5 minutes (2 hours, 27 minutes, and 31 seconds), exceeding the established standard. Three types of waste were identified: overprocessing, waiting, and transportation, occurring consistently across all payer categories. Root cause analysis indicated contributing factors related to human resources, methods, materials, equipment, and the physical environment. Following the elimination of identified waste, a future-state process was proposed, resulting in reduced discharge times across all groups become less than 2 hours. These improvements demonstrate the potential of Lean Management in enhancing hospital discharge efficiency and compliance with national service standards

ABSTRAK

Proses pemulangan pasien rawat inap merupakan salah satu indikator pelayanan pasien di rumah sakit yang berkaitan erat dengan kepuasan pasien. Penelitian mengenai waktu tunggu pemulangan pasien rawat inap sebagian besar belum mengkategorikan waktu tunggu berdasarkan jenis penjamin pembiayaan pasien, seperti BPJS Kesehatan (sesuai kelas atau naik kelas), asuransi, dan umum. RSI Siti Hajar Mataram menghadapi permasalahan pada waktu tunggu proses pemulangan pasien baik untuk pasien dengan penjamin biaya BPJS Kesehatan sesuai kelas, BPJS Kesehatan naik kelas, penjamin umum, maupun asuransi. Penelitian ini bertujuan menganalisa *waste* menggunakan *lean management* sehingga dapat diketahui *waste*, akar masalah, serta perubahan lamanya waktu tunggu pemulangan pasien rawat inap apabila *waste* dihilangkan. Menggunakan metode kualitatif dengan observasi dan wawancara, penelitian ini memperlihatkan hasil: Proses pemulangan pasien rawat inap rata-rata adalah 147,5 menit. Ditemukan *waste of overprocessing*, *waste of waiting*, dan *waste of transportation* pada seluruh kategori penjamin pembiayaan pasien. Akar masalah ditemukan faktor manusia, metode, material, mesin, dan lingkungan. Setelah melakukan eliminasi *waste* ditemukan *future condition* menjadi kurang dari 2 jam. Hal ini menunjukkan bahwa *lean management* dapat membantu meningkatkan efisiensi proses pemulangan pasien sehingga memenuhi standar yang ditetapkan.





A. INTRODUCTION

Based on hospital complaints data recorded in Public Relation Unit, there are complaints via WhatsApp from July to October 2024, three reports highlighted long discharge processes. These inefficiencies lead to ER blockage due to delays in transferring patients to inpatient rooms. From July to October 2024, an average of 3–4 patients per month experienced inpatient room transfer delays of over 30 minutes due to unprepared rooms.

According to Indonesia's Ministry of Health Regulation No. 3 of 2020(22), hospitals must provide comprehensive individual health services and establish minimum service standards for quality assurance. Regulation No. 28 of 2024 further emphasizes the improvement of service quality as a patient right. Quality indicators are essential to assess service targets and hospitals performance (20). The minimum service standard for inpatient discharge is less than 120 minutes or 2 hours. If this indicator is not met by the hospital, patient satisfaction will decrease, and the overall quality of the hospital cannot be optimally achieved. This situation has been experienced by RSI Siti Hajar Mataram, which is why this study was conducted to address the issue.

Research on the waiting time for inpatient discharge needs to be carried out because of risk factors that can significantly impact hospital operations, including high-impact and high-quality categories. However, before making improvements, the root cause of the long inpatient discharge waiting time must first be identified. Inpatient discharge requires several processes involving multiple hospital work units(26). Through lean management, the entire process flow can be illustrated so that waste in the process can be identified and, if eliminated, can create a more efficient process flow. This study will describe the inpatient discharge process using VSM so that it is expected to analyze the waste found in the process(25). The VSM illustration distinguishes processes based on the patient's cost guarantor due to process differentiation determined by the administration of the patient's cost guarantor(9). Research on waste in the inpatient discharge process at Siti Hajar Islamic Hospital Mataram is expected to identify problems in depth so that the hospital can carry out improvement plans with the main goal of providing quality and patient-oriented services(7).

Research on the inpatient discharge process has not yet specifically categorized discharge waiting times based on the type of patient guarantor as observed in real-world settings. Differences in administrative procedures among patients covered by BPJS Kesehatan, self payments, and private insurance can lead to variations in discharge waiting times. In particular, BPJS Kesehatan patients may either be hospitalized according to their entitled class or in a higher class (class upgrade), each involving distinct administrative processes. These differences potentially affect the length of the discharge process, yet existing studies have not comprehensively explored this aspect.

According to Womack and Jones, in Marlina, et al. (2024), lean management theory stems from efforts to improve efficiency and reduce waste in organizations through process simplification. There are five (5) basic lean principles, namely determining value from the customer's perspective, identifying the value stream and eliminating non-value-adding

activities, creating an uninterrupted flow in the process, pulling services based on customer demand, and striving for perfection through continuous improvement. In the context of healthcare services, lean management is implemented to speed up patient service time, reduce medical errors, and improve care quality. The application of lean principles such as value stream mapping (VSM) in hospitals is used to analyze and improve critical processes, such as patient care and medical logistics, so that waste can be reduced(16).

Several studies show that the use of Lean management can improve hospital system performance, create quality improvement, and enhance efficiency. In implementing Lean, hospitals focus on reducing waste (27). One problem found in hospitals is the long waiting time for inpatient discharge. Lean management is needed by hospitals because it is able to address the main challenges in healthcare services. A literature review by Anita & Yuliaty (2024) indicates that the implementation of Lean Management in hospital environments can provide significant contributions to improving operational efficiency(5). The positive impact of lean implementation is seen in the reduction of patient waiting time, optimization of resource utilization, and increased productivity of health workers(13). The increase in operational efficiency through the lean approach not only reduces operational cost burdens but also impacts the improvement of patient experience and, most importantly, the overall quality of service(29). Through the application of lean principles, health institutions can manage human resources, medical equipment, and service spaces more structured and efficiently, thereby minimizing waste and increasing the effectiveness of the services provided. Therefore, lean management can be seen as a relevant managerial strategy in efforts to improve the quality of service in the healthcare sector (15).

Lean Hospital is a managerial approach that adopts basic principles of lean manufacturing and is implemented in healthcare service systems, particularly in hospitals(19). This approach aims to increase efficiency and service quality by identifying and eliminating various forms of waste, improving workflows, creating sustainable systems, and being responsive to patient needs(14). By using lean principles, hospitals can create more efficient processes and focus on activities that provide added value, both for patients and for the organization as a whole. Practically, the implementation of lean hospitals has been proven to increase diagnostic accuracy, reduce the rate of medical errors, accelerate response times to patient needs, and improve the efficiency of using resources such as labor, medical equipment, and care rooms(21). In addition, lean hospitals also make significant contributions to increasing patient satisfaction and reducing operational costs without sacrificing the quality or safety of healthcare workers(12). The importance of lean hospitals in healthcare services has been widely recognized by experts. Dr. Donald Berwick, President Emeritus and Senior Fellow at the Institute for Healthcare Improvement (IHI), stated that lean hospitals are a key tool for improving the quality and safety of care. Similarly, Dr. John Toussaint, author of *The Lean Hospital*, highlighted that this approach is not just about cost efficiency, but also about creating more value for patients and healthcare workers by improving work processes and team collaboration. By implementing lean principles, hospitals can redesign their service systems to be more effective, efficient, and responsive to patient needs and operational challenges (14). Therefore, hospitals that are committed to improving

the quality of services and sustainable operational efficiency should consider lean hospitals as a strategic approach to be integrated into managerial policies and daily clinical practices (4).

Value Stream Mapping is a lean tool to identify the company's information flow and solve existing problems. This Lean tool helps to understand data collection methods quickly and effectively and how data is used for planning (18). The VSM method is very important and appropriate because it can be used to find and evaluate waste along with finding solutions or recommendations to improve the waste created (6).

Waste is a form of inefficiency and waste caused by materials, human resources, and time. In the context of operational management, waste, known in Japanese as *muda*, refers to all activities that do not add value to a product or service (17). In a healthcare environment, waste can appear in various forms, such as products or services that are not needed by patients, excessive inventory accumulation, non-essential process implementation, inefficient movement of staff or goods, waiting times due to distribution delays, and any form of output that does not meet the expectations or needs of service users. Identification and elimination of waste are crucial in improving overall service efficiency and quality (28).

There are 7 types of waste that have been introduced since the first discovery of the lean concept, this was stated by Taiichi Ohno, in Agnieszka, et al (2022). Waste in the lean concept is then known as TIMWOOD (Waste of: Transportation, Inventory, Motion, Waiting, Overproduction, Overprocessing, Defects) (3).

In response to persistent patient complaints about long discharge waiting times, Siti Hajar Islamic Hospital Mataram needs to apply structured management analysis to support effective and sustainable decision-making. Prolonged waiting times not only lower patient satisfaction but also disrupt service flow and hospital efficiency. By using evidence-based management tools and continuous improvement methods—such as Lean Management—the hospital can identify root causes, streamline processes, and enhance team coordination. Through this approach, the hospital can also identify various forms of waste within the process—such as the seven types of waste outlined in the TIMWOOD framework allowing for more targeted and impactful improvements in operational efficiency and patient experience.

B. METHODS

This research was conducted at RSI Siti Hajar Mataram, located on Jalan Caturwarga, Mataram, Lombok, West Nusa Tenggara. The study focused on general inpatient wards, excluding obstetric and gynecology wards as well as intensive care units. Only patients discharged in good condition were included in the study, while deceased and referred patients were excluded. The research took place over a four-month period, from November 2024 to February 2025. A descriptive qualitative method with a phenomenological approach was used to explore and understand the discharge process in depth. The phenomenological approach was chosen to gain detailed insights into the actual experiences of those involved, helping to identify core issues and potential solutions.

Data collection was carried out through direct, passive observation and semi-structured interviews using a set of interview guidelines developed by the researcher. The interview questions were organized based on the specific activities performed during the discharge process, namely: activities at the nurse station, in the pharmacy, at the billing department, and at the cashier. Interviews were conducted with both key and supporting informants. Key informants included the head of the inpatient unit, the patient service manager, and the head of the billing division, selected

for their knowledge and experience. Supporting informants, selected to verify and enrich the data, consisted of 15 individuals including 2 attending physicians, 3 heads of inpatient rooms, 5 nurses, 3 pharmacist, and 2 cashier staff. All data from observations and interviews were processed through recording, transcription, and editing, then analyzed qualitatively through descriptive narratives without statistical computation. To ensure credibility, the study used source triangulation techniques to validate the findings.

C. RESULT AND DISCUSSION

During the observation, the researcher collected data on the average number of inpatient visits in 2024 based on the type of guarantor, excluding patients discharged due to death, referred patients, patients in ICU/NICU care, and those in obstetric and gynecological care. From this data, the average number of inpatient visits by guarantor is as follows.

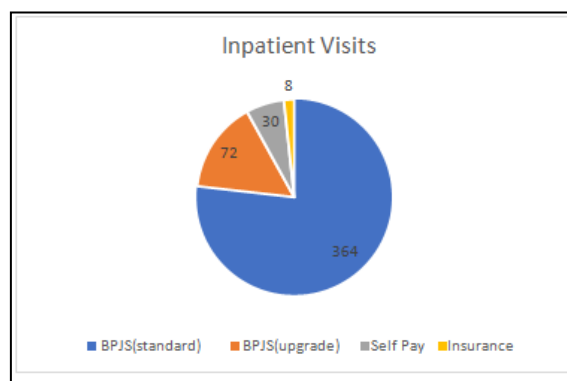
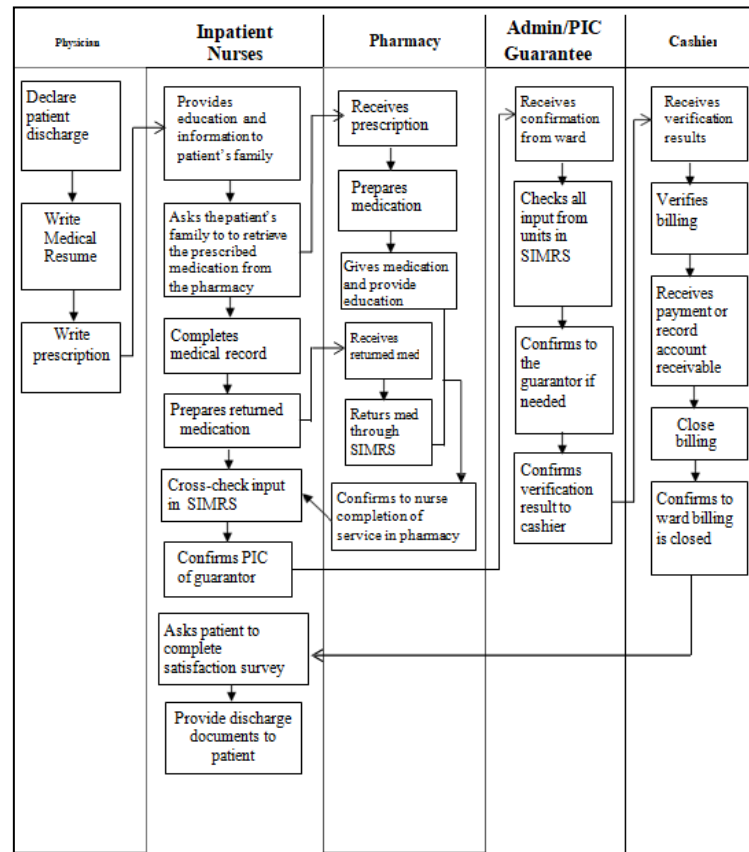


Figure 1. Diagram of Average Number of Inpatients per Month in 2024

Based on the diagram above, inpatient visits at Siti Hajar Islamic Hospital Mataram are dominated by BPJS Kesehatan patients, which is 92% of total visits. Of BPJS inpatients, 84% occupied rooms according to their class entitlements and 16% chose to upgrade their care class. Meanwhile, insurance patient visits at the hospital were only 1.7% of total visits and self-paying or private guarantor patients were 6.3%.

The inpatient discharge process at RSI Siti Hajar Mataram involves a series of continuous activities, with core procedures remaining consistent regardless of the patient's guarantor. The following is an overview of the process.

Table 1. Overview of the Inpatient Discharge Process

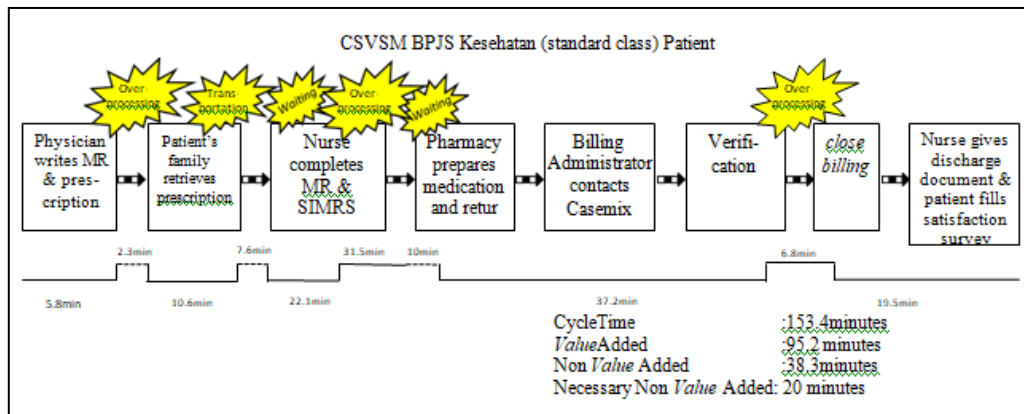


The overview of the inpatient discharge process outlined in the table above was mapped by the researcher after conducting observation. Although patient guarantors vary, the activities carried out are generally similar because they have the same objective. To facilitate data mapping in this study, the author has summarized the inpatient discharge process into the following eight activity stages.

1. Stage 1: Attending Physician Writes Discharge Summary and Prescription
2. Stage 2: Patient's Family Receives Prescription and Education
3. Stage 3: Nurse Completes Medical Records and Inputs Data
4. Stage 4: Pharmacy Prepares Medication and Processes Returns
5. Stage 5: Billing Admin Contacts the Guarantor
6. Stage 6: Billing Admin Verifies Data
7. Stage 7: Cashier Closes Billing and/or Processes Payment
8. Stage 8: Nurse Provides Follow-Up Letter and Patient Satisfaction Survey

The mapping of these eight activity stages is then categorized based on the patient's guarantor to illustrate the inpatient discharge process. This illustration is presented using a Current State Value Stream Mapping (CSVSM). The activities depicted in the mapping can identify value-added (VA), non-value-added (NVA), and necessary but non-value-added (NNVA) activities, as well as waste that occurs throughout the inpatient discharge process. The Current State Value Stream represents a process flow that reflects the existing or current

condition, meaning it captures the state of the process at the time of the research without any intervention from the researcher in the ongoing activities. Here is the illustration of CSVSM.



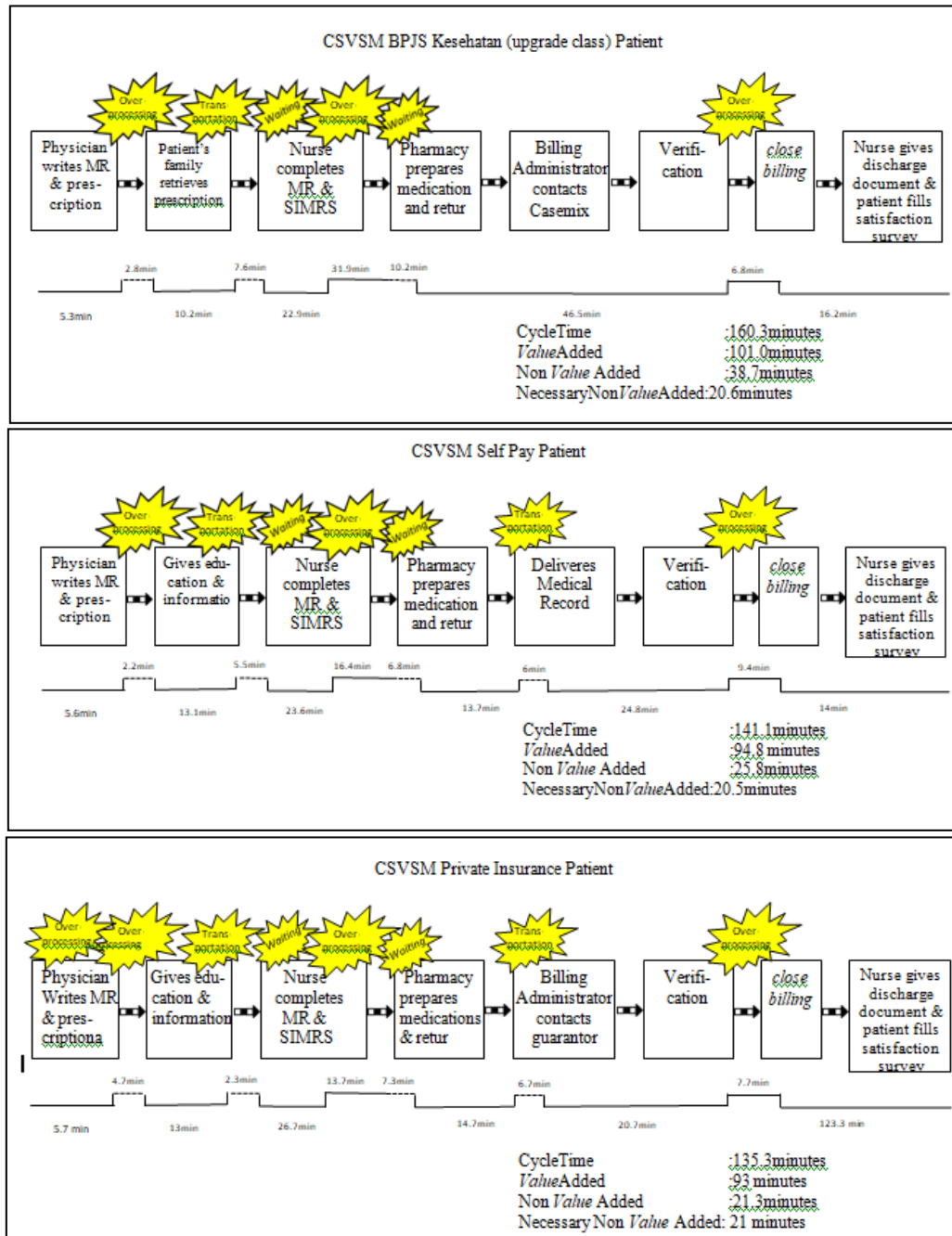


Figure 2. Current State Value Stream Mapping of Patients According to Guarantor

Value stream mapping (VSM) is illustrated in Figure 2. The VSM shows that the average cycle time for the inpatient discharge process at RSI Siti Hajar Mataram is 147.5 minutes or 2 hours 27 minutes and 31 seconds. This waiting time exceeds 120 minutes or 2 hours which is not in accordance with the Minimum Service Standard established by the Ministry of Health of the Republic of Indonesia. Discharge for patients guaranteed by BPJS according to class takes 153.4 minutes, upgraded BPJS 160.3 minutes, private/self-pay 141.1 minutes, and insurance 135.3 minutes. Waiting times exceeding 2 hours affect patient satisfaction, inpatient unit quality indicators, and congestion in the ER. A systematic review by Aggarwal, K., etc. (2024) showed that delays in patient discharge cause bed blockage in the ER, reduced patient satisfaction, emotional fatigue for caregivers, and increased use of hospital

resources(2). The waste identified in this study based on the stages of the inpatient discharge process is as follows.

Table 2. Identification of Waste Based on Activities Carried Out

No	Process Stage	Activity	Type of Waste	Payer
1	Doctor (DPJP) writes discharge summary and prescription	- The doctor writes the prescription not directly on the prescription form. - The doctor writes the discharge summary twice: once for the hospital, and once for insurance.	Overprocessing	- BPJS (standard class) - BPJS (upgraded class) - Out-of-pocket/Private - Insurance
2	Family receives prescription and education	The prescription paper is hand-carried by the patient's family to the inpatient pharmacy.	Transportation	- BPJS (standard class) - BPJS (upgraded class) - Out-of-pocket/Private - Insurance
3	Nurse completes medical records and data entry	- Medical record documents are completed by the staff nurse but must be rechecked by the team leader. - Waiting for the head of the ward to complete entries in the hospital information system (SIMRS).	Overprocessing Waiting	- BPJS (standard class) - BPJS (upgraded class) - Out-of-pocket/Private - Insurance
4	Pharmacy prepares and returns medications	- Preparation of discharge medications waits for the prescription sheet to be delivered by the patient's family. - Medication returns wait for the ward nurse to deliver them to the pharmacy.	Waiting	- BPJS (standard class) - BPJS (upgraded class) - Out-of-pocket/Private - Insurance
5	Billing admin contacts payer	Patient documents are delivered by the ward staff to the billing admin.	Transportation	- Out-of-pocket/Private - Insurance
6	Billing verification by admin	-	-	-
7	Cashier closes billing and/or processes payment	The cashier waits for the billing PIC, but performs a similar task by reviewing and verifying the billing against the payer type.	Overprocessing	- BPJS (standard class) - BPJS (upgraded class) - Out-of-pocket/Private - Insurance
8	Nurse gives follow-up letter and asks patient to fill satisfaction survey	-	-	-

The VSM description also found waste in the activity process as outlined in Table 2, with the following conclusions:

- Waste of Waiting: Occurs due to waiting caused by dependence on staff skills and waiting for items that need to be delivered to proceed with the process.
- Waste of Overprocessing: Repetitive tasks occur due to unsupported resources and inefficient administrative checks due to manual processes.
- Waste of Transportation: Manual delivery of items causes excessive use of time and energy.

Using a qualitative approach and data source triangulation technique, the researcher conducted in-depth interviews with three key informants directly involved in the inpatient discharge process at RSI Siti Hajar Mataram, namely the Head of Inpatient Unit, the Patient

Services Manager, and the Head of Finance – Billing Division. The purpose was to explore the root causes of the prolonged inpatient discharge process. The researcher employed an interview guide that had been previously developed based on initial observations. From these observations and interviews, the root causes of waste occurring in the discharge process were identified. The types of waste found during the process included waste of waiting, waste of overprocessing, and waste of transportation. These findings were then analyzed using a fishbone diagram as follows.

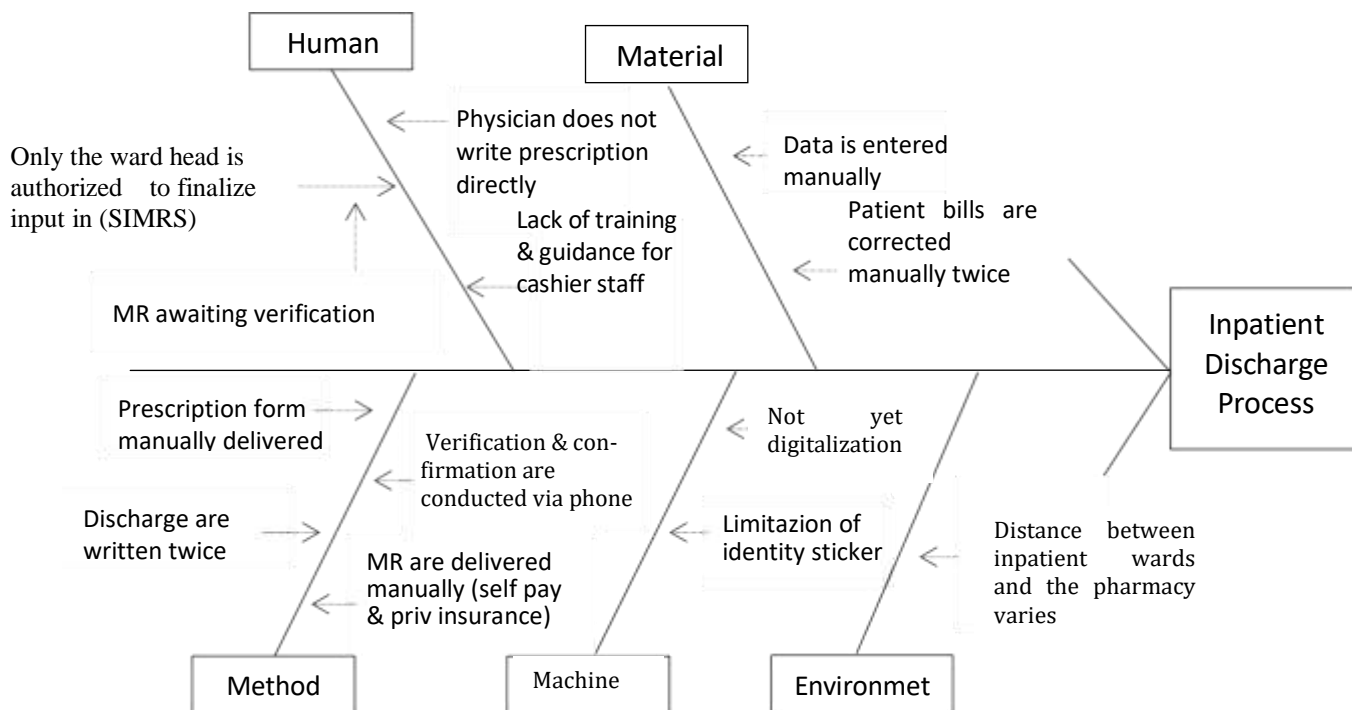


Figure 3. Fishbone Diagram

According to the fishbone diagram, from the human factor side, limited access to SIMRS only by the head nurse causes delays in discharge data finalization if the person is not present. In addition, attending doctors often do not immediately write prescriptions on prescription forms, thus increasing waiting time because nurses have to rewrite prescriptions from previous notes. In the billing department, the lack of experience of new cashiers and minimal training causes repetition of billing verification processes by billing admins and cashiers, slowing down administration.

From the method side, work procedures are still manual, such as the physical delivery of prescriptions and patient documents, and duplicate writing of medical resumes for internal and external use, causing time and energy waste. Communication between units still relies on telephones which often results in miscommunication and coordination delays(1).

From the material aspect, SIMRS is only used to store digital data without full integration in service processes, so data input still requires manual correction. Lack of training and guidance for staff also causes inconsistency in billing management. From the machine side, the use of patient identity stickers is not optimal due to limited sticker supply, so the documentation workload of nurses has not been significantly reduced(11). Billing and

insurance administration documents are still mostly in physical form, slowing down the entire process.

Lastly, the environmental factor also contributes to the long discharge process, where distances between units such as inpatient rooms, pharmacies, and billing admin vary and are quite far, so document delivery by staff or patients' families takes time and causes logistical waste.

Future Condition Mapping: Future state value stream mapping can be used as a reference or perspective in improving an ongoing activity process. Thus, a shorter, less complex, and more efficient process execution can be identified(10).

Table 3. Future Condition

Guarantor	Current Condition	Future Condition1	NNVA		Future Condition2	%
	Cycletime (minutes)	Cycletime (minutes)	Waste of overprocessing (Writes MR & Prescription)	Waste of transportation (Prescription delivery)	Cycletime (minutes)	CycleTime Savings
BPJS (standar)	153,4	115,2	2,3	7,6	105,3	31,35
BPJS (Upgrade)	160,3	121,6	2,8	7,6	111,2	30,63
Self Pay	141,1	115,3	2,2	5,5	107,6	23,74
Private Insurance	135,3	114	4,7	2,3	107	20,91

Future condition 1 illustrates cycle time with NVA eliminated and future condition 2 shows cycle time after eliminating NNVA that can be replaced with digital transformation, resulting in greater time savings. With a lean approach, the inpatient discharge waiting time across all guarantors becomes less than 120 minutes, with the shortest time for patients guaranteed by BPJS according to class at 105.3 minutes and the longest for self-pay patients at 111.2 minutes.

According to Gaspersz, V., & Fontana, A. (2011), a service process that produces more than 30% Non Value Added is considered ineffective and inefficient and contains waste in its activities. The research results indicate that there are still wasteful activities that need to be identified and minimized to improve the effectiveness and efficiency of the inpatient discharge process(8).

D. CONCLUSION AND SUGGESTIONS

Illustration using current condition value stream mapping shows that the cycle time for inpatient discharge with BPJS according to class is 153.4 minutes, upgraded BPJS is 160.3 minutes, private/self-pay is 141.1 minutes, and insurance is 135.3 minutes.

Wastes found in the inpatient discharge process are waste of waiting, waste of overprocessing, and waste of transportation. The causes of long inpatient discharge waiting times originate from human factors, method factors, material factors, machine factors, and environmental factors. In the human factor, lack of coaching or succession planning for employees causes waiting time or repeated processes. In the material, machine, method, and environmental factors, the common conclusion is dependency on manually conducted activities that waste time and energy.

Through the lean management approach and the development of the future condition, it can be seen that the total discharge time can be significantly reduced by eliminating waste.

Based on the findings of this study, it is recommended that RSI Siti Hajar Mataram implement a digitized and integrated hospital information system to reduce manual processes and administrative redundancies. Continuous training programs should be provided to staff across units, especially those directly involved in the discharge process, to ensure better coordination and minimize delays. Furthermore, standard operating procedures (SOPs) for inter-unit communication and discharge workflows need to be reviewed and adjusted in accordance with Lean principles to ensure sustainability of improvements. Periodic evaluations using Value Stream Mapping are suggested to monitor ongoing performance and ensure continuous quality improvement.

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