Unnes Journal of Public Health 13 (1) (2024)

Unnes Journal of Public Health

http://journal.unnes.ac.id/sju/index.php/ujph

Implementation of Lean Hospital Intervention in Outpatient Pharmacy Depot at the National Brain Center Hospital Prof. Dr. dr. Mahar Marjono Jakarta, Indonesia

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Article Info

Article History:
Submitted October 2023
Accepted January 2024
Published January 2024

Keywords:
Utilization, Mental Health Services, BPJS

DOI
10.15294/ujph.v13i1.74992

Abstract

Waiting time for prescription services indicates the quality of hospital services. The waiting time at the National Brain Center Hospital Prof. Dr. dr. Mahar Marjono Jakarta (RSPON Jakarta) Regular Outpatient Pharmacy Depot has not yet reached the standard of ≤30 minutes for non-concoction prescription, ≤60 minutes for concoctions prescription. This research aims to reduce the waiting time for outpatient prescription services using the Lean Hospital approach, which uses operational research methods with a qualitative approach through direct observation, interviews, and document review. In current state conditions, the lead time for non-concoction prescriptions is 46.7 minutes, with the ratio of value-added activity to total service time 25%:75%, while for concoctions prescriptions is 98.9 minutes, with the ratio of 27%:73%. The highest waste is waiting and overprocessing. Causes of waste are human resources inefficiency, simultaneous doctors' practice schedules, no separate system for regular and executive outpatient staff, e-prescriptions optimation, internet instability, and patient interruptions. Lean hospital intervention was the Balancing-Heijunka through modification of shifts and 5S. Future state results showed a 28% reduction in lead time for non-concoction prescriptions (33.3 minutes), while concoction prescriptions decreased by 32% (67.1 minutes). Lean Hospital can reduce waste and lead time for prescription services.

INTRODUCTION

Based on the Decree of the Minister of Health Number 129 of 2008 concerning Minimum Hospital Service Standards, hospitals must be able to provide health services in accordance with minimum service standards so that hospitals can guarantee patient safety and security, one of which is the waiting time for prescription drug services in pharmacy services. The long waiting time for drug prescription services can cause patient dissatisfaction (Fitriah, 2016).

Previous research showed that lean hospital method helps determine the waiting times for outpatient drug prescription services at Mitra Husada Hospital, identifying waste and the root cause of the main problem, namely the human factor due to an imbalance between the number of prescriptions that accumulate during peak hours with the number of employees in prescriptions screening section, efforts are being made to de-

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Open Access
pISSN 2252-6781
eISSN 2548-7604

sign changes as an improvement effort using the lean method with Plan Do Check Act (PDCA) tools, regulating the number of employees during busy hours, the 5S method, visual management and heijunka. The results were an increase in waiting time for non-mixed prescription services from 42.18% in June 2022 to 59.31% in July 2022 (Elawati, 2022).

Waiting time for outpatient services is a crucial indicator of the quality of hospital services that must continue to be maintained and improved, especially at the National Brain Center Hospital Prof. Dr. dr. Mahar Marjono Jakarta (RSPON Jakarta) as a special hospital and a referral hospital for neurology cases in Indonesia. Identifying problems and continuous improvement intervention efforts using the Lean Hospital approach can be implemented to overcome the problem of long waiting times for outpatient pharmacy services.

According to Performance Accountability Report Data (LAKIP) of RSPON Jakarta in 2022, the number of drug prescriptions served at RSPON Jakarta over the last 3 (three) years shows an average increase of 10%, respectively amounting to 269,130 prescriptions in 2020, 315,968 prescriptions in 2021, and reach 335,348 prescriptions in 2022 (RSPON Jakarta, 2023). An increasing number of visits can lengthen the queue for prescription drug services at the outpatient pharmacy, resulting in longer service waiting times. According to data from the Jakarta RSPON pharmacy depot, in 2022, the average waiting time for non-concoction prescriptions for Indonesian Health Social Security Agency (JKN) patients was 80.29 minutes, and for concoction prescriptions was 93.52 minutes. This shows that the waiting time in outpatient pharmacy services still does not meet the Minimum Service Standards target, where the standard waiting time for non-concoction prescriptions is ≤ 30 minutes and for concoction prescriptions ≤ 60 minutes. Based on the researchers' initial observations, especially on busy days and hours, the waiting time for finished medicine services at regular outpatient pharmacy depots exceeds 30 minutes. Some patients even wait more than 90 minutes, giving rise to patient complaints. Based on this, researchers are encouraged to conduct research using the Lean Hospital approach to identify problems related to the outpatient pharmacy service process so that later they can provide suggestions for improvements, as well as conduct intervention trials implementing Lean Hospital to determine its effect in reducing waiting times for services at the outpatient pharmacy depot.

METHOD

This study uses operational research methods with a qualitative approach through the application of Lean Hospital by observing, interviewing 12 selected informants, and document review. Primary data were obtained through direct observation of the time required for outpatient pharmaceutical prescription services, and as in-depth interviews with management, the Head of Pharmacy Installation, regular outpatient pharmacy depot staff, and patients. The selection of informants is based on several provisions, including appropriateness and adequacy. Informants are also still directly involved in research activities and can provide adequate time to be asked for information within the scope of the research time. Based on these provisions, the informants in this study are from the managerial hospital (1 person), the head of pharmacy installation (1 person), the person in charge of the outpatient pharmacy (1 person), implementing staff in the outpatient pharmacy installation consisting of pharmacists and pharmaceutical technical personnel (6 people), and patients/patient families (3 people). Document review is carried out by studying policies, guidelines, and standard operating procedures related to drug services in pharmaceutical installations and other related hospital documents. This research was conducted at the Regular Outpatient Pharmacy Depot RSPON Jakarta in May-July 2023. The research has gone through an ethical review process to obtain ethical clearance from The Research and Community Engagement Ethical Committee Faculty of Public Health, Universitas Indonesia, with ethical approval number Ket-159/UN2.F10.D11/PPM.00.02/2023 and ethical approval Number DP.04.03/KEP/062/2023 from RSPON Jakarta Research Ethics Committee. To ensure that the information we derive from research data accurately reflects the truth about phenomena under investigation, different research methods are used. Triangulation is one method that helps increase the validity, reliability, and legitimation, which encompasses credibility, dependability, confirmability, and transferability, of research findings (Moon, 2019).

Quantitative data processing and analysis were carried out by univariate analysis by calculating the average value, maximum value, and minimum value to describe the time required for each prescription service process (lead time), as well as to determine the time of activities that provide added value or value added time (VAT) and non-value added time (NVAT). Qualitative analysis was conducted by recapitulating the re-

sults of observations combined with the results of relevant in-depth interviews and then narrating descriptively.

RESULT AND DISCUSSION

In the current state condition analysis, the patient's regular outpatient pharmacy service flow at RSPON Jakarta is generally divided into three main stages: the prescription review process, drug preparation, and drug delivery. This is in accordance with Minister of Health Regulation on Number 72 of 2016 concerning Pharmaceutical Service Standards in Hospitals. The flow of patient prescription services at the RSPON Jakarta Regular Outpatient Pharmacy is explained in Figure 1 below:

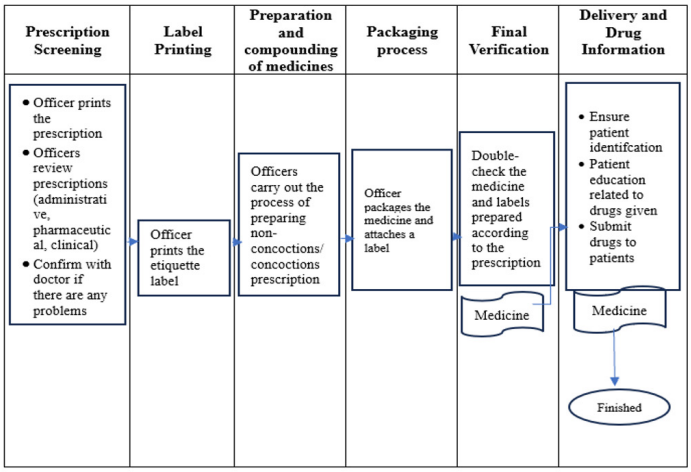

Figure 1. Prescription Service Flow at the RSPON Jakarta Regular Outpatient Pharmacy

The observation process for measuring prescription service time was carried out using the time and motion study method by recording the time of value-added activity (VA) and non-value-added activity (NVA) from each stage of the outpatient prescription service process flow, starting from the time the prescription is entered on the e-prescription until the patient receives the medicine. Each officer's activity in the prescription service process is followed, and the Value-Added Time (VAT), Non-Value-Added Time (NVAT), Cycle Time (CT) for each stage, and Lead Time (LT) are calculated. The Value Stream Mapping (VSM) description of finished drug prescription services in the current state can be seen in the following picture:

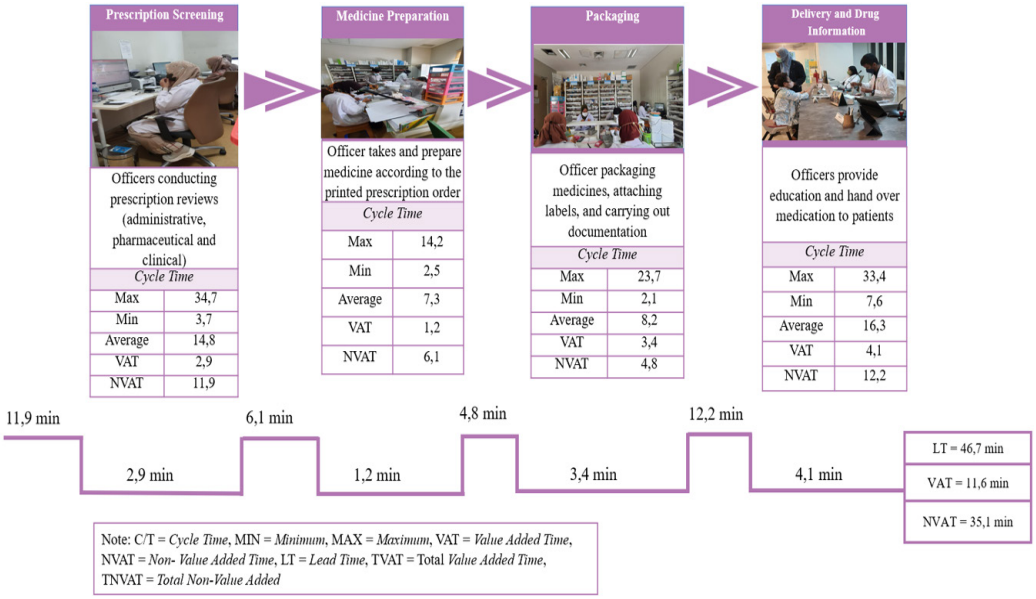

Figure 2. Current State Value Stream Map of Non-concoction Prescriptions

Based on the results of VSM observations for the flow of finished medicine prescription services, it was found that in the current state, the lead time for non-concoction medicine services is 46.7 minutes, with an average VAT of 11.6 minutes and NVAT of 5.1 minutes. So the ratio of value

added activities to total service time is 25%:75%. Based on the data above, the assessment stage and drug delivery stage have the longest NVAT with 11.9 minutes and 12.2 minutes respectively out of a Total Non-Value-Added Time (TNVAT) of 35.1 minutes. This means that NVAT at the assessment and drug delivery stages contributed to 68.67% of TNVAT. If the types and causes of waste at the assessment and delivery stages can be identified, then 68.67% of waste can be resolved.

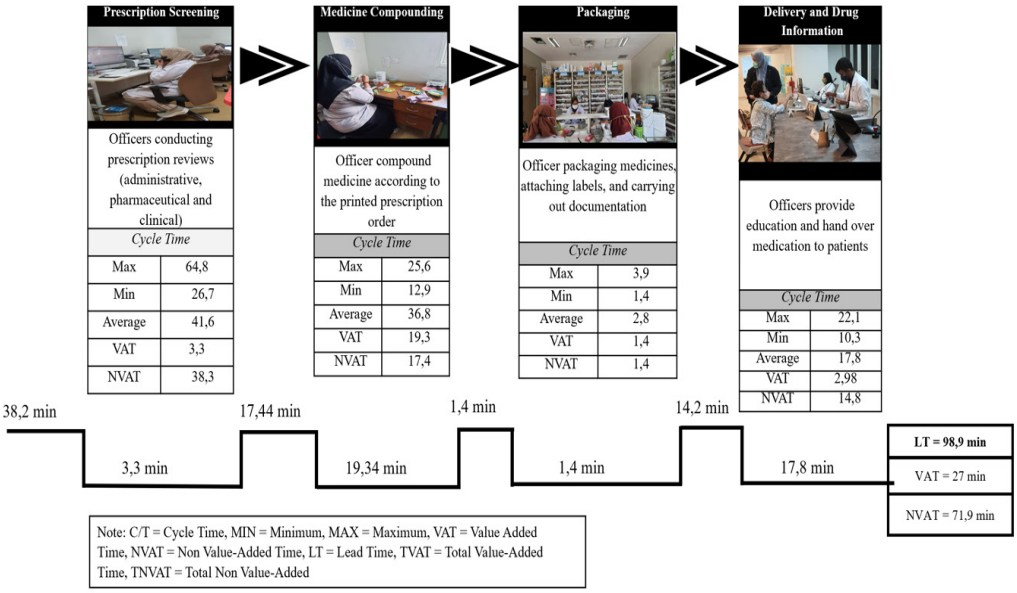

Figure 3. Current State Value Stream Map of Concoction Prescriptions

Based on the results of VSM observations for the flow of concoction prescription services, the lead time was 98.9 minutes, with an average VAT of 27 minutes and NVAT of 71.9 minutes. The ratio of value-added activities to total service time is 27%:73%. Data obtained from the prescription review stage had the longest NVAT of 38.3 minutes out of TNVAT of 71.9 minutes. This means NVAT at the prescription review stage contributes to 53% of TNVAT.

The results of observations of the cycle time for each stage in the VSM of concoction prescription services show that the longest NVA is the delay between the prescription being entered into the e-prescription and getting a response from the pharmacy officer for review (an average 38.2 minutes). From the observations, it was found that delays were mainly caused by officers still carrying out activities on previous prescriptions due to slow loading and network connections during peak hours, as well as confirmation from doctors regarding prescriptions.

Identification of VA and NVA Activities

The results of direct observation apart from calculating time, also observing, and recording value-added activities and non-value-added activities from each stage of the outpatient prescription service process flow, as follows:

Based on the observation results, it was

Table 1. Value Added and Non-value-added Activities during the Value Stream Map Process.

Activity step	Value added activities			Non-value-added activities		
	Activity	Average VAT (minutes)	Number of Activities	Activity	Average VAT (minutes)	Number of Activities
			Non-concoction prescriptions			
Prescription review	Prescription screening process	2.1	30	Queue for reviewing prescriptions	6.4	30
	Print prescription orders, copy prescriptions (if any)	0.3	30	Officers do double assessment in the system	1.5	3

Activity step	Value added activities			Non-value-added activities		
	Activity	Average VAT (minutes)	Number of Activities	Activity	Average VAT (minutes)	Number of Activities
Non-concoction prescriptions						
				E-prescriptions that have been printed are stacked before being taken by the preparation officer	3.2	30
Preparation of medicine	Preparation of non-concoction medicine	1.2	25	Queues waiting to be prepared for medication	6.1	30
Medicine Packaging	Carry out re-verification of medication	0.6	30	Stacking of drug trays that have been prepared, before being delivered to the drug delivery officer	4.8	30
	Put the medicine in plastic medicine packaging	1.4	30			
	Attach medication labels	1. 2	30			
	Documentation of drug preparation at the Hospital EHR using a tablet/cell phone	0.8	30			
Medication dispensing	Verify/check suitability of drugs, prescriptions	0.3	30	Waiting for the queue (prescriptions are finished simultaneously, thus have to wait for the delivery of other drugs)	8.3	30
	The medication dispensing officer calls the patient	0.2	30	Officers search for and administer medication to patients who are absent when called or from previous visits	3.1	8
	Medication dispensing and education to patients	3.2	30	Officers respond to patient interruptions asking about queues or medication collection procedures	0.8	9
	The officer informs about next visit schedule	0.6	30			

Activity step	Value added activities			Non-value-added activities		
	Activity	Average VAT (minutes)	Number of Activities	Activity	Average VAT (minutes)	Number of Activities
Concoction prescriptions						
Prescription review	Prescription screening process	2.4	5	Queue for reviewing precriptions	26.2	5
	Print prescription orders, copy prescriptions (if any)	0.5	5	Print etiquette labels must be done one by one, if there are many drug items, it will take longer	0.8	5
	Checklist and initial the prescription review documentation form	0.4	5	The e-prescriptions that have been printed are stacked before being picked up by the preparation staff	11.3	5
Preparation of medicine	Drug compounding (calculated, blended, put into capsules)	19.3	5	The concoction officer is also in charge of production: making mixed analgesic capsules	17.4	3
Medicine Packaging	Carry out re-verification of medication	0.2	5	Stacking of drug trays that have been prepared, before being delivered to the drug delivery officer	1.4	5
	Put the medicine in plastic medicine packaging	0.3	5			
	Attach medication labels	0.5	5			
	Documentation of drug preparation at the Hospital EHR using a tablet/cell phone	0.4	5			
Medication dispensing	The medication dispensing officer calls the patient	0.3	5	Waiting for the queue (prescriptions are finished simultaneously, thus have to wait for the delivery of other drugs)	11.3	5
	Medication dispensing and education to patients	0.2	5	Officers search for and administer medication to patients who are absent when called or from previous visits	2.7	1
	The officer informs about next visit schedule	1.8	5	Officers respond to patient interruptions asking about queues or medication collection procedure	0.8	3
	The medication dispensing officer calls the patient	0.6	5			

found that there was a NVAT delay/delay in both non-concoction and concoction prescription services, the longest delay being the waiting time between the prescription being entered in the e-prescription until the prescription assessment officer responded to the prescription. This is because a lot of drug prescriptions come in at the same time and increasingly pile up during busy service hours, namely when many doctors start practicing simultaneously (usually Monday-Thursday, 09.00-13.00), officers wait for the loading time on the information system. Officers also sometimes have to reconfirm by telephone to the doctor, either because of the dosage or availability of drug stock.

After finding non-value-added activities (waste), then proceed with determining the type of waste as summarized in Table 2 below:

Table 2. Non-value-added Activities (Waste) and Types of Waste

Non-value-added Activities	**Average NVAT (minutes)**	**Types of Waste**
Non-concoction Prescriptions		
Queue for reviewing prescriptions	6.4	*Waiting*
Officers do double assessment in the system	1.5	*Overprocessing*
Print etiquette labels must be done one by one, if there are many drug items, it will take longer	0.8	*Overprocessing*
E-prescriptions that have been printed are stacked before being taken by the preparation officer	3.2	*Waiting*
Queues waiting to be prepared for medication	6.1	Waiting
Stacking of drug trays that have been prepared, before being delivered to the drug delivery officer	4.8	*Waiting*
Waiting for the queue (prescriptions are finished simultaneously, thus have to wait for the delivery of other drugs)	8.3	*Waiting*
Officers search for and administer medication to patients who are absent when called or from previous visits	3.1	*Overprocessing*
Officers respond to patient interruptions asking about queues or medication collection procedures	0.8	*Waiting*
Concoction Prescriptions		
Queue for reviewing prescriptions	26.2	*Waiting*
Print etiquette labels must be done one by one, if there are many drug items, it will take longer	0.8	*Overprocessing*
The e-prescriptions that have been printed are stacked before being picked up by the preparation staff	11.3	*Waiting*
The concoction officer is also in charge of production: making mixed analgesic capsules	17.4	*Waiting*
Stacking of drug trays that have been prepared, before being delivered to the drug delivery officer	1.4	*Waiting*
Waiting for the queue (prescriptions are finished simultaneously, thus have to wait for the delivery of other drugs)	11.3	*Waiting*
Officers search for and administer medication to patients who are absent when called or from previous visits	2.7	*Overprocessing*
Officers respond to patient interruptions asking about queues or medication collection procedure	0.8	*Waiting*

Based on Table 2, 9 non-value-added activities were found in the prescription drug service, 85% of the activities were waste waiting with a total non-value-added time = 29.7 minutes, and 15% of the activities were waste overprocessing with a total non-value-added time of 5 .4 minutes. In concoction drug prescriptions there are 8 non-value-added activities, with 94% types of waste

waiting with a total non-value-added time = 68.4 minutes and 6% waste overprocessing with a total non-value-added time of 3.5 minutes.

The following is a Pareto diagram based on the type of waste in non-value-added activities in finished drug prescriptions and concoctions:

Based on Figure 4, the type of waste that contributes most to the prescription of concoction drugs is waiting because it has a high cumulative value of 85%, especially at the drug assessment and delivery stage. So, lean interventions are focused on types of waste waiting and overprocessing.

For concoction drug prescriptions, critical

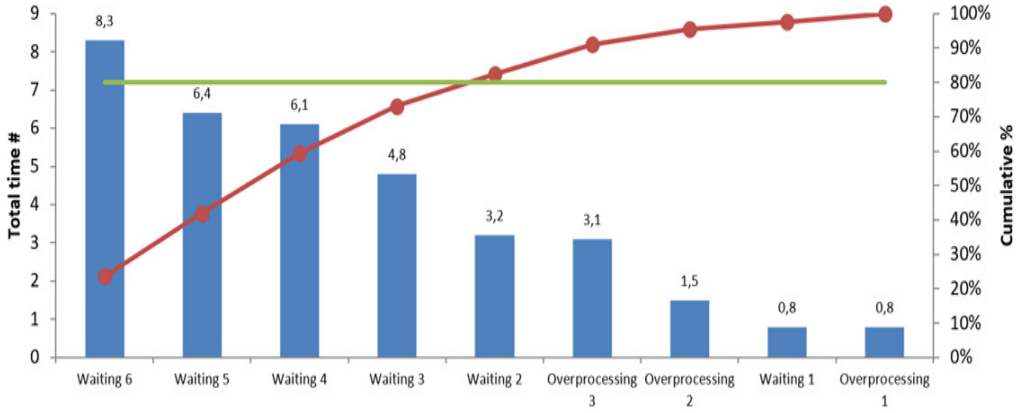

Figure 4. Pareto Diagram on Waste of Non-concoction Prescriptions

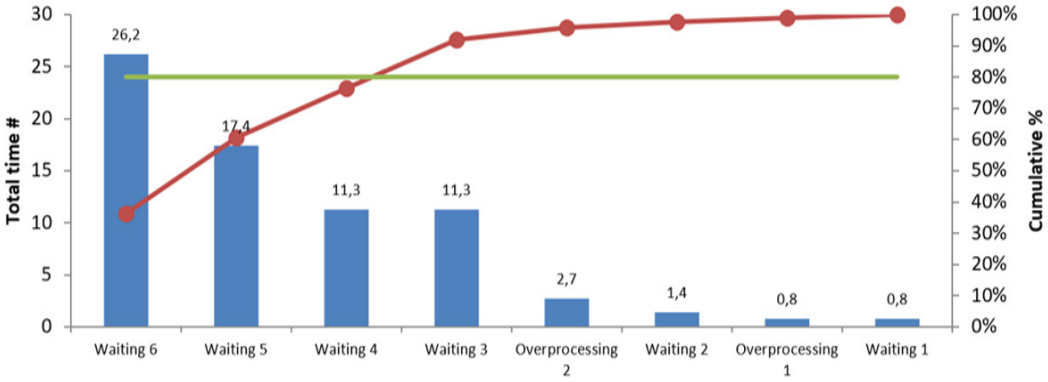

Figure 5. Pareto Diagram on Waste of Concoction Prescriptions

waste is waiting with a cumulative 94%, especially at the prescription review stage, so lean interventions can be focused on this waiting waste.

Identification of the causes of waste. Based on the results of observations and interviews, various factors were obtained that became the problem of waiting time, including:

1. There is a buildup of incoming e-prescriptions waiting to be reviewed during peak hours at 09 AM to 01 PM because there is an imbalance between the number of employees and the number of prescriptions during peak hours. The regulation of the number of employees during peak hours is not optimal, so it is necessary to rearrange the number of existing employees accordingly with a workload during peak hours.
2. There are still quite a lot of patients/families who still ask the pharmacy counter about procedures and queues for taking medicines.
3. The e-prescription information system could be more optimal: internet capacity/loading could be faster, especially during peak hours, prescription screening notifications are not yet effective so there is no double processing, and drug label printing must be done one by one.
4. Regular outpatient pharmacy staff is still combined with executive outpatient pharmacy.
5. Drug dispensing officers still concurrently carry out the task of producing mixed capsule concoction drugs every day due to a lack of human resources in the production department.
6. Lack of pharmaceutical personnel to carry out prescription reviews and drug preparation.
7. Lack of facilities, such as computers, tab-

lets, and microphones for calling patients, monitoring lists of patients who are absent/absent when their name is called. 8. The need to improve room facilities (the room is too narrow, and the distance between the counters is very close so that it is sometimes disturbing when pharmacists perform PIE on patients; provision of equipment such as blenders and small capsule-making tools and the absence of supporting facilities for employee needs such as toilets, pantries.

To find the causes of waste in prescription services at outpatient pharmacies, a root cause

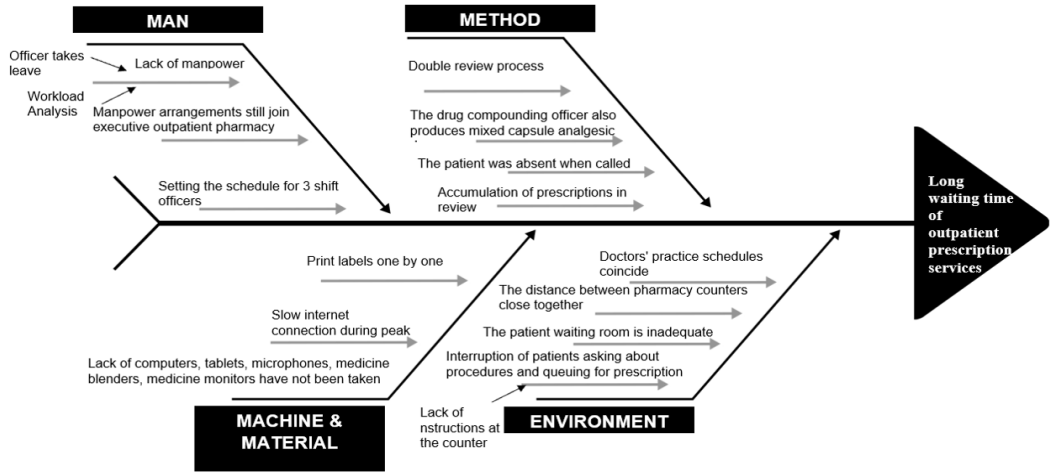

Figure 6. Fishbone Diagram of the Causes of Waiting Times for Outpatient Prescription Services

analysis is carried out using the following fishbone diagram tool:

The problem stems from long response times in prescription service due to human resources, procedure/method, and material and machine factors. Inefficiency in human resources, double/multiple drug dispensing officer assignments, and slow Information Technology facilities can contribute to waiting times. Environmental factors, such as morning doctor appointments, can also cause a buildup of prescriptions and longer waiting times.

The Lean Hospital implementation that was attempted was the Balancing-Heijunka and seiri, seiton, seiso, seiketsu, dan shitsuke (5S) methods, as follows:

Lean Hospital's principle of process balancing aims to improve the flow of value by equalizing time needed to complete each process stage. To achieve this, shift work hours are rearranged to accommodate accumulating prescriptions during busy hours. The prescription screening secti-

Table 3. Modification of Shift Schedule for Outpatient Pharmacy Officers
Before shift modification:

Shift	**Screening Prescription Officers**	**Medicine Preparation & Compound Officers**	**Packaging Officers**	**Delivery and Education Officers**	**Total**
Morning Shift (07.30-15.30)	3	2	2	3	10
Middle Shift (09.00-17.00)	4-5	2	2-3	4	12-14
Afternoon Shift (13.00-19.00)	3-4	2	2	3	10-11

After shift modification:

Shift	**Screening Prescription Officers**	**Medicine Preparation & Compound Officers**	**Packaging Officers**	**Delivery and Education Officers**	**Total**
Morning Shift (07.30-15.30)	5	2	2-3	4-5	14-15
Middle Shift (09.00-17.00)	5	2	2-3	4-5	14-15
Afternoon Shift (13.00-19.00	4	2	2	3	11

on is optimized, with 4-5 officers working during rush hours and rearranging employee schedules during peak hours. Additional overtime is categorized as overtime, aiming to overcome morning prescription accumulation for sustainability.

1)The application of the 5S method so that the atmosphere and work environment are clean. The main purpose of 5S is to prevent problems and establish a work environment that makes it easier for employees to provide the best service to patients in an effective way (Kanamori et al., 2015). Figure 7 shows a full workbench with documentation and a prescription, and a label printer. With the implementation of 5S, making the workplace tied and cleaner, it seems easier to find the items needed.

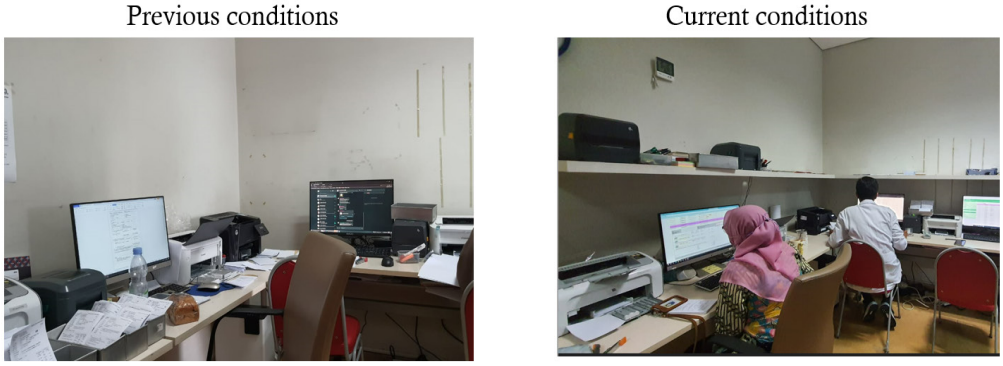

Figure 7. 5S Implementation on Prescription Screening Desk

After the intervention was carried out for two weeks, the researcher then took data to find out the future current state map, with a total sample of prescriptions taken for direct observation using the time and motion study method again amounting to 30 prescriptions, consisting of 25 drug prescriptions so and five prescriptions for concocted medicine. Value stream mapping data in future state conditions for finished drug prescriptions and concoctions are as follows:

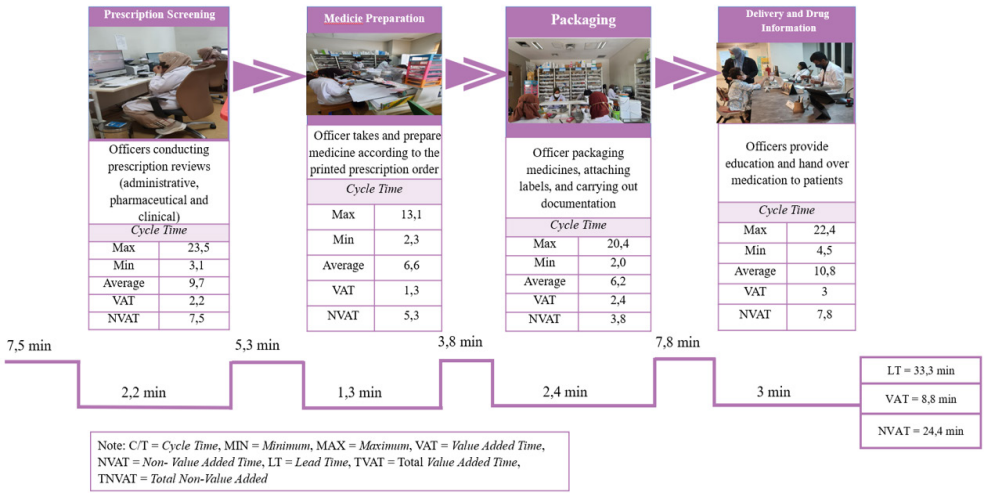

Figure 8. Future State Value Stream Map of Non-concoction Prescriptions

Based on the results of Value Stream Mapping observations for prescription drug service flow, it was found that the lead time for finished drug service was 33.3 minutes, with an average value added of 8.3 minutes and 24.4 minutes of non-value added. Thus, there is a decrease in lead time of 28%.

The results of Value Stream Mapping observations in the future state conditions for the flow of concoction prescription services show that the lead time for concoction drug services is 67.1 minutes, with an average value added of 25.6 minutes and 41.5 minutes of non-value added. This means that there is a decrease in a lead time of 32%.

Description of Waiting Time for Outpatient Drug Services

The RSPON Jakarta Pharmacy Installation's total lead time for outpatient drug

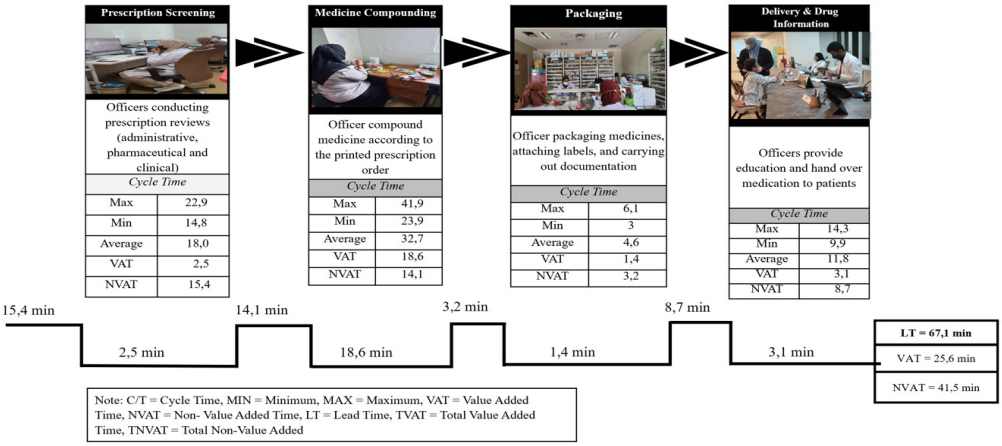

Figure 9. Future State Value Stream Map of Concoction Prescriptions

service was 46.7 minutes for finished drugs and 98.9 minutes for concoctions, exceeding the Ministry of Health's standards of 30 minutes and 60 minutes respectively. This result is in line with several other studies where the waiting time for drugs still exceeds the Minimum Service Standards, such as thoseat Atmajaya Hospital, GPI Hospital, and Mitra Husada Hospital (Suryana, 2018, Yuliati, 2021, Elawati, 2022). The C/T prescription review stage required the longest time compared to C/T at other stages with a proportion of 62.68% of the lead time while the NVAT at the review stage was 67 .97% of the total NVAT (Rasyid, 2017). A company is considered a lean enterprise if the value-to-waste ratio reaches 30%; based on the observations above, the RSPON Jakarta pharmaceutical installation service is still considered an Un-Lean Enterprise (Gaspersz 2007).

Analysis of Non-Value-Added Activities

The study results found that there were 9 non-value-added activities in non-concoction prescription services and 8 in concoction prescription services, where the highest non-value-added activities were in the waste waiting and overprocessing categories. Waste waiting is an ineffective process and wastes time when one process remains to start while another is finished, when the process flow should run smoothly and continuously (Yuliati, 2021). H This result is in line with the research results in the Outpatient Pharmacy Installation at Abdul Wahab Hospital, Samarinda, amounting to 33.8% (Wulandari, 2023). Critical waste in the outpatient pharmacy at PKU Muhammadiyah Bantul Hospital is waste waiting (Triyani, 2019). Critical waste is waste waiting due to shortages of medicines, so pharmacists have to confirm with the doctor, which affects the length of time waiting for medicines (Yuganingsih, 2021). The type of overprocessing waste is in second place in this research. Overprocessing waste is adding work that is not needed. Over-processing as one of the seven wastes was caused by the presence of unclear standards and specifications. Several operators often try to provide the best services, but are not always aware of factors that truly add value to the product (Harahap et all., 2023).

From the analysis of the causes of waste in outpatient prescription services using the fishbone diagram, it was found that three main causes of problems are as follows:

1)Prescriptions pile up due to polyclinic doctors practicing at the same time, increasing waiting times for the drug queue. Prescriptions coming together increased the waiting time for the drug queue (Purwanto, 2015). The root cause is an imbalance between employee numbers and prescriptions during busy hours, as the regulation of the prescription reception section was not optimal. The number of human resources needed to be in accordance with needs can affect the length of service time. Pillay (2011) states that workloads that exceed the ideal capacity of human resources can cause long waiting times for prescription services. A shortage of pharmaceutical human resources will cause a buildup of prescriptions that must be served, especially with the increasingly dense medical services at certain hours, thus affecting patient waiting times (Loh, 2017).

2)E-prescriptions, which are part of hospital information system, help increase the efficiency and effectiveness of hospital services so that leaders can make policies quickly, precisely, and accurately based on information related to health services in hospitals (Topan, M., & Najoan, 2015). E-prescriptions are currently quite optimal in their utilization. Input from pharmacists

as users further enhances the role and function of hospital information system in outpatient prescription services. Inadequate computer system resulted in longer prescription service queues (Purwanto, 2015) .

3)Availability of facilities and infrastructure that support officers in outpatient prescription services. The facilities and infrastructure is one of the factors affecting the waiting time for outpatient drug prescriptions in hospitals, for instance internet-based computer programs possess drawbacks due to unstable internet connections, also the equipment for conducting prescription services was frequently damaged so that it interferes with the service process (Fitriah et al., 2016)

Lean's goal is to continuously increase customer value by identifying VA and NVA which does not provide added value (waste). In this study, the most waste found was waiting. Having the same polyclinic hours is the reason for the accumulation of prescriptions at certain hours (09-13, Monday-Thursday). One of the tools in lean that can be used as a solution is Heijunka (in Japanese means "leveling"), which is trying to make the entire work process take place at a certain level that is the same and even in all conditions, to avoid fluctuations, because fluctuations mean something not planning (Santoso, 2020). One of the concepts from Heijunka that can be implemented is to modify the shift schedule of outpatient pharmacy employees to anticipate the bottleneck buildup of prescriptions in the morning so that, in the end, it will be able to reduce waiting times. At this level, the workload is distributed evenly at all times so that the principle of just in time can be applied (Ledbetter, 2018). Another study also recommends rearranging middle shift working hours in the hope of overcoming the accumulation of prescriptions to reduce drug waiting times (Elawati, 2022).

The second intervention is applying the 5S method so that the work atmosphere and environment make it easier for officers to carry out their work. This is also due to the limited space at the RSPON Jakarta outpatient pharmacy depot. 5S is a technique improves efficiency, productivity and quality by making the workplace orderly, pleasant and organized (Chandrayan et al., 2019). Long waiting times can be caused by hospital management information system, which often experiences a long loading process, especially during busy service times, so officers need more time to process incoming prescriptions (Everdine, 2023).

Based on the research results on future state conditions, there is a significant decrease in the percentage of total non-value-added time during the outpatient prescription service process, both non-concoction and concoction prescriptions, influencing reducing lead time. This is in accordance with lean theory, where the focus of lean intervention is reducing or eliminating waste (non-value-added activity), whereas this research is modifying shifts for pharmacy staff as an effort to help reduce the bottleneck of incoming prescriptions and eliminate piling up activities (waste waiting). The critical waste found in the outpatient pharmacy of RSU PKU Muhammadiyah Delanggu was waste of waiting. After the lean hospital intervention, the lead time for drug prescription services fell from 54.35 minutes to 39.23 minutes and was delayed. Service fell from 44.25 minutes to 30.01 minutes, and the Value Added Ratio (VAR) rose from 15% to 22.8% (Nurlaila, 2022). The waiting time for chronic prescription services at RSU Dr. Zainal Abidin before the intervention was 86 minutes, decreased to 56 minutes after the lean redesign layout intervention (Yani, 2022).

Lean Hospital is a sustainable approach to process improvement, improving workflow in hospitals, which requires coordination and collaboration between related units to create a smoother and more efficient workflow so that patient service waiting times can be reduced and the treatment process is more effective.

CONCLUSION

In this study, lean hospital intervention with the balancing method, Heijunka, through modification of pharmacy staff shifts and 5S, in the future state, resulted in a 28% reduction in lead time for finished drug prescriptions and 32% for compounded prescriptions. The causes of waste include inefficiency of human resources, imbalance in the number of personnel and incoming prescriptions, concurrent doctor's practice schedules, no separation system for regular and executive outpatient prescription service officers, the need to optimize e-prescriptions and the number of interruptions of patients asking questions at the pharmacy counter. The application of lean hospital as a continuous improvement effort in achieving improved outpatient pharmacy prescription services must be accompanied by the fulfillment of personnel and facility needs to achieve waiting times according to standards.

ACKNOWLEDGEMENT

The researcher thanks to National Brain Center Hospital Prof.Dr.dr. Mahar Mardjono Jakarta and Faculty of Public Health, Universitas Indonesia, Depok, Indonesia.

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