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WASTE ANALYSIS IN OUTPATIENT SERVICES AT HOSPITAL USING LEAN PRINCIPLES

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ABSTRACT

Background : Quality improvement (QI) is a practice that hospitals use to improve efficiency, clinical outcomes, employee satisfaction, and patient safety. One of the QI practices is the implementation of lean principles. Lean is a set of methods intended to eliminate waste and increase process efficiency. Lean implementation can have a significant impact on operational efficiency and effectiveness. This research is aimed at analyzing services at the RS Naili DBS Outpatient Installation using lean principles.

Method : This research use a qualitative descriptive design, where observations will be made to identify waste that occurs in outpatient services. Data collection was carried out through direct observation of the outpatient service process from arrival to receiving doctor consultation services. From the observations, visualization of the service process was carried out using big picture mapping and analysis of waiting time and waste was carried out using lean principles. Apart from that, in-depth interviews were conducted with selected informants, namely from within the hospital and patients as service recipients.

Result : The results of the research showed that the outpatient waiting time from the time the patient contacted the registration officer until the doctor's service was completed was 1 hour 18 minutes 50 seconds. This time still exceeds the minimum service standard set by the government, namely 60 minutes. The results of observations regarding waste, found as many as 36 types of waste spread across the queuing process, registration, polyclinic waiting room and clinic room.

INTRODUCTION

Hospitals are health service institutions for the community with their own characteristics that are influenced by the development of health sciences, technological advances, and the socio-economic life of the community which must still be able to improve better quality and affordable services by the community in order to realize the highest degree of health [1]. Increased costs, poor service quality, and high prevalence of medical errors encourage hospitals as health institutions to continue to innovate. One of the efforts made is to adapt quality improvement (QI) practices.

The implementation of QI aims to improve efficiency, clinical outcomes, employee satisfaction, and patient safety. However, healthcare professionals are often inexperienced with QI techniques. Due to ignorance, health professionals are somewhat skeptical of QI efforts, not even sure if these techniques, created in non-health settings, can actually improve health care [2]. One of the practices of QI is the

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application of lean principles. The lean management philosophy originated in the manufacturing industry, pioneered by Toyota Motor Corporation, which is seen as a pioneer in the utilization of this QI method. Lean has yielded remarkable results in improving quality and efficiency in both the manufacturing industry and the service sector industry [3].

Lean is a set of methods and tools intended to eliminate waste and improve process efficiency. Waste is defined as something that does not add value or is not necessary to a product or process. [4]. In the current economic situation, it is very important to reduce waste. Therefore, finding solutions that are low cost while increasing value for customers and companies is essential [5].

Patient satisfaction is one of the indicators of national quality of health services. Hospitals must ensure the accuracy of health services, including in outpatient units. Outpatient is a functional unit that handles the admission of patients at the hospital, both those who are undergoing outpatient treatment and those who will be treated in the hospital. Outpatient services start from patient registration in the medical record to drug receipt at the pharmacy [6]. Based on the Manual of Hospital Planning and Designing, outpatient services provide the following functions: consultation with specialist doctors and sub-specialists, physical examinations, providing day care base care, performing minor procedures, ongoing consultation and case management, pre-operative examination of patients, providing education and counseling to patients and families related to health, referring patients to other specialties or sub-specialties get a second opinion or follow-up treatment and treatment, refer patients for inpatient services, as a training and education center for health students, a link between the community [7]

Even though they are not in an emergency or emergency condition, they must still be served within the stipulated time. This is to ensure that the patient's needs for a diagnosis and treatment plan are met. Long waiting times can lead to patient dissatisfaction and delays in diagnosis and treatment. The outpatient waiting time in question is the time needed from the time the patient comes into contact with the registration officer until he or she receives the services of a doctor/specialist, and the time set in the national quality indicator is 60 minutes [8]

In 2018, research was carried out at dr. Rasidin obtained the results of the average waiting time for outpatient patient services, which is 99 minutes or 1 hour 39 minutes. Of the 53 patients observed, 35 patients experienced a waiting time of more than 60 minutes [9]. Another research conducted in 2019 at dr. Reksodiwiryo shows the average waiting time for outpatient treatment is 212 minutes. The results of this research were obtained that 105 people experienced an unfinished waiting time and only 3 people met the standard [10].

Based on the results of the study occurs in outpatients services at Tugu Depok Hospital can be concluded that the results of the patient assessments starting from the registration process to getting drugs at the pharmacy still show too long a wasting time. This happens because of the many obstacles that occur along the outpatient unit service process. The results of the identification of activities and activities during the work process of the outpatient unit were found to be wasted, so that the ratio of Value Added Activities was less than 30%, as a form of problem in humans / men, namely radiology doctors who are not full-time so that the supporting results are long, there is no customer service, the skills of some nurses are considered lacking, nurses are in two poly rooms at once, doctors who are late and many medical record officers have not participated in the Medical Record training. Meanwhile, in the method, it was found that there were still errors in the swipe card at Admission but over the limit at the cashier, the patient's outpatient flow was not standard, especially in terms of administration, there was no use of social media and registration by phone [11].

RS Naili DBS is one of the private hospitals in the city of Padang that has been operating since 2016. RS Naili DBS must be able to meet the expectations of patients as consumers to achieve the highest satisfaction while still considering the effective and efficient use of resources. With several new policies from the government and the high demand for good health services from the community, it will certainly greatly affect the strategy and planning at RS Naili DBS.

Based on the quality committee report and an interview with the Chairman of the Quality Committee of RS Naili DBS, the waiting time at the Outpatient Installation during 2022 was only achieved 3 times,

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namely in April, July and August and no quality of waiting time has been achieved during 2023. This occurs due to various factors but has never been analyzed by directly observing the service flow in the Outpatient Installation. The quality of health services in hospitals is said to be poor if many patients are not satisfied with the services they receive. Patient dissatisfaction not only has an impact on the decrease in the number of hospital visits but also on their health status. They do not get health services according to their needs.

The number of patient and doctor comparisons greatly affects the waiting time experienced by patients. With a large number of patients and inadequate doctors, it can cause the waiting time experienced by patients to be quite longThe number of patient-doctor comparisons greatly affects the waiting time experienced by patients. With a large number of patients and inadequate doctors, it can cause the waiting time experienced by patients to be quite long [12]

Departing from the background and the absence of direct observation of the problems found, this research is aimed at analyzing services in the Outpatient Installation of RS Naili DBS using lean principles. Direct observation is needed to be able to see the actual situation in the field so that problems and efforts that can be made to improve the quality of service in outpatient installations can be formulated. Good service quality will increase patient satisfaction which will contribute directly to an increase in the number of patients and an increase in hospital income.

METHOD

This research use a qualitative descriptive design occurs in outpatient services on July 2023 at RS Naili DBS. Data collection was carried out through direct observation of the outpatient service process from arrival to receiving doctor consultation services. From the observation results, the visualization of the service process was carried out with big picture mapping and an analysis of waiting time and waste was carried out with lean principles. Furthermore, the cause of waste was identified through a fishbone diagram. In addition, in-depth interviews were conducted with selected informants, namely from within the hospital and patients as service recipients. The outcomes will be determined by the analysis of the content. The process of analyzing and validating data using the triangulation method, namely through source triangulation and method triangulation. Informant in this research is director, head and staff of outpatient department, medical record department, doctor and outpatient patients.

RESULTS AND DISCUSSION

Service Time Analysis

Observations were made to 35 patients at Internal Medicine clinic for 7 days to get the service time of each patient from arrival to completion receive doctor consultation services. Service time observation consists of service cycle time (CT), waiting time (WT) and overall time (lead time / LT) [13]. The observation results are projected to be big picture mapping and the value of each activity is categorized.

1. Cycle Time

The cycle time of outpatient services is described as follows:

Table 1. *Outpatient Service Cycle Time*

No	Activities	Time		
		Minimum Hours.Minutes.Seconds	**Maximum** Hours.Minutes.Seconds	**Average** Hours.Minutes.Seconds
Queue				
1	Queue number retrieval	00.00.01	00.08.00	
2	KIUP filling (for new patients)	00.04.00	00.06.00	00.00.38
Registration				
3	New patient enrollment	00.05.00	00.07.00	
4	SEP Printing	00.03.00	00.06.00	00.04.25
5	SEP file search	00.01.00	00.03.00	
6	Printing of insurance files	00.03.00	00.05.00	

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No	Activities	Time		
		Minimum Hours.Minutes.Seconds	**Maximum** Hours.Minutes.Seconds	**Average** Hours.Minutes.Seconds
Polyclinic Waiting Room				
7	File submission and tension check	00.03.00	00.05.00	00.03.00
Consultation Room				
8	Consultation & Examination	00.03.00	00.10.00	00.05.26
	Total			00.13.29

Source : Processed Field Data, 2023

Based on the results of the study, it was found that the total cycle time of outpatient services was 13 minutes 29 seconds. The average duration of consultation and examination with a doctor is 5 minutes 26 seconds and the other duration of time is the administrative process.

2. Waiting Time

From the observation results, it was found that the waiting time for outpatient services was described as follows:

Table 2. *WaitingTime* Outpatient Services

No	Activities	Time		
		Minimum Hours.Minutes.Seconds	**Maximum** Hours.Minutes.Seconds	**Average** Hours.Minutes.Seconds
Queue				
1	Queue number retrieval	00.00.01	00.08.00	
2	KIUP filling (for new patients)	00.04.00	00.06.00	00.00.38
Registration				
3	New patient enrollment	00.05.00	00.07.00	
4	SEP Printing	00.03.00	00.06.00	
5	SEP file search	00.01.00	00.03.00	00.04.25
6	Printing of insurance files	00.03.00	00.05.00	
Polyclinic Waiting Room				
7	File submission and tension check	00.03.00	00.05.00	00.03.00
Consultation Room				
8	Consultation & Examination	00.03.00	00.10.00	00.05.26
	Total			00.13.29

Source : Processed Field Data, 2023

Based on the results of the study shown in table 2, the total waiting time for outpatient services is 1 hour 48 minutes 07 seconds. The longest waiting time is waiting for consultation, which is with an average time of 1 hour 3 minutes 46 seconds and a queue waiting time with an average time of 40 minutes and 6 seconds. Waiting time is the most spent time by patients in this study. The long waiting time in the queue occurs due to the accumulation of patients who will register on one. This accumulation of patients occurs from Monday to Friday from 14.00 – 17.00 where the doctor's practice schedule is concentrated at that time.

3. Lead Time

From the observation results, it was found that the waiting time for outpatient services was described as follows:

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Table 3. *Outpatient Service Lead Time*

No	Activities	Time		
		Minimum Hours.Minutes.Seconds	**Maximum** Hours.Minutes.Seconds	**Average** Hours.Minutes.Seconds
Queue				
1	Queue number retrieval	00.00.01	00.08.00	00.00.41
2	Filling of KIUP (new patients)	00.04.00	00.06.00	00.05.00
3	Queue	00.02.00	01.22.00	00.40.06
			Total	00.40.48
Registration				
4	New patient enrollment	00.05.00	00.07.00	
5	SEP Printing	00.03.00	00.06.00	00.04.25
6	File search	00.02.00	00.04.00	
7	Printing of insurance files	00.03.00	00.05.00	
			Total	00.04.25
Polyclinic Waiting Room				
8	File submission and tension check	00.05.00	00.07.00	00.03.00
9	Waiting for a tension check	00.00.00	00.06.00	00.01.18
10	Waiting for Consultation	00.12.00	02.06.00	01.03.46
			total	01.07.12
Consultation Room				
11	Consultation & Examination	00.03.00	00.10.00	00.05.26
12	Waiting for an unavailable tool/file	00.02.00	00.04.00	
13	Waiting for the introductory file of supporting examinations/medicines/medical records	00.01.00	00.02.00	00.01.37
			Total	00.07.13
Total				**01.59.38**

Source : Processed Field Data, 2023

Based on the results of the study shown in table 12, the total lead time or total overall outpatient services is for 1 hour 59 minutes 38 seconds. Total outpatient services are the time that patients live from the time they come to register at the hospital until they finish receiving consultations and examinations

The length of service can be caused by an imbalance between the supply and demand of services that causes queues. Queues can occur in various hospital services, both medical (such as outpatient, inpatient, pharmacy, surgery, hemodialysis) and non-medical (such as finance, maintenance, kitchen, canteen). This happens because the subject of the queue is not only people, such as patients, but also inanimate objects, such as piles of medical record files that must be tidied up, prescriptions that must be served, X-ray film photos that must be read by radiologists, and so on [14].

4. Big Picture Mapping

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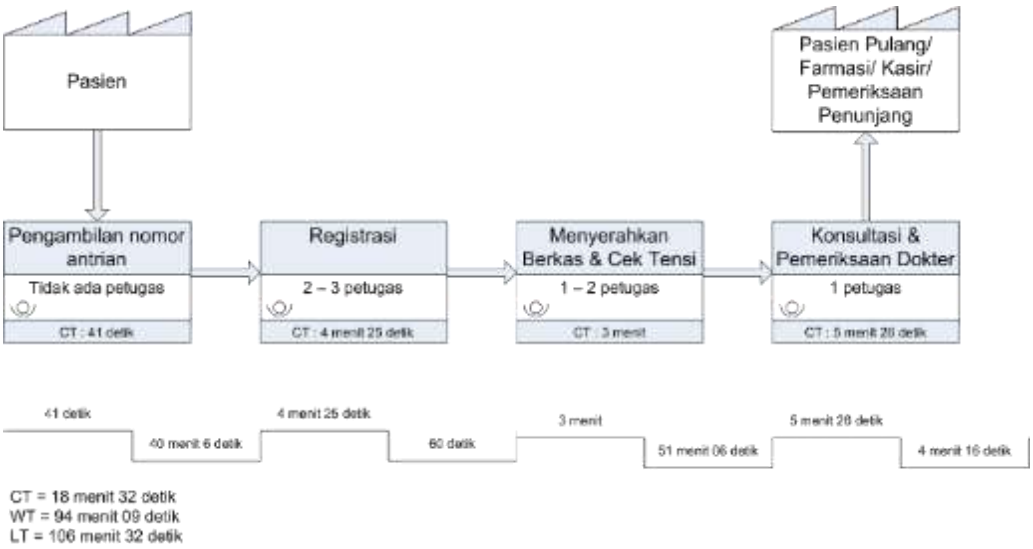

Figure 1. Big Picture Mapping of Outpatient Services

The process taken by patients from coming to the queue until the completion of the consultation and examination of the doctor (figure 1) is described as follows:

- Activity 1 : Patients come to pick up the registration queue number that has been available. There are no special officers in charge of handing over the queue number, only assisted by security or helpers.
- Activity 2: Patients can go directly to the registration desk if there is an officer who is not serving patients. If all officers are serving patients, then patients wait in the registration waiting room. The registration officers on duty are 2 officers in the morning and 3 officers during the day.
- Activity 3: The patient walks to the waiting room of the internal medicine clinic which is 20 meters away. The patient submits the file to the nurse on duty and a blood pressure check is carried out. After submitting the file and checking the tension, the patient can enter the clinic according to the queue. The number of nurses on duty is 1-2 people depending on the number of patients who register.
- Activity 4 : Patients enter the internal medicine clinic room. The medical record file is delivered inside by the nurse and handed over to the nurse on duty in the room. Patients are consulted and examined by doctors. The doctor fills in the necessary medical record files and formulas (supporting examinations/prescriptions). The nurse on duty is 1 person.

5. Value Analysis

From the results of the study, it was found that of the 9 outpatient service activities, there were 2 processes that were value added, 4 processes that were non value added and 5 processes that were necessary non value added. The percentage of value of activities in outpatient services at RS Naili DBS is 4.6% is value added activities, 91.1% is non-value added activities and 4.3% is necessary non value added activities (table 4).

Table 4. *Value Analysis* of Outpatient Services

No	Activities	Time	Percentage
	Value Added		
1	Tension check	0	
2	Consultation & Examination	326	4.60%
	Non Value Added		
3	Queue	2406	33.80%
4	Waiting for a tension check	78	1.10%
5	Waiting for Consultation	3826	53.80%
6	Waiting due to unavailable tools/files	165	2.40%
	Necessary Non Value Added		
7	Queue number retrieval	38	0.60%

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No	Activities	Time	Percentage
	KIUP filling (for new patients)		
8	New patient enrollment	265	3.70%
	SEP Printing		
	SEP file search		
	Printing of insurance files		
9	Submission of files	0	
	Total time	7104	100%

The categorization of activities based on the value of outpatient services is divided into value added (VA), non value added (NVA) and necessary non value added (NNVA). The percentage of value-added activities compared to non-value-added and necessary non-value-added can indicate whether a process is lean or not. A higher percentage of value-added activities indicates that there is less waste in the process of these activities. The lean principle aims to allocate all hospital resources to activities that increase value for patients [15]

Other related research value services have also been carried out by other researchers. Quoted from Danyel Suryana's research in 2018, the results of in-depth observations and interviews show that non-value-added activities can be up to 85% and value-added activities are only 15% in the preparation of non-concocted drugs. Meanwhile, for non-value-added drugs, activities are around 68% and value-added is 32% of the value [16]. The data shows that there has been waste. In another study by Elisabeth Dyah Novian in 2017, the results showed that 90% of service time was non-value-added activities and only 10% of value-added activities [17].

Waste Analysis

In this study, identification was carried out waste or waste on outpatient services. Principle of Lean is to eliminate waste in a process. To be able to reduce or even eliminate waste, it is necessary to identify and categorize the waste found. Management waste based on the category will make it easier to handle it compared to handling all types of waste as a whole [18]. Identification was obtained by making direct observations on the outpatient service process. The service process observed is from patients coming to queue up to register until they get consultation and examination services by doctors. Identification was also obtained from interviews conducted with patients as service recipients, hospital staff and doctors as direct service providers and management as policy makers.

Table 5. *Outpatient Service* Waste Analysis

It	Uraian *Waste*	Source *of Waste*
	Over Processing	
1	Calling a lost queue number	Registration
2	The patient asks the location of the clinic room to be visited	
3	Re-check the completeness of the file	Poly Waiting Room
4	Add files that are not in the medical record document	Clinic Room
	Transportation	
5	Patients heading to the wrong clinic	Polyclinic Waiting Room
	Over Producing	
6	Nurses prepare a prescription sheet for each patient, even though the patient will not necessarily be prescribed medication	Clinic Room
7	Providing too many inspection files that exceed the need	Clinic Room
	Waiting	
8	Writing on a new file because the medical record document has not been found until the patient enters	Clinic Room
9	Wait before the registration process	Queue

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It	Uraian *Waste*	Source *of Waste*
10	Waiting for the collection of medical record files	Registration
11	Waiting for SEP printing	
12	Waiting due to network disruption	
13	Waiting before file submission and tension check	Polyclinic Waiting Room
14	Waiting for admission before doctor's consultation	
15	Waiting due to incomplete tools/documents	Clinic Room
	Inventory	
16	ATK that exceeds the need	Registration
17	Medical record documents that exceed the requirements	
18	Blank examination/supporting files that exceed the need	Clinic Room
19	ATK that exceeds the need	
	Motion	
20	Taking ATK/documents that cannot be reached immediately	Registration
21	Find a clinic room	Polyclinic Waiting Room
22	Taking examination/support files that cannot be reached immediately	Clinic Room
	Defects	
23	Queue number invocation error	Queue
24	Insertion in the queue	
25	Data input errors	Registration
26	Defects in file printing due to printers	
27	Dual medical record numbers	
28	Calling patients to enter the clinic room is not in accordance with the queue	Polyclinic Waiting Room
29	Sphygmomanometer error device	
30	Collective consultation at one time	Clinic
31	Poorly read recipe writing	
	Human Potential	
32	The use of *security/helper* to help queues is not optimal	Queue

From the observation results, it was found that 32 wastes were found in outpatient services from the queue process to the completion of consultation and doctor's examination. The most waste that occurs in the queue stage is waiting. Queues occur when the need for service exceeds the capacity of the service facility. As a result, patients who come cannot get services immediately due to the busyness of services. The problem of queuing is often encountered in the service business because service products have a random nature, both from the pattern of arrivals and from the difference in the time requirements provided [19]. At RS Naili DBS, doctors' schedules are concentrated in the afternoon so that the number of patient arrivals is high at one time. The large number of patients registering at one time and the limited number of officers led to a long waiting time. The length of service can be caused by an imbalance between the supply and demand of services that causes queues.

The registration queue system at Naili DBS Hospital is still done manually where patients take the available queue numbers themselves. There are no special officers in charge of directing the queue process, only assisted by security or helpers. The use of security or helpers is a waste on human potential. From the review of the document, the main task of security is to organize in the field of hospital security and the task of the helper is to help patients and employees. From the scheduling of the service, the security who serves in each shift is 2 people and the helper is 1 person, When the security or helper concurrently acts as an officer who manages the queue, the function of the main task is reduced. Security must always be aware of

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security around the hospital and helpers must always be on standby when there are patients or other employees who need help.

Another waste identified is the loss of queue numbers. The loss of the queue number can occur due to the patient taking but not returning it or due to the officer who puts the queue number handed over by the patient in the wrong place and causes the queue number to no longer be in order. Registration officers will always call the queue numbers in sequence so that the incident of calling a lost queue number occurs many times. Calling a number that does not exist reduces efficiency in service time. In addition, the call of queue numbers at Naili DBS Hospital is still done manually and this will drain the officers. This is waste in the category of overprocessing. The defect found in the registration is a data input error. Data input errors can occur due to officers who are not focused. Moorhead and Griffin said that hospital administrators, including the registration department, are professions in the health sector that cause the most work stress. The high number of patient visits has an impact on the performance of officers who are required to provide the right services in accordance with existing standards [20]

Errors in the file printing process are also waste in the defect category. File printing errors can occur due to the officer's negligence in selecting the documents that need to be printed or file damage during printing due to a printer machine that has decreased performance. The number of ATK and medical companion documents that exceed the needs is waste in the inventory. Excessive ATK and paperwork lead to buildup and reduce the work area. In addition, build-up can result in damage or loss of goods before use.

In the polyclinic waiting room, the waste that occurs is over-processing, transportation, waiting, inventory and defects. The overprocessing that occurred was 58 patients asking about the clinic room to be visited and re-checking the completeness of the file. Both things occur due to the lack of availability of information media. At the registration desk, information media is displayed containing information about the doctor's name, specialty and clinic room number, but only 1 piece is available with a size that is only the size of A4 paper. Along the passage from the registration to the polyclinic waiting room, there are no directions to the polyclinic so new patients must ask. Waste in transportation also occurs due to the lack of directions and causes patients to go to the wrong room. Information media containing information on the completeness of the file is also not available, so some patients come without bringing the file that must be submitted to the officer at the polyclinic. Because of this, the officer had to re-check the files of all patients who came to make sure there were no missing files. This also causes waste transportation where patients have to return to registration to complete the file. The most common waste in the polyclinic waiting room is waiting. Patients must wait before getting consultation services and doctor's examination. Defects in the form of queue insertion were also found in the polyclinic waiting room. The insertion of the queue number occurs due to the factor of knowing "insiders" and this causes complaints by patients who have been waiting. Inaccurate sphygmomanometers are also included in defects. Some patients complain that their blood pressure is always high when examined at the hospital even though it tends to be normal when examined at home

CONCLUSION

From the observation results in this study, the total cycle time of outpatient services is 13 minutes and 29 seconds. The average duration of consultation and examination with a doctor is 5 minutes 26 seconds and the other duration of time is the administrative process. Cycle time is the time required to produce a good or provide a service. Waiting time is the most spent time by patients in this study, which is 1 hour 48 minutes 7 seconds. The waiting time of the queue recorded in this study was from 2 minutes to 1 hour 22 minutes. The long waiting time in the queue occurs due to the accumulation of patients who will register on one.

Overall time or lead time indicates the total time taken by the patient from the beginning to the end of the service, in other words it is a combination of cycle time and wait time. The total average time taken by patients as a whole from coming to the queue to receiving consultation services and doctor examinations is 1 hour 59 minutes 38 seconds. The highest time in lead time is the waiting time before seeing a doctor, which is with an average time of 1 hour 3 minutes 46 seconds.

From observations throughout the outpatient service process of RS Naili DBS, from 8 categories of waste (over processing, transportation, over producing, waiting, inventory, motion, defect and human

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potential), it was found that there were 32 types of waste spread across the queue process, registration, polyclinic waiting room and clinic room. After the weighting, the priority of solving the problem that needs to be prioritized is to minimize waste waiting, namely the waiting time in the registration queue and the waiting time before getting doctor consultation services.

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