Research Article

The Optimization of Pharmacy Waiting Time Using the Lean Healthcare Method

Novita Nuraini 1,*, Rossalina Adi Wijayanti 2
1 Politeknik Negeri Jember; novita_nuraini@polije.ac.id
2 Politeknik Negeri Jember; rossa@polije.ac.id

* Correspondence: novita_nuraini@polije.ac.id

Abstract: The waiting time for prescription services at dr. M. Suherman Clinic, a primary healthcare clinic with pharmacy services, did not meet the standard. It was about 15 minutes for the maximum waiting time for non-concoction prescriptions and 30 minutes for concoction medicines. A preliminary study of 100 patient visits in a day revealed that 15 non-concoction prescriptions and 20 concoction prescriptions exceeded the waiting times standard. It explicated the inefficiency in pharmacy services. The purpose of this research was to make the waiting time for pharmacies became more efficient. This research used lean healthcare method by using fishbone and 5M management elements. The data were collected by interviews, observation, and brainstorming. This study found that waiting time for pharmacy services approximately 36 minutes, with the Non-Value-Added ratio 56.7%. It is concluded that the condition of pharmacy services had been inefficient. The units which contributed most waste were polyclinics and pharmacies. This research will produce a definite solution using the brainstorming method. The clinics need to standardize the deadline for doctors to input prescriptions, update the medical drug formulary, add new computers and drug blenders, add the number of staffs as human resources, and rearrange the clinic rooms.

Keywords: pharmacies; waiting time; lean healthcare

1. Introduction

Clinics are health service facilities that provide individual health assistance through basic and/or special medical treatments [1]. The clinic also offers several services, such as emergency, inpatient, outpatient, and pharmacy services. Pharmacy Installation is part of the clinics. It was related to organizing, coordinating, regulating, and supervising all pharmacy service activities and carried out pharmaceutical technical guidance at the clinic. Pharmacy service can be worth if it offers excellent quality assistance. One of the service standards in pharmacies is waiting time. Hence, waiting time becomes a component that either cause patient dissatisfaction or patient loyalty [2]. The necessity to evaluate the waiting time at prescription services in pharmaceutical installations was to find the weaknesses that affected prescription services. So, the improvements could be made immediately in order to improve the pharmaceutical services quality [3]. In order to achieve the excellent service, pharmacies must optimize the waiting time of prescription service at concoction and non-concoction medicine.

dr. M. Suherman is one of the primary clinics in Jember. It is located at Jalan Karimata Number 49, Jember, Jawa Timur. This clinic is managed by a higher education institution, the Muhammadiyah University of Jember. dr. M. Suherman clinic was organized to provide health services for students at the Muhammadiyah University of Jember and the general public. dr. M. Suherman is a first level health facility that provides pharmaceutical services to patients. After four years, the dr. M. Suherman clinic has growing rapidly. Not only the number of outpatients visits, but also the number of prescriptions were increased annually, as shown in Figure 1.
Source: Annual Report of dr. M. Suherman Clinic

**Figure 1. The Number of Outpatient Visits**

dr. M. Suherman clinic has already performed pharmacy services for four years. On the other hand, based on preliminary study conducted in July 2022 by interview found that there were still complaints about the average time it takes in pharmacy services. The waiting time were explicated in table 1 as follows:

**Table 1. Details of Pharmacy Service Waiting Time in dr. M. Suherman Clinic in 2022**

<table>
<thead>
<tr>
<th>Px</th>
<th>Medicine Types</th>
<th>The waiting time (in minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concoction Medicine</td>
<td>45 minutes</td>
</tr>
<tr>
<td>2</td>
<td>Concoction Medicine</td>
<td>42 minutes</td>
</tr>
<tr>
<td>3</td>
<td>Concoction Medicine</td>
<td>50 minutes</td>
</tr>
<tr>
<td>4</td>
<td>Non-concoction Medicine</td>
<td>25 minutes</td>
</tr>
<tr>
<td>5</td>
<td>Non-concoction Medicine</td>
<td>20 minutes</td>
</tr>
<tr>
<td>6</td>
<td>Non-concoction Medicine</td>
<td>19 minutes</td>
</tr>
</tbody>
</table>

Source: Observation Data of dr. M. Suherman Clinic, 2022

Table 2 showed the waiting time at pharmacy services in dr. M. Suherman clinic. Mostly the waiting time were more than 30 minutes either at concoction medicines, or non-concoctions prescriptions. The time it takes in waiting at pharmacy services affects the patient dissatisfaction and decrease clinical service quality. The Lean concept is a continuous measure to eliminate waste and increase the value added to products (goods and/or services) to provide customer value [4]. The lean healthcare method is a management system that can change the perspective of a health service to be more organized by improving the quality of service for patients by reducing errors and waiting times [5]. Lean management methods have been applied by several health care organizations and resulted in a positive impact for some health care organizations [6]. Like previous study conducted by Nuraini et al. [7], the lean concept can be used to shorten the patients’ waiting time. Lean healthcare recommends improvements to reduce waste in the service system [8]. Moreover, optimizing the management of the waiting time for pharmacy services is essential to reflect a good quality of clinical service facilities. This preliminary study showed that prescription services in pharmacies have not been optimal. This study aimed to shorten the waiting time at pharmacy services in the dr. M. Suherman clinic of 2022.
Thus, it needs to improve the waiting time at pharmacies unit in the clinic of dr. M. Suherman. The researcher is interested in conducting research titled "The Optimization of Pharmacy Waiting Time using the Lean Healthcare Method in dr. M. Suherman Clinic".

2. Materials and Methods

The study was a qualitative and discussed the problems related to the length of pharmacy waiting time in the dr. M. Suherman clinic. This study aimed to shorten the waiting time in pharmacy services at the dr. M. Suherman clinic in 2022. This study used the lean healthcare method to optimize the waiting time at pharmacy unit in dr. M. Suherman clinic. Furthermore, it also used the primary and secondary data as data collection method to determine the flow of pharmacy service process. The primary data were collected by observation in all of pharmacists’ activities. The in-depth interviews were conducted with selected informants who could provide information and adequately meet the researcher's needs. Meanwhile, the secondary data were taken from document reviews of SOPs, Pharmacy Service Guidebooks, Office Schedules, and Pharmacy Monthly Reports.

3. Results

3.1. The Depiction of Value Stream Mapping

Value Stream Mapping is a structured diagram or method used to map the flow of products and information from suppliers, manufacturers, and customers into a complete picture, encompassing all processes of a system [9]. Value stream mapping (VSM) is an important tool of the lean approach and is used to identify value-adding activities and those considered wasteful of materials and the flow of information and people [10]. VSM is described as a technique used for the diagnosis, implementation, and maintenance of a lean approach. Its main function is to identify opportunities for improvement and the elimination of waste with support from operational staff [11, 12, 13]. Researchers conducted observations to map the value stream (description of the overall pharmacy service flow) of prescribing service activities at pharmacies. Mapping begins with collecting information on the physical flow and pharmacy services information flow. After that, a description is carried out throughout the pharmacy service process, from the medicine prescription given to the pharmacy until the patient gets the medicine they need.

Figure 2. Big Picture Mapping

The Figure 2 showed the flow of patients waiting time to get the drug. Starting from the drug prescription that had been inputted by the doctor in the poly, then the payment process was conducted at cashier until the patient gets the drug at the pharmacy. The long time (LT) needed by the patient to get the drug was 36 minutes, consist of 30-minutes
cycle time (CT) and 6 minutes of waste time (WT). Cycle time consists of 13 minutes of value-added (VA) and 17 minutes of non-value added (NVA).

Big Picture Mapping is a tool used to describe the system as a whole and the value stream within it. The tool is used to identify where the waste is and to find out the relationship between information flow and material flow. Value-added activities are all activities that, in producing products or services, provide added value. Non-value-added activities are all activities that produce products or services that do not generate added value. This activity is called waste, which must be targeted to be eliminated immediately [14].

3.2. Cross-Functional Flowchart

The activity details mapped in Value Stream Mapping can be seen explicitly in the cross-functional flowchart. Here, the cross-functional flowchart describes the journey of the prescription process and who is responsible for the dispensary service. In addition, the flowchart also shows the relationship of the responsible parties or implementers in the pharmacy service activity process.

3.3. Geographical Flowchart

The process of outpatient service activities is illustrated in a geographical flowchart. This diagram is drawn according to a scale showing the location of all activities in the flow process mapping. The “activities” mentioned above mean the movement of patients and implementers from one place to the next. A guideline indicates them in the form of arrows. The outpatient process begins when the patient receives a registration queue number. After that, the staff will call the patient according to the queue number to proceed with the registration process and obtain a queue number for the appropriate department. The patient then waits in front of the designated department to be examined by the doctor. After the examination, the patient makes the payment at the cashier. The cashier will verify the services received by patients and calculate the bill that needs to be paid. Lastly, the patient waits at the pharmacy to receive the medication prescribed by the doctor.

3.4. Waste Identification

The VSM (Value Stream Map) calculation results on non-value added for pharmacy services is 56.7%, which is 17 minutes. Supposed the ratio of non-value added is more than 30%. It means that the clinic has ineffective pharmacy service. Moreover, the above calculation results identify the presence of waste impacting less than optimal pharmacy performance. The lean concept states that activities with non-value added must be eliminated and minimized. Hence, based on the data described, it is necessary to streamline the pharmacy service process. Based on the observation, waste obtained in pharmacy services is described as follows.
<table>
<thead>
<tr>
<th>No.</th>
<th>Waste Type</th>
<th>Waste Source</th>
<th>Occurrence Time (When)</th>
<th>Reason for Happening</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Waiting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Waiting for the doctor to input the medicine prescription</td>
<td>Outpatient unit</td>
<td>Outpatient service process</td>
<td>The doctor will only input the medicine prescription when the patient data has been collected in a certain amount.</td>
</tr>
<tr>
<td></td>
<td>Motion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Pharmacists need to go to back and forth in taking and delivering the medicines and also educating patients about medicines usage</td>
<td>Pharmacy</td>
<td>During the pharmacy service process</td>
<td>There is no specific staff for taking and delivering medicines and educating patients about the medicines.</td>
</tr>
<tr>
<td></td>
<td>Defect / error transaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The medical drug formulary has not been updated on clinic’s system.</td>
<td>Outpatient unit</td>
<td>During the prescription inputting process</td>
<td>There is no updated medicine formulary.</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>• The doctor still needs to confirm with the pharmacists about the medication stock by phone.</td>
<td>Outpatient unit</td>
<td>During the prescription inputting process</td>
<td>There is no medicine formulary update.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Overproduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>New patients have difficulty knowing the pharmacy service flow (they always ask for the next step to do)</td>
<td>Outpatient unit</td>
<td>During the poly service process</td>
<td>There is no detailed description on the banner about the pharmacy service flow.</td>
</tr>
<tr>
<td></td>
<td>Human Potential</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Based on the description in Table 2, it is known that waste identification in the pharmacy involves six types of waste: waiting, motion, defect, communication, overproduction, and human potential. This allows for the identification of the sources of waste, the timing of occurrences, and the reasons behind them. In each process of the pharmacy workflow, sources of waste are found in the reception area, cashier, and pharmacy.

3.5. The Problem Cause Identification Using Fishbone

After mapping the flow and identifying waste in the pharmacy service flow, it is known that the most significant waste occurs in the poly unit. Based on the observation, documentation, and in-depth interview with respondents, we can identify the causes of waste into five management elements (Man, Method, Machine, Material and Milieu). In figure 3, a fishbone diagram is used to identify waste in the pharmaceutical service flow.

**Figure 3. Fishbone Diagram**

4. Discussion

4.1. Determining the Location of Value Added and Non-Value Added

The values added and non-values added from the table above are obtained from the following calculations,

Poly Unit (VA value = time to input patient medication prescription) (NVA = waiting time for the process done + time to confirm the medicine stock to the pharmacy)

Cashier Unit (VA = processing time for calculating the bills of medication prescription and patient treatments) (NVA = waiting time for the manual verification process)
Pharmacy Unit (VA = time to comprehend the prescriptions + take or prepare the medicines + provide labeling and educate patients on medical drug use) and (NVA = waiting time for the prescription to enter).


After analyzing the root cause of the problem using fishbone, which aims to find waste factors in the pharmacy service flow, the researcher proposes a solution in eliminating existing non-value-added processes with some considerations that follow. The researcher realized that to change and plan a proposed improvement needs long and complicated steps because it involves various policies and regulations in force at the time. It also needs consultations with the elements in charge and the clinic leader to realize the desired refinement.

Based on the research result, we can see that the waiting time for concoction medicine is > 30 minutes and for non-concoction medicine is > 15 minutes. It does not meet minimum service standards existing standards of waiting time for prescription service (15 minutes for non-concoction medicines and 30 minutes for compound medicines) [15]. The waiting time for prescription services can reflect pharmacists’ work process in providing assistance to the situation and patient expectations. To attain an excellent service, the pharmacy has to be able to shorten the waiting time in order to increase patient satisfaction [15]. Dissatisfaction due to waiting time affects the patient’s perception towards hospital service quality as a whole and reduces the number of patient visits [16]. This can be realized by using the lean method in which trimming and elimination waste in some activities in polyclinics and pharmacies. Lean is an approach that supports staff and medical personnel to be more focused in providing services, it can also help build more synergistic relationships between departments [17]. The waste in the prescription process occurs because of the long period of doctors inputting medical prescriptions to the pharmacy. Meanwhile, the doctors are still waiting for a certain number of patients and must first confirm the medication formulary with the pharmacists before inputting prescriptions to the CMIS. The lack of human resources and machines in pharmacy unit affects the prescription service process also contributes to this waiting time. In line with Fitriah and Wiyanto’s research, the cause of the long waiting time for drug services is the accumulation of drug prescriptions [18]. This of course will have an impact on the low satisfaction of outpatients with the quality of drug services [19].

Based on this analysis, the brainstorming was conducted with staffs at the dr. M. Suherman clinic to determine the recommendations in eliminating waste. The brainstorming results explicate that it needs to standardize the deadline of medication prescriptions, update the drug formulary on CMIS, add new computers and blenders, add new staff, and rearrange the clinical room.
### 4.3. Recommended Solution

#### Table 3. Solution Recommendation Table with Brainstorming

<table>
<thead>
<tr>
<th>No.</th>
<th>Variable</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Man</td>
<td>The doctor will only input the medication prescription when the patient data has been collected in a certain amount. &quot;The doctor did not immediately input the prescription for the medication.&quot;</td>
<td>The agreement is made between doctors and pharmacy staff to determine the maximum number of prescriptions the doctor must input at one time. In this case, once four medical prescriptions have been collected, the doctor must input those prescriptions into CMIS immediately.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is no specific staff for taking and delivering the medicines and educating patients about medication usage.</td>
<td>Add one new medicine retrieval staff and one officer to deliver and educate patients about medication usage.</td>
</tr>
<tr>
<td>2</td>
<td>Method</td>
<td>Inappropriate tasks division at the pharmacy</td>
<td>Do some staff replacements according to their educational qualifications.</td>
</tr>
<tr>
<td>3</td>
<td>Machine</td>
<td>Lack of computers in pharmacies. Thus, the staff has to take turns in using it. Lack of a blender to compound the medicines.</td>
<td>Add one computer to the pharmacy. Adding more blender at the pharmacy.</td>
</tr>
<tr>
<td>4</td>
<td>Material</td>
<td>The medication formulary has not been updated in the clinic’s system.</td>
<td>Update the medication formulary at the pharmacy.</td>
</tr>
<tr>
<td>5</td>
<td>Milieu</td>
<td>Non-strategic clinic room layout.</td>
<td>Redesign or rearrange the clinic room more strategically.</td>
</tr>
</tbody>
</table>

#### 5. Conclusions

The Value Stream Mapping results of the pharmacy service flow in dr. M. Suherman Clinic shows that the average waiting time in this clinic is 36 minutes. Moreover, the most significant waste in the pharmacy service flow occurs in poly and pharmacy units. In this case, the root of the problem that made the waiting time in this clinic so long is that the doctors need more time to input medication prescriptions to doctors. To finish this process, the doctors still wait for many patients and collect their prescriptions before delivering them to the pharmacy. Also, the doctor must confirm the medication formulary with the pharmacy before inputting medical drug prescriptions to the CMIS. Furthermore, the lack of pharmacy human resources and tools in the prescription service process worsens the situation. The non-value-added ratio in the pharmacy service flow is 17 minutes, and the most considerable wasting time is in the poly and pharmacy units. After elimination, the time spent by the patient to get the medication was 12 minutes for non-concoction pills and 25 minutes for compounded medications. Other recommendations the clinic needs to take are standardizing the maximum time for doctors to input prescriptions, updating the medical drug formulary, adding new computers and blenders, adding human resources, and rearranging clinic rooms. The limitations in this study are the limited time of the research so that the data collection is limited because it is carried out during service hours.
6. Patents

Conflicts of Interest: The authors declare no conflict of interest.

References


