Lean Hospital Approach for Improving The Process of Taking Drug Services in Outpatient Pharmacy Installations

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Abstract. Lean is a method to reduce activities in the form of waste to increase efficiency in manufacturing or production lines and can be implemented in health services. This study analyse the flow of prescription services in BPJS Outpatient Pharmacy Installation as data for improvement. The results showed non-value added activities of 22%, value added activities of 74%, necessary non-value added activities of 4%, and process cycle efficiency of 74%. As for non-concoction drugs, non-value added activities are around 39%, value added is 61% and process cycle efficiency is 61%. The data shows that there is a process of non-value added and necessary non-value added which causes the waiting time for outpatient pharmacy. Furthermore, using fishbone analysis to determine the cause of the problem and build improvements based on FMEA results. From the research results obtained that waste that often occurs is waiting that occurs in the taking of drugs. The recommended improvements are the addition of human resources in the collection and compounding of drugs, classifying and allocating types of drugs based on the speed of the drug and the implementation of 5S in BPJS outpatient pharmacy.

1. Introduction
Hospital pharmacy services are one of the activities in hospitals that support quality health services. This was made clear in the Decree of the Minister of Health No. 1333 / Menkes / SK / XII / 1999 regarding Hospital Service Standards, which states that hospital pharmacy services are an inseparable part of the hospital health care system which is oriented towards patient services, providing drugs that are quality, including affordable clinical pharmacy services for all walks of life. Hospital pharmacy installation is a part or facility in a hospital as a place to conduct all pharmaceutical work activities indicated for the hospital's own needs. The problem of the quality of health services in pharmaceutical installations is important for all hospitals, one of which is a private hospital in the Depok area. The number of hospital patients is increasing day by day. This house has an agency that is responsible for the supply, management and distribution of drugs, namely pharmaceutical installations. Pharmacy installations are divided into 2 pharmaceutical installations namely BPJS pharmaceutical installations and general pharmaceutical installations. In one day outpatient pharmaceutical installation BPJS received more than 200 prescription concoctions and non-concoction prescriptions. Every process of service provided by this pharmaceutical installation cannot be separated from patient complaints. Based on interviews with officers, the problem that is often complained by patients about health services in BPJS outpatient pharmaceutical installations is the problem of waiting time in the service process. This is reinforced by the results of a short interview with 15 patients who expressed similar complaints.
The problem faced at the Hospital is that the average delivery time of the drug has 61 minutes for concoctions and 32 minutes for non-concoctions, to reduce the waiting time, of course there is a need to improve existing services because the waiting time in the service process become one of the waste that needs to be followed up. Based on journal based on journal titled Lean Healthcare Approach to Minimize the Waste in the UNISMA Malang Islamic Hospital, this problem can be solved. This Based on observations on the outpatient pharmaceutical service process BPJS still has waste in some of the activities it does. The waiting time of patients in taking drugs shows that BPJS outpatient pharmaceutical installation has unwanted waste. Based on this, it is necessary to conduct research on waste that occurs in BPJS outpatient pharmaceutical installations so that pharmacy can make service improvements. Based on the above background, the purpose of this research is to analyse the conditions of BPJS Outpatient Pharmacy Installation, knowing the root cause of the problem, getting improvement and reducing or eliminating processes such as waiting time and unnecessary movements that are included in the waste of the service process which can complicate staff through the lean hospital approach.

2. Literature Review

2.1 Lean Service

According to the Institute for Healthcare Improvement, the first step towards reducing waste is identifying steps that have added value in each process, accurately determining what is on the value stream map. Kind of waste in the service industry are error in document, transport of documents, doing unnecessary work not requested, waiting for the next process step, process of getting approvals, unnecessary motions, backlog in work queues, and underutilized employees.

2.1.1 Value Stream Mapping (VSM). Value Stream Mapping is a tool used to describe a system as a whole along with the flow of values. The purpose of Value Stream Mapping is to know the flow of information and the physical in the system, the lead time needed from each process that occurs. The data was obtained from the interview with relevant officers and field observations.

2.1.2 Root Cause Analysis (RCA). Root cause analysis is a systematic process that is used to overcome problems or discrepancies to identify the source of the problem. The root is the basis of damage or failure of a process that, when resolved, prevents the problem from re-occurring. An important aspect of RCA is the use of a systematic approach to checking for errors, eliminating the focus on individuals in the process of analysing a situation. The steps in the RCA process to do the analysis. As the steps are listed and uses the 5 Whys technique to be examined. Details in the process is ask five or more why you must explore the root causes.

2.2 Failure Mode and Effect Analysis (FMEA)

FMEA (Failure Mode and Effect Analysis) is a structured procedure to identify and prevent as many failure modes as possible. The steps in making FMEA are as follows:

- Review the process.
- Brainstorm for potential risk.
- Make a list of risks, causes and potential effects.
- Determine the level of severity, which is an assessment of the severity of the seriousness of the effects arising from failure modes, calculating how much the impact of events affect the process output, and subsequent processes.
- Determine the level of occurrence, which is an assessment of the opportunity frequency of the cause of the failure mechanism that will occur, so that it can produce a form of failure that gives certain consequences during the period of product use.
- Determine the level of detection, namely the measurement of the ability to control and control failures that can occur.
2.2.1. Fuzzy Failure Mode and Effect Analysis. The application of fuzzy logic is very appropriate to coordinate problems that arise in conventional FMEA. Fuzzy rules describe the level of criticality of an error for each combination of input variables. Fuzzy techniques help overcome "partial truth" and "multi-likelihood" in responses. In addition, this technique is able to tolerate blurred boundaries in definitions and allows assessors to use linguistic terms to assess indicators in natural language expressions.

2.3. Define, Measure, Analyse, Improve, Control (DMAIC)

DMAIC is a very simple and practical approach. The stages of this approach include determining the problem, measuring capability and objectives, analyzing data as a way to understand the problem, improving the process and reducing the cause of the problem, and implementing long-term process control.

Define is the first stage, which focuses on identifying problems, determining process objectives and identifying customer needs internally and externally. Measure is the goal of this stage to objectively set the basics of improvement. Measure is a data collection step, the purpose of which is to set performance standards. Analyse phase isolates the main causes that are focused on the problem. In many cases there are usually no more than three causes that must be controlled to achieve success. Improve phase focuses on full understanding of the main causes identified in the analyse phase, with good intentions as controlling or eliminating the causes of these problems to achieve maximum performance. Control phase of the DMAIC approach is about maintaining changes made in the improve phase. The aim is to maintain profits, monitor improvements to ensure continued success.

3. Research Methodology

3.1 Method

The concept of this study uses lean hospitals for observation and interviews. The study was conducted at the Outpatient Pharmacy Installation of BPJS and data collection was carried out in May and June 2020. The data source of this study was primary data and secondary data. Primary data obtained through direct observation and interviews. Observation in the field by measuring the time of each activity carried out by officers in the outpatient pharmacy installation since the patient submitted the prescription until the patient took the drug. Interviews were conducted with the head of the pharmaceutical installation, BPJS outpatient pharmacy daily administrators and BPJS outpatient pharmacy officers. The study population was all BPJS outpatient prescription patients who came from Monday to Saturday at 08.00 - 14.00 WIB.

The number of samples to be taken in this study were 30 prescriptions for concoctions and 30 prescriptions for non-concoctions. After getting the time from each activity the service process is continued by identifying the resources available in the pharmaceutical installation. The data is used to describe the value stream mapping of the service system. Analysis and discussion using the DMAIC approach that starts with, identifies current value stream mapping in pharmaceutical installation services, identifies waste that occurs and frequency of waste, measures the performance of pharmaceutical services and performance goals to be achieved, analyse the root causes of waste that occur, provides suggestions for improvement by calculating in advance the risks that might occur, and supervise the proposed improvements made.

3.2 Methodology

There are 6 steps of this research. The initial stage of the research consisted of determining the research topic, identifying the actual conditions of the research object, identifying the problem formulation, determining research objectives, determining research boundaries and determining the research

- Calculate RPN (Risk Priority Number), which is the result of multiplication of severity (S), occurrence (O), and detection (D).
methodology. The next step is study literature. At the literature study stage, the author studies theory and research related to the main topics in research to gain further understanding as a basis of knowledge for conducting research. The next is data collection, to collect data, the initial stage of this process is to identify the data needed to solve the problem. The next step is data processing. After all data is collected, a value stream mapping is then compiled to describe the flow of goods and information from outpatient pharmacy services. Analysis and discussion phase is to analysis the problem by DMAIC approach. The last one is conclusion to answer all the purpose of the research.

4. Results and Discussion
The research discussion uses the define, measure, analyse, improve and control approaches solving the waste problems that occur in BPJS outpatient pharmaceutical installations.

4.1 Define
Based on observations of the flow of the prescription service process in BPJS outpatient pharmaceutical installations can be explained as follows:

- The patient gives a control card and a prescription to the administration workers.
- Officers screen prescriptions and enter prescription and patient data into the Avicenna system and print labels. If problems are found regarding the prescription, the officer will consult further with the doctor concerned. After the obstacle or problem is resolved the recipe will be input into the system.
- Labels that have been printed are received by dispensing officers and officers prepare drugs according to the label.
- If there is a concoction drug, the officer will prepare tools and ingredients for dispensing and continued with compounding the drug.
- After the drug is ready the officer will check for each drug and its label and proceed with writing a copy of the prescription.
- The next process is drug packaging and drug completion reporting on the computer.
- Dispensing officers hand over drugs to administrative officers for drug delivery.
- The administration officer for the delivery of drugs receives and calls the patient.
- Administrative staff will confirm the name, place and date of birth and the patient's cell phone number.
- After confirming the officer explained the rules of drug use and drug delivery.

Compound and non-concoction drugs have activities that have value added, non value added and necessary non value added. The activity data is illustrated by value stream mapping which aims to map the process and see the entire process of the activities which can be seen in Figure 1 and Figure 2.
Based on current value stream mapping it can be seen that:

- Data from observations of recipe concoctions
  In the value stream mapping service at the BPJS outpatient pharmacy installation for prescription concoctions, it can be seen that the average time required from the prescription received by the officer to the delivery of drugs to patients is 3645 seconds or 61 minutes, consisting of 74% value added activities, 22% non-value added activities and necessary non-value added activities of 4%. Based on the activities of value added, non-value added and necessary non-value added outpatient pharmaceutical services for BPJS concoctions have a process cycle efficiency of 74%.

- Data from non-concoction recipe observation results
  In the value stream mapping prescription service for outpatient concoctions at BPJS outpatient pharmacy installations for non-concoction prescriptions, it can be seen that the average time required from the prescription received by the officer to the delivery of drugs to patients is 1905 seconds or 32 minutes, consisting of 61% added value activities, non-value added activities 39% and necessary non-value added activities 0%. Based on the activities of value added, non-value added and necessary non-value added outpatient pharmaceutical services for non-concoction drugs BPJS has a process cycle efficiency of 61%.
In the observation of the service process in the outpatient pharmacy installation since the patient submits a prescription until the patient gets a prescription, it can be identified that each waste process can be grouped based on 8 types of waste. Waste that occurs in pharmaceutical installations has different levels of occurrence, based on the questionnaire the level of frequency of events can be seen that the most frequent waste occurs is waiting.

4.2 Measure
BPJS outpatient pharmaceutical installation conditions have 61 minutes for concoction drugs and 32 minutes for non-concoction drugs with the intended conditions that is time for the process of concoction drug services not greater than 60 minutes and for non-concoction drug service processes not greater than 30 minutes according to hospital service standards. In addition, the desired improvement in outpatient pharmaceutical services BPJS is expected to reduce the total lead time that exists and can increase the process cycle efficiency of the service of concoctions and non-concoctions.

4.3 Analyse
Based on the value stream mapping, an analysis is conducted to find the root of the waste problem that occurs in BPJS outpatient pharmaceutical installations. The translation of cause and effect depicted with a fishbone diagram found the root of the problem from waste of queues / waiting times in terms of humans, methods, machines, and the environment. From a human perspective, the root cause of the waiting problem that occurs is the insufficient number of human resources who have the role of taking or dispensing drugs. In terms of the process, taking drugs through difficult stages due to the placement of drugs according to drug categories. In terms of material, the root cause of the problem of waiting material has a location that is not easily reached by officers. From the environment,

4.4 Improve
Before determining the proposed improvement for the root of the problem is identified in advance to determine activities that have a high risk of causing complaints by using Fuzzy-FMEA. The application of fuzzy logic is very appropriate to coordinate problems that arise in conventional FMEA. Risk assessment using Fuzzy-FMEA can be seen in Table 1 below:

| Potential Failure Mode | Potential Effect of Failure | Potential Cause of Failure | S | O | D | FR | PN | Rank |
|------------------------|----------------------------|---------------------------|---|---|---|----|----|------|
| R1                     | There is a queue for the completion of drug dispensing | The waiting time for taking the drug in the dispensing section is longer | 8 | 7 | 7 | 8 | 1 |      |
| R2                     | Medicinal concoctions require a long time | The processing time of concoction is long | 5 | 4 | 3 | 5 | 6 |      |
| R3                     | Drugs is difficult to reach | The workers make more movements to take drugs | 8 | 7 | 7 | 8 | 2 |      |
| R4                     | Writing a recipe copy takes a long time | Drug dispensing time is long | 6 | 5 | 6 | 6,5 | 4 |      |
| R5                     | The patient is crowded when unexpected time | Lots of recipe queues | 8 | 3 | 3 | 3,5 | 9 |      |

Table 1. Fuzzy-FMEA of possible risks
Every failure or risk that might occur is assessed its severity, occurrence and detection rate. From this assessment, it is calculated FRPN which is a fuzzy value of severity, occurrence and detectability. The risk that has the highest Fuzzy-FMEA value is R1, that is, there is a queue to work on the drug. In the second rank is R3 where the risk that occurs is the placement of drugs that are difficult to reach thus slowing the work of officers. Third rank is R7 which is less precise and efficient use of space. The proposed improvements to respond to the root of the waiting problem based on the Fuzzy-FMEA rating are as follows:

- The proposal to improve R1 is the addition of 1 HR in the BPJS outpatient pharmacy installation which is divided into 1 recipient of prescription and inputting prescription data, 3 people take and prepare drugs and 1 person for drug delivery.
- The proposal to improve R3 is to classify and allocate all types of drugs for each drug category based on drug characteristics (Fast, slow, Non-moving) and drug use.
- The proposal to improve R7 is to implement 5S, namely:
  - *Seiri*, activities aimed at separating unnecessary equipment or materials from equipment or materials that are still needed.
  - *Seton*, activities aimed at keeping goods neatly organized so that they are easy to find or use.
  - *Seiso* is an activity that aims to preserve the cleanliness of the work environment, both the workplace and the goods or materials contained therein
  - *Seiketsu* is an activity that has a purpose, which is sorting, structuring, and cleaning activities that have been carried out continuously
  - *Shitsuke* aims to familiarize 5S culture as an effort to create a better work environment

The flowchart for 5S implementation begins with the instruction of the heads of all pharmacy officers to carry out 5S in their respective work areas with sorting activities. As a guideline for sorting, provisions are made that any items that are not used in a damaged condition or in their respective work areas must be removed and moved to the area that has been prepared to collect the items. So that the items left in each work area are only items that are clearly used. Sorted goods are then managed by the asset section for further handling. They can be used as auctioned goods for goods that are still functioning well and destroyed for damaged goods and can no longer be used. With the work area that has been sorted, the working area will change to a neat condition, roomy and no more items piled up. In addition, the room cleaning schedule also runs regularly to ensure the pharmacy work area is clean. Customizing 5S culture can be done by attaching a visual warning to officers to always maintain the cleanliness, neatness of the work area.

So that if the proposed improvement is applied it will increase the time for compound drugs to 52 minutes for compound drugs and 32 minutes for non-compounded drugs and make the process cycle efficiency increase for compound drugs to 87% and non-compound drugs to 82%.
4.5 Control
Supervision of repairs is divided into 3 parts, namely supervision with control gate review, the use of control check sheets and the existence of standard operational procedures for pharmaceutical services.

5. Conclusions and Recommendations
The conclusion of the research conducted is outpatient pharmaceutical installation BPJS has 61 minutes of service time for concoctions and 32 minutes for non-concoctions and has a process cycle efficiency of 74% for concoctions and 61% for non-concoctions. Based on observations it can be seen that the most dominant waste problem that occurs is due to waste waiting caused by the root cause of the problem are the lack of human resources in the process of taking or dispensing drugs, arranging shelf storage by category, and inefficient use of space in pharmaceutical installations.

Whereas which activities have the highest risk of causing complaints in the BPJS pharmaceutical installation service process is the lack of staff working on drugs. The proposed improvement is by adding human resources in the dispensing section, categorizing drug shelves based on fast moving, slow moving and non moving drugs and applying 5S culture for a more efficient workflow. The proposed design is in the form of a future value stream mapping of concoction drugs so as to increase the process cycle efficiency of 61% to 82%. Suggestions for further research to improve design proposals can show significant results, the need for differentiating output results between before and after can be done with simulation methods using simulation software.

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