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Lean Hospital Approach to Identify Critical Waste in The Outpatient Pharmacy Unit of Rural Public Hospital in Yogyakarta

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Abstract: Many pharmacy units have the service problem with long waiting time. This shows that there are still waste. This research purpose to identify critical waste, root cause of critical waste and to provide improvements suggestions to minimize critical waste in the outpatient pharmacy unit. This research is case study with a qualitative approach. The stages of the research are the observation of service processes mapped through value stream mapping, questionnaires to obtain critical waste, interviews with the 5why method to find out the root of the critical waste and to provide suggestions for improvement. The results of value stream mapping showed ratio value added to waste for non-concoction prescription services is 8,6% while concoction prescription services is 7.6%. Waste waiting is a critical waste accounting for 24.4%. The root causes of waste waiting are the length of use of hospital management information system server, limited number of human resources and influenced by layout factors and the flow of service process. Proposed improvements applying the 5S method.

1 INTRODUCTION

Outpatient pharmacy unit is one of the hospital's units which become attention due to its service quality that makes patient dissatisfied. The issues which generally occur are slow staff, complicated procedures, unclear information from staff, and etc. (Ingerani et al, 2002).

Inefficiency in medical service is a problem which needs to be handled immediately. Hence, many methodologies appear to solve the problems. One of them is Lean methodology (Kim et al, 2006). Lean is an effort to remove waste and add value to a product or service in continuous in order to add value to customers (Graban, 2009).

Lean concept starts to appear in 1950. It was adapted by many companies to increase value added and minimize waste in industry (Gazpers & Fontana, 2011).

Lean approach has been used by many hospitals around the world and resulted in many advantages such as reduce patient's length of stay (Bisgaard & Does, 2009), increase efficiency (Arbos, 2002), increase patients and staffs' satisfaction (Dickson et al., 2009), reduce clinical error (Raab et al., 2006), reduce waiting time (Yu & Yang, 2008), improvement process at radiology and medical administration installation (Lioyd & Holesnback, 2006), and reduce patients' length of stay and waiting time in emergency department (Mandahawi et al. 2010).

Rural Public Hospital in Yogyakarta is a hospital has a total capacity of 240 beds and 723 human resources. At the hospital has many supported facilities such as pharmacy unit service. The secondary data, evaluation and monitoring of waiting time for outpatient pharmacy unit in May and June 2018, shows that the average time of concoction medicine prescription or non-concoction medicine have not yet met the standard of Minister of Health Regulation No.129/Menkes/SK/II/2008. Based on this regulation, waiting time for prescription medication services must be less than or equal to 30 minutes, while waiting time for concoction drugs is less than or equal to 60 minutes.

In May, average time of non-concoction medicine is 1 hour 34 minutes and for concoction medicine is 1 hour 44 minutes. In June, average time of non-concoction medicine is 1 hour 23 minutes and for concoction medicine is 1 hour 12 minutes. The occurred problems prove there are many waste or non-value added which influence patients' satisfaction.

Based on the background above, the researcher interested to conduct a research which entitled Lean Hospital Approach to Identify Critical Waste in Outpatient Pharmacy Unit of Rural Public Hospital in Yogyakarta.

2 METHOD

This research is case study research using qualitative approach. The used data collection methods with natural setting are questionnaire distribution, participatory observation, deep interview, unstructured interview, and documentation also documents review.

Based on the observation, the data are analyzed through several steps as follows:

2.1 Map the system of Outpatient Pharmacy Unit service process

It aimed to know the process within Outpatient Pharmacy Unit service of Rural Public Hospital in Yogyakarta. At the first step, the researcher conducts field participatory observation by following, conducting, and observing the service process. Unstructured interview is done during the participatory observation in order to add necessary data, also the researcher reviews the documents and then documented it later. The result of system mapping is current value stream mapping of service and service process plot.

2.2 Identify service process

After value stream mapping is obtained, the researcher identifies the activities within the organization which are value added activities and non-value added activities. The information is obtained through observation, unstructured interview in form of qualitative or quantitative, documents review and documentation. Then, the researcher calculates ratio value added activities to waste in order to distribute service system performance in assessment scale in form of percentage.

2.3 Identify critical waste of Outpatient Pharmacy Unit service process

In this research, waste is identified on Outpatient Pharmacy Unit service process by distributing waste questionnaire. The purpose is to discover the frequency level of eight types waste based on the lean concept and according to observation also experience of staff. The questionnaires are analyzed with Borda method.

2.4 Look for the root of critical waste

After assigning the types of critical waste on service process, the researcher identifies the root of the problem through deep interview by using 5 why method. 5 why method is a method that uses in root causal analysis to be a problem solving. It is used to look for root of the problem.

2.5 Collecting improvement ideas

This step is aimed to obtain improvement ideas, thus the researcher can adjust the need, capacity, and resource as a form of improvement. The collecting action is done through discussion of team and expert panel. Thus, experts are able to give suggestion and advice. Nevertheless, if it is not possible, the discussion is conducted only between researcher and the expert.

2.6 Designing proposed improvement

The researcher proposes improvement designs which are proposed improvement of plan, location, layout, process simplification, work process method, virtual management, service process workflow and other resources which contributed to the efficiency in Rural Public Hospital. Also, improvement through the elimination of unnecessary waste to increase service value.

2.7 Draw conclusion and recommendation

The analysis result and proposed improvement are formulated as one research conclusion. The recommendation is made based on the background above in which to improve service process specifically by identifying activity which does not add value, produced waste, occurring critical waste. Also, makes proposed improvement to increase service value in Outpatient Pharmacy Unit of Rural Public Hospital in Yogyakarta.

3 RESULTS

3.1 Value Stream Mapping and Value Added Assessment of Outpatient Pharmacy Unit Process

As for the result of value stream mapping and value added assessment throughout the service process in Outpatient Pharmacy Unit is as follows:

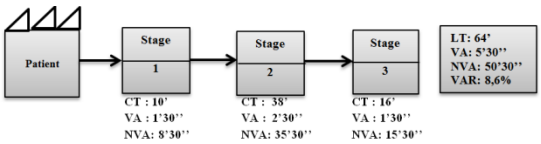

Figure 1: Value Stream Mapping of non-concoction medicine service

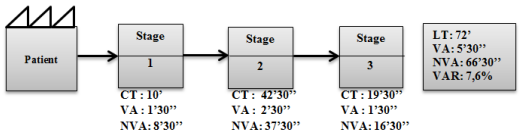

Figure 2: Value Stream Mapping of concoction medicine service

On figure 1, it shows the result of lead time 64' or 1 hour 4 minutes with comparison value of VA : NVA in amount of 5'30 : 50'30'' and VAR value in amount of 9,75%. On figure 2, it shows the result of lead time 74' or 1 hour 14 minutes with comparison value of VA : NVA in amount of 5'30'' : 66'30'' and VAR value in amount of 7,6%.

Information:

CT : Cycle Time
LT : Lead Time
VA : Value adding time
NVA : Non value adding time
VAR : Value Added Ratio

3.2 Critical Waste that occurs in Outpatient Pharmacy Unit

The result of 8 types waste identification is as follows:

1. Defect, including the error in billing process, labeling etiquette error, and mistake in giving the amount of medicine.
2. Overproduction, including staff who prepares compounding medicine before patients pay the medicine.
3. Transportation, the staff back and forth to take receipt forms in registration counter, and taking medicine stock in warehouse in the first floor.
4. Waiting, patients wait for medicine.
5. Inventory, including excessive stock medicines until they are expired.
6. Motion, counter for taking medicine and giving medicine is too far.
7. Overprocessing, including the staff who should inform patients especially patients with national health insurance since doctor prescribes the medicines which are not included as national formulary or the medicines which should be bought at outside pharmacy.
8. Human potential, including staffs which tend to be passive in giving suggestion and critic for

process improvement especially to management. Since management give less response to the critics and suggestions.

The researcher spreads waste questionnaire to all of respondents which including as research criteria. The criteria within this research are staff who directly involved in outpatient pharmaceutical installation process. The numbers of staffs in Outpatient Pharmacy Unit are 18 people. After the waste questionnaires are distributed and filled by the 18 informants, the researcher conducts an analysis using Borda method. It is conducted by weighing each waste type. The weighing si done by adding up each multiplication level with each weight. The result of waste questionnaire and weighing with Borda method can be seen in Table 1.

Table 1: The Analysis Result of Waste Questionnaire with Borda Method

Type of waste	Level								Total	Weight
	1	2	3	4	5	6	7	8		
Defect	1	11	1	2	2	0	1	0	93	0,184
Overproduction	0	4	2	5	1	2	2	2	63	0,125
Transportation	0	0	7	5	3	1	2	0	68	0,135
Waiting	17	0	0	1	0	0	0	0	123	0,244
Inventory	0	0	4	2	4	0	4	4	44	0,087
Motion	0	0	1	2	4	4	5	2	38	0,075
Overprocessing	0	0	2	1	4	5	4	2	40	0,079
Human Potential	0	3	2	0	0	3	2	8	36	0,071
Score	7	6	5	4	3	2	1	0	505	
Total										

Source : Primary Data processed, 2018

Therefore, it can be concluded that critical waste in outpatient pharmacy unit of Rural Public Hospital in Yogyakarta is waste waiting with percentage in amount of 24,4%.

3.3 Analysis the Causal Root of Critical Waste within Outpatient Pharmacy Unit Service

The next step is to find the root of problem that cause waste waiting by doing deep interview with 5why method. The interview is conducted towards the chosen informant. The result of deep interview can be seen in appendix.

3.4 The proposed improvement to minimize critical waste

The proposed improvement to minimize waste is by short term proposal, middle term proposal, and long term proposal. Also, by applying 5S method which is believed to be excellent in *lean* concept. The proposed improvements are:

3.4.1 Short term proposal

a. Applying 5S method which is believed to be excellent in *lean* approach to eliminate waste.
b. Optimizing the placement of staffs according to their capability.
c. Optimizing staffs' schedule with middle shift system due to recommendation to not add more human resources.

3.4.2 Middle term proposal

a. Realize the establishment of standard operational procedure when trouble/loading server occurs at patient data input.
b. Realize the establishment of standard operational procedure on hospital management information system (SIMRS) server maintenance.
c. Change the plot of prescription processing based on layout efficiency and effectivity and according to the applicable regulations.

3.4.3 Long term proposal

Realize the replenishment of new hospital management information system server to make service process faster particularly in outpatient pharmacy unit.

4 DISCUSSION

Based on mapping result of outpatient pharmaceutical installation service process, the value of non-compounding medicine lead time is obtained in amount of 1 hour 4 minutes and VAR in amount of 8,6%. Meanwhile, for compounding medicine lead time is 1 hour 12 minutes with VAR in amount of 7,6%. According to Gasperz (2011), a company can be said as lean if it has ratio value between waste and total activity more than 30%.

Therefore, outpatient pharmacy unit service process in Rural Public Hospital in Yogyakarta is not yet lean. It shows there are many waste activities that need to be eliminated so the performance will be more efficient and effective, increase patients' safety, increase patients and staffs satisfaction (Putri, 2017).

Based on the result of questionnaire distribution and analysis using Borda method, the highest waste in outpatient pharmaceutical installation is waste waiting in amount of 24,4%.

Waste waiting is a waste that happens because of activity absence or waiting process, for instance, patients waiting time, machine waiting time or material waiting time (Charron et al, 2015). Based on the other opinions, waste waiting is ineffective activity and takes a long time in one process. In example, waiting for work plan, order, machine, email, and etc. (Chalal & Narwal, 2017).

In this research, waste waiting occurs because of loading when input or entry patients' prescription data to hospital management information system. Based on the deep interview to technical information expert, hospital management information system speed decreases because of the use of old server since 2008 until 2018.

The implementation of hospital management information system in this hospital refers to the Health Ministry Regulation Number 82 Year 2013. This regulation aimed to increase service in more efficient, effective, and professional way. Nonetheless, the maintenance of hospital management information system in Rural Public Hospital in Yogyakarta has not yet regularly conducted. It is just conducted when there is a problem. Consequently, it needs regulation or standard about hospital management information system maintenance. Besides, adding up new server and may be long term program to repair management information system in Rural Public Hospital in Yogyakarta.

Another cause of waste waiting in outpatient pharmacy unit in this hospital is human resources issue. Limited human resources occur because of administration staff in counter is transferred to management department of the hospital and the staffs who continue their study.

When limited human resources happen, it is not recommended to add more staff since it needs more cost which against the lean concept. Thus, the important action which needs to be taken is optimizing the number of human resources by placed them in the place according to their capability. Placement is assigning someone in certain position of work that suit their capability in which later will influence the quality and quantity of the work (Mathis & Jackson, 2006).

Several things which need to be concerned in work placement are education, work knowledge, skill, and work experience (Suwatno, 2003). Other than replacement, staffs need to be optimized during peak hour so medicine service will run smoothly and increase patients' satisfaction.

Waste waiting is a waste that caused by waiting for broken machine, waiting for raw material, waiting for machine work when bottleneck happen because of imbalance production speed (Liker & Meier, 2007). Imbalance speed within service process may be caused by room layout. Effective layout room and unstructured service process will cause waste and it needs to be eliminated by institution/organization.

Based on the observation of layout room and service plot in Rural Public Hospital in Yogyakarta, the researcher finds the goods or places have less good and less neat arrangement. Also, ineffective and inefficient prescription process which influence patients' waiting time. It will be so much better if there are some improvement about prescription process such as staff placement and the location of pharmacy unit. Government has made a guideline on technical building especially for hospital class B. The guideline is published by Directorate of Medical Support Services and Health Facilities in 2012.

The proposed layout and service process above are expected to increase effectivity and efficiency of services. In the proposed layout, prescription plot process is different due to the new layout. Besides, it can be seen that the staff placement in counter will decrease the buildup prescription form. Also, by the placement, patients will have perception that their prescriptions are immediately processed.

Long waiting time is identified as one of the factors of patients' dissatisfaction on medical services among many countries (Aldana,Piechulek, & Al-Sabir, 2001; Muhondwa et al., 2008; Umar et al., 2011). Lack of resources is one of the causes of waiting time especially on human resources (Lucas, 2002; WHO, 2006).

Based on the root of the problem above, the researcher proposes improvement ideas which one of them is the implementation of 5S method.

5S method is basic methodology that comes and develops in Japan manufacture field which is Toyota Company. 5S method is reported as one of the excellent methods in lean concept due to its simplicity and easy to understand.

Several researches show there is benefit in applying 5S method such as a research by Moriones, Pintado & Diaz de Cerio (2010). The research shows there is positive relationship between the implementation of 5S method and several factors such as size, factory integration in multinational group, and the used technology in factory system quality. Also, 5S method is positively related to operational performance especially refers to quality and productivity.

It is in line with a research by Young in Hokong 2014 entitled "The Use of 5S in Healtcare Services". The research proves that 5S method can be applied in hospital and emerge benefits. Other researches also show that there is relationship between the implementation of 5S approach and waiting time reduction in outpatient installation of

Tanzania hospital. (Ishijima, Eliakimu & Mashana, 2016).

5S refers to five Japanese words with initial S, they are Seiri, Seiton, Seisou, Seiketsu, Shitsuke. In English it becomes Sort, Set, Shine, Standardize, Sustain and in Bahasa Indonesia it becomes 5R, Ringkas, Rapi, Resik, Rawat, Rajin.

5 CONCLUSIONS

Waste waiting is critical waste in Outpatient Pharmacy Unit of Rural Public Hospital in Yogyakarta with percentage in amount of 24,4%. The roots of waste waiting are the length of use of hospital management information system server, limited human resources and layout also service process factors.

The proposed improvement includes short term proposal, middle term proposal and long term proposal in which among them is the application of 5S, optimize service and human resources, change prescription plot based on the effective and efficient layout also by updating SIMRS server.

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Table 2: The Causal Root of Critical Waste in Outpatient Pharmacy Unit with 5why method

Why 1		Why 2		Why 3		Why 4		Why 5	
Why there is long queue in the counter of outpatient pharmacy unit in Rural Public Hospital in Yogyakarta?	Because staff needs a long time to input prescription data in hospital management information system.	Why staff take a long time to input prescription data in hospital management information system?	Because loading often happens when staff inputs data in hospital management information system and it takes a long time to finish one prescription form.	Why loading happens when staff input prescription data to hospital management information system so it takes time?	Because hospital management information system speed decreases when it uses to input many prescription data.	Why hospital management information system speed decrease when it uses to input many prescription data?	Because the server spec is not enough to process many data.	Why the server spec is not enough to process many data?	Because the server has been used since 2008 or 10 years and causes the server capacity decreases.
	Because prescription form that submitted to pharmacy is not always immediately processed	Why prescription form that submitted to pharmacy does not directly processed?	Because there is no staff at the counter.	Why there is no staff at the counter?	Because there is other duty which need to be finished.	Why other duty is not finished fast if the staff stays at the counter?	Because the limited human resources	Why the human resources is limited?	Because the staffs are transferred to management department and some of them continue their study
	Because medicine prescription service takes a long time	Why medicine service process takes a long time?	Because the medicine that has verified by the staff is not directly given to the patient.	Why the medicine that has verified by the staff is not directly given to the patient?	Because the verified medicines are collected in a basket first	Why the verified medicines are collected in a basket first?	Because if the medicines are given one by one to the patient, it will make the staff goes back and forth	Why if the medicines are given one by one to the patient, it will make the staff go back and forth?	Because the place of verification and counter are too far and it makes the staff takes a long time