

Implementation of Lean Management for Covid-19 Patient Services at Hospitals in Deli Serdang

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Abstract.

The need to improve the quality of health services in hospitals by eliminating waste in order to achieve an efficient health service process through a Lean Management approach. Methods using descriptive qualitative analysis where data is compiled, analyzed and then explained through data collection, problem solving, planning improvement ideas and by providing design improvement proposals. The application of this lean hospital reduces the service time for Covid-19 patients at Deli Serdang Hospital by 467.4 seconds in the service flow and the application of this lean hospital can reduce the service time for Covid-19 patients at the Haji Hospital by 377 seconds in the service flow. The conclusion of the study is that the application of the Lean Management approach at Deli Serdang Hospital and Haji Hospital is able to increase the effectiveness and efficiency of health services.

Keywords: Lean Management; Patient Service; Covid-19; Value Added Activity.

I. INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) [1]. The COVID-19 pandemic is considered a major event that disrupts many aspects of this decade. The new virus has increased the influx of patients, leaving healthcare facilities facing unprecedented challenges in dealing with increased demand and capacity. Based on a literature study conducted by Leite and colleagues on health management operations during a pandemic, there is an increase in the demand, resources, and capacity of health services, which can disrupt the health care system [2]. Hospitals are one of the health care facilities that have received the greatest impact from this pandemic, where along with the spread of this disease, problems in the health sector are also becoming increasingly clear [3]. The Government has designated 835 hospitals as referrals for handling COVID-19 patients, of which there are 132 national referral hospitals designated by the Ministry of Health and 703 Provincial/District/City referral hospitals designated by the Governor [4].

In North Sumatra, there are 37 referral hospitals for COVID-19 patients. Deli Serdang is one of the regencies in North Sumatra with three government hospitals and 21 private hospitals which is ranked the 2nd highest positive case of COVID-19 with a cumulative number of 5692 confirmed cases as of June 2021. One of the common obstacles found in every hospital is the increasing need for health workers due to the large number of health workers infected with COVID-19. This is the reason for the importance of a health service management to ensure the service process to patients runs efficiently and effectively. Lean management functions to minimize waste which in turn will increase added-value work. Waste in health services can be in the form of costs, length of time waiting for patients to get emergency services, the emergence of patient and health worker dissatisfaction, prolonging The Length Of Stay (LOS), and what is worse is the occurrence of patient safety incidents such as nosocomial infections (Hospital Acquired Infections). The occurrence of re-admissions, medication errors, and even death [5]. Along with the increasing number of patients who are confirmed positive for COVID-19 in Deli Serdang district, hospitals of course also face big challenges in improving the quality of health services which require hospitals to eliminate waste in order to achieve an efficient health service process through a Lean Management approach [5].

II. METHODS

Study Parameter

This study relates to analyzing how the implementation of lean management in two hospitals in the district of Deli Serdang to see how the implementation of lean management there [6]. The definition of operational parameters in this study can be seen in table 1.

Table 1. Study Parameter

No.	Variabel	Definition	Measuring	Measuring Instrument
1.	COVID-19 Patient Service Flow	Starting from screening COVID-19 patients until it is decided whether the patient is an outpatient or a special inpatient for COVID-19	- Field observation - Interview related health workers	- Researcher as observator - SOP guidelines for COVID-19 patient care - Interview guidelines
2.	Method	All activities carried out by health workers in hospitals related to the service of COVID-19 patients	- Field observation - Interview related health workers	- Researcher as observator - Interview guidelines
3.	Environment	Arrangement of rooms and facilities for each process of service for COVID-19 patients	- Field observation - Interviews with related health workers	- Researcher as observator - Interview guidelines
4.	Value Added Activities	Activities that add value to the service of COVID-19 patients	- Field observation - Interviews with related health workers	- Researcher as observator - Interview guidelines
5.	Non-Value-Added Activities	Activities that do not add value to the service of COVID-19 patients	- Field observation - Interviews with related health workers	- Researcher as observator - Interview guidelines
6.	Non-Value Added Activities but necessary	Activities that do not add value to the service of COVID-19 patients but cannot be eliminated	- Field observation - Interviews with related health workers	- Observation by researcher - Time is measured using a stopwatch
7.	Waste	Problems or disturbances that arise and affect work or services for patients	- Field observation - Interviews with related health workers	- Researcher as observator - Interview guidelines
8.	5S	Eliminate waste by improving the organization of the workplace to be more systematic and orderly.	- Field observation - Interviews with related health workers	- Researcher as observator - Interview guidelines

This research is descriptive qualitative research that aims to describe behavior, field events, and certain activities in detail and depth without questioning the relationship between variables and the problem being studied [7]. Case studies which include observations, interviews, audio-visual materials, documentation and reports in this research involve collecting a lot of data in order to build an in-depth picture of a case. This research was conducted in September – December 2021 at the Deli Serdang Regional General Hospital and the Haji General Hospital. Lean management observations in the service flow are carried out by observing patients where 5 patients are selected who follow the COVID-19 service flow from each hospital and the sample is selected using cluster random sampling, namely random sampling in each

clump/group. The instruments used in this study were observation sheets, interview guidelines and a stopwatch to measure the time of observation

III. RESULT AND DISCUSSION

Identification of Problems in COVID-19 Patient Services

Patient COVID-19 Service Value Stream Map

By reviewing the value stream map of the two hospitals, it is known that the service flow of the two hospitals begins with registering the patient at the registration counter, the patient then participates in primary triage including checking temperature, swab and antigen before being examined by the emergency room doctor. Patients who have gone through the stages of examination in the ER will then be determined whether to be hospitalized or receive outpatient treatment. Patients who are declared to be allowed to go home or have been allowed outpatient must first visit the pharmacy to pick up drugs before making payments at the cashier desk before the patient goes home [8].

Geographical Flowchart of COVID-19 Patient Services

By reviewing the geographical flowchart in the two hospitals, it can be concluded that there is a considerable distance between the arrival of patients in the primary triage and the observation room. This will result in an increase in the time required for primary triage services that the patient needs.

Value Assessment results for COVID-19 patient services

In the assessment of the patient, the calculation begins when the patient enters the ER. The value assessment for patient flow is presented in the table below, on Sunday, October 10, 2021, where there are more patients than normal working days because that date is a holiday. The value assessment table for Covid-19 patient services can be seen in the table 2:

Table 2. Value Assessment of Covid-19 Patient Services at Deli Serdang Hospital

No	Activity	Mean	Value Added	Non-Value Added	
				Avoidable	Non-Avoidable
1	Triage Primer	54	37,6	0	16,4
2	Observation Room	1297	407	297,2	592,8
3	Registration	367	266	101	0
4	Supporting Investigation	523,4	292	139,4	92
5	Pharmacy	1085	482	543	60
Total		3326,4	1484,6	1080,6	761,2

$$\text{Value Added (VA)} = \frac{1484,6}{3326,4} = 44,6\%$$

$$\text{Non-Value Added (NVA)} = \frac{(1080,6 + 761,2)}{3326,4} = 55,4\%$$

Based on the results of the calculations above, it is known that the overall activity in the Covid-19 patient service flow has a value added of 44.6% and is above 30%. If the hospital has a ratio between value added and non-value added/waste activities of 30%, it can be said to be lean. The calculation begins when the patient enters the ER. The value assessment for patient flow is described in the value assessment table for Covid-19 patient services which can be seen in the following table:

Table 3. Value Assessment of Covid-19 Patient Services at Haji Hospital

No	Activity	Rata-Rata	Value Added	Non-Value Added	
				Avoidable	Non-Avoidable
1	Registration	409,2	350,4	58,8	0
2	Triage Primer	917,4	900	0	17,4

3	Observation Room	1776,4	588,6	36	1151,8
4	Supporting Investigation	440	305,2	119,8	15
5	Pharmacy	531,6	452	45	34,6
Total		4074,6	2596,2	259,6	1218,8

Value Added (VA) = $\frac{2596,2}{4074,6} = 63,71\%$

Non-Value Added (NVA) = $\frac{(2596,2 + 1218,8)}{4074,6} = 55,4\%$

Based on the results of the calculations above, it is known that the overall activity in the Covid-19 patient service flow has a value added of 63.71% and is above 30%. If the hospital has a ratio between value added and non-value added/waste activities of 30%, it can be said to be lean.

Visual Management Assessment of COVID-19 patient services

Based on the results of interviews with the 4 respondents at the Deli Serdang Hospital, it can be concluded that the 4 respondents provided answers that detail that there are several problems for the hospital in providing services which can be grouped into 4 (four) groups of problems examined in the service. Covid patients at Deli Serdang Hospital, which is explained in the following diagram:

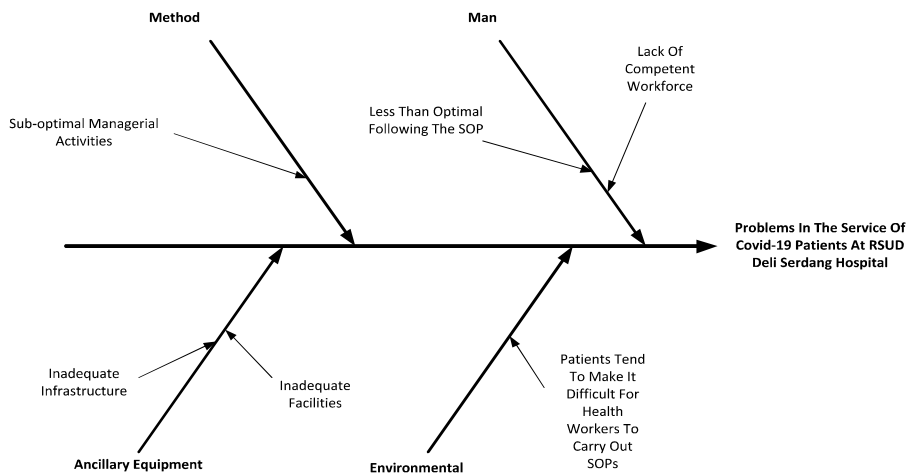


Fig 1. Fishbone Diagram of COVID-19 Patient Service Problems at Deli Serdang Hospital

Based on the presentation of the results of interviews with the 4 respondents at RSU Haji, it can be concluded that the 4 respondents provided answers that detail that there are several problems for the hospital in providing services which can be grouped into 4 (four) groups of problems studied in the service. Covid patients at Haji Hospital, which is explained in the following diagram:

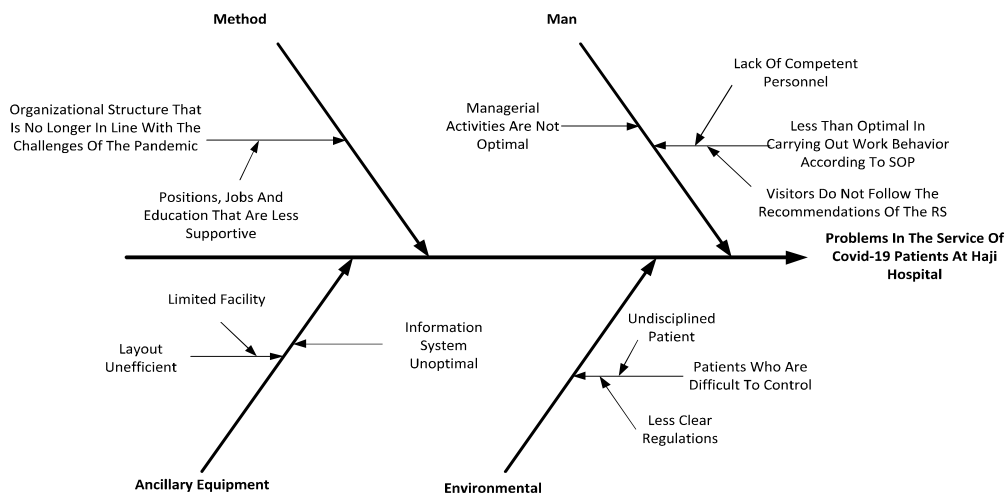


Fig 2. Fishbone Diagram of COVID-19 Patient Service Problems at Haji Hospital

Action Planning according to the Ideal COVID-19 Patient Service Management based on Lean Hospital Principles

After knowing the problems that occur in the service of Covid-19 patients at Deli Serdang Hospital and Haji RSU, a proposed improvement plan that is expected to be ideal can be drawn up based on lean hospital principles. Action planning is made and can be seen in the following table.

Table 4. Action Planning on Covid Patient Services at Deli Serdang Hospital

<i>Resouches</i>	Problem	Problem Solving
Man	Lack of workforce competence	Improving the competence of medical and non-medical personnel with in-service training programs
	Lack of optimization following SOP	Re-socialization was carried out by the management team regarding the previously established SOPs and the importance of implementing them
Method	Less than optimal managerial activities	Monitoring is carried out on the evaluation of managerial performance achievements Application of 5S culture
Anciliary Equipment Environment	Inadequate facilities	Improvements to existing facilities
	inadequate infrastructure	Improvements to existing infrastructure
	Caused because the patient tends to give a bad attitude so that health workers are hampered from following the SOP	Training related to the handling of the medical team in controlling patients

Table 5. Action Planning on Covid Patient Services at Haji Hospital

<i>Resouches</i>	Problem	Problem Solving
Man	Managerial activities that are not optimal	Evaluate the performance of hospital management and make basic improvements Application of 5S culture
	Lack of competent personnel	Training for existing workforce to improve work competence
	Visitors do not follow the hospital's recommendations	Provide direction to visitors regarding the rules set in the hospital
Method	Position, occupation and educational background in an unsuitable organizational structure	Performance evaluation and job analysis in the hospital organizational structure
Anciliary Equipment	Limited facilities	Procurement and repair of facilities that can still be improved in order to develop the quality of the facilities owned
	Information systems in hospitals that are not optimal	Carry out repairs and development of information systems in hospitals
Environment	Lack of clarity of existing regulations for patients	Evaluate the regulations made by the hospital and hold a visual display to introduce hospital regulations to patients
	Undisciplined patient	Provide training to health workers related to the science of calming patients

Implementation of Lean (Action Taking)

After knowing and identifying which activities are value added and non-value added, a design is made for the improvements that are expected to be made at the Covid-19 patient service installation at Deli Serdang Hospital and Haji RSU. The following is a lean implementation that occurred during the research [9].

- a. Improving the competence of medical and non-medical personnel with in-service training programs
- b. Re-socialization was carried out by the management team regarding the previously established SOPs and the importance of implementing them

- c. Monitoring is carried out on the evaluation of managerial performance achievements Penerapan budaya 5S
- d. Improvements to existing facilities Perbaikan terhadap prasarana yang dimiliki
- e. Training related to the handling of the medical team in controlling patients

The design for the improvements that are expected to be installed in the service of Covid-19 patients at the Haji Hospital can be seen as follows:

- a. Evaluate the performance of hospital management and make basic improvements.
- b. Application of 5S culture
- c. Training for existing health workers to improve work competence
- d. Provide direction to patients regarding the rules set in the hospital
- e. Performance evaluation and job analysis in the hospital organizational structure
- f. Procurement and repair of facilities that can still be improved in order to develop the quality of the facilities owned
- g. Carry out repairs and development of information systems in hospitals
- h. Provide training to health workers related to the science of calming patients.

Quality Improvement (Action Evaluation)

The implementation of lean hospital through action planning based on lean principles, namely the value stream map, visual management and 5S, has had a positive impact on services at the Deli Serdang Hospital and Haji RSU, namely improving quality which is assessed based on the effectiveness and efficiency of service time which increases in each service process flow. covid patient [10]. After the lean hospital approach was applied in the emergency room, the authors then calculated the value assessment again for activities that previously produced waste, so that the following results were obtained.

Table 6. Action Planning on Covid Patient Services at Deli Serdang Hospital

No	Activity	Average Before Lean	Average After Lean
1	Triage Primer	54	45
2	Observation Room	1297	1207
3	Registration	367	256
4	Anciliary Equipment	523,4	506
5	Pharmacy	1085	845
Total		3326,4	2859

Table 7. Action Planning on Covid Patient Services at Haji Hospital

No	Activity	Average Before Lean	Average After Lean
1	Registration	409,2	350,4
2	Triage Primer	917,4	800
3	Observation Room	1776,4	1740,4
4	Anciliary Equipment	440	320,2
5	Pharmacy	531,6	486,6
Total		4074,6	3697,6

Research Implication

Based on the action evaluation that has been carried out, it can be concluded that with the implementation of lean hospital at Deli Serdang Hospital, it will be able to reduce service time for Covid-19 patients. The reduced time is known to occur at the primary triage stage with a reduction of 9 seconds per patient service, a reduction of 90 seconds for each service in the observation room, a reduction of 111 seconds in the registration service time, a reduction of 17.4 seconds of service time on ancillary examinations and a reduction of 240 seconds. in patient care in the pharmacy unit. It can be concluded that

the application of lean hospital can reduce service time for Covid-19 patients at Deli Serdang Hospital by 467.4 seconds in the service flow. with the implementation of lean hospital at RSU Haji, the service time for Covid-19 patients was reduced at the registration stage by 58.8 seconds, at the primary triage stage there was a reduction of 117.4 seconds, at the stage in the observation room there was a reduction in service time of 36 seconds, at the supporting examination stage there was a reduction in time of 119.8 seconds and at the service activity stage in the pharmacy department there was a reduction in time of 45 seconds. So, it can be concluded that the application of lean hospital can reduce service time for covid-19 patients at Haji RSU by 377 seconds in the service flow.

IV. CONCLUSION

Based on the results of the value assessment of Covid-19 patient services at the Deli Serdang Hospital, it is known that the overall activity in the Covid-19 patient service flow has a value added of 44.6% and is above 30%. If the hospital has a ratio between value added and non-value added/waste activities of 30%, it can be said to be lean but further improvements need to be made in order to provide even better services. Based on the results of the calculation of the value assessment for Covid-19 patient services at the Haji RSU, it is known that the overall activity in the service flow for Covid-19 patients with value added is 63.71% and is above 30%. If the hospital has a ratio between value added and non-value added/waste activities of 30%, it can be said to be lean. Based on the fishbone diagram to explore the factors that cause problems in the service. It is known that the causes of the problem in the service of COVID-19 patients at Deli Serdang Hospital and at Haji RSU can be concluded, namely in terms of 4 factors, namely humans (lack of workforce competence, lack of optimality following SOPs), Methods (less than optimal managerial activities), supporting facilities (inadequate facilities and infrastructure) and environmental cause.

Because patients tend to give a bad attitude so that health workers are hampered from following SOPs). After the lean hospital approach was applied in the emergency room, the authors then calculated the value assessment again for activities that previously generated waste, so that the application of lean hospital can reduce service time for COVID-19 patients at Deli Serdang Hospital by 467.4 seconds in the service flow. The results of this study are in line with the results of research conducted by Elisabeth (2017) which states that the proper service time can be provided without experiencing time waste if lean management is applied. This is because by applying the principles of lean management, it will be able to provide several designs for the service process with activities that can actually be simplified or even eliminated so that the activities carried out to provide services to patients are the most targeted activities [11].

After the lean hospital approach was applied in the emergency room, the authors then calculated the value assessment again for activities that previously generated waste, so that the application of lean hospital can reduce service time for COVID-19 patients at Haji RSU by 377 seconds in the service flow. The results of this study are in line with the results of research conducted by Indrianawati (2017) which states that the proposed improvements that researchers can give for any waste are waiting, errors in service (defects) and improper processes. Several proposals such as those that have been submitted can be considered coupled with improving the skills of the officers to reduce the potential for errors [11].

Ethical Considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

The authors would like to thank the University of Prima Indonesia, Medan, Indonesia, for the opportunity and support given to the authors in conducting this research. The author would also like to thank all those who helped in carrying out the research and writing this article.

Conflict Of Interest

The authors declare that there is no conflict of interest.

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