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Systematic review: Application of lean management in improving service efficiency in hospitals in Indonesia

Emy Novita Sari[*], Faculty of Public Health, Universitas Diponegoro, Semarang, Central Java, Indonesia
Septo Pawelas Arso, Faculty of Public Health, Universitas Diponegoro, Semarang, Central Java, Indonesia
Sutopo Patria Jati, Faculty of Public Health, Universitas Diponegoro, Semarang, Central Java, Indonesia

[*]Email for Correspondence: emynovitasari@gmail.com

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ABSTRACT

Patient satisfaction is affected by the quality of care provided by hospitals. Background: According to the Indonesian Ministry of Health in 2022, the waiting time in Indonesian hospitals is still far from ideal. Lean can be used as a method to solve this problem. Lean is a systematic approach to eliminate waste and improve efficiency. Lean Hospital aims to improve the quality of patient care by reducing waiting time. This study aims to determine the effect of lean management on the efficiency of hospital services in Indonesia. This study was a systematic review and meta-analysis using the PRISMA diagram. The search for articles was based on the eligibility criteria of the PICO model. P = Hospital Management; I = Hospitals that Implement Lean Management; C = Hospitals that Do Not Implement Lean Management; O = Service Efficiency. The articles used were from 4 databases, namely: Google Scholar, Portal Garuda, PubMed, and Researchgate. With keywords including "Lean" AND "service efficiency" AND "hospital" AND "cross sectional". The articles were analyzed using the PRISMA diagram and the Review Manager application. The implementation of Lean hospital services can significantly improve efficiency, as indicated by an odds ratio of 2.43, consistent with previous studies. The p-value in the heterogeneity test is less than 0.05, indicating no heterogeneity problem.

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INTRODUCTION

A hospital is a place that provides health services to the community, helps speed up healing, and recovery of patients. According to government regulations, a hospital is an institution that provides comprehensive health services, including inpatient, outpatient, and emergency. However, hospitals also face pressure to continuously improve the efficiency and effectiveness of their services (Lestari et al., 2020; Prado-Prado et al., 2020; Visconti & Morea, 2020). In general, patients in hospital outpatient units have to wait longer than in other units. This waiting time is an important issue as the number of outpatients in Indonesia continues to increase (Kusumayati, 2023; Susanti et al., 2020). In addition to waiting times, medication errors and therapy problems are also problems in the outpatient unit (Kurniasih et al., 2021).

The purpose of health services is to improve public health by providing effective and satisfactory services for all parties, both the community and service providers (Arief Sutisna & Triyanto, 2022; Naher et al., 2020; Songstad et al., 2011). However, currently in Indonesia, many citizens are dissatisfied with the health services provided by the government because the picture of the situation and conditions is quite poor (Dewi et al., 2023; Handayani et al., 2015).

Based on the results of research conducted by the Ministry of Health of the Republic of Indonesia in 2022, there are several problems in hospital services in Indonesia, one of which is the long waiting time. Long waiting times are one of the most frequent problems complained by patients. Long waiting times can occur in various hospital services, ranging from outpatient, inpatient, to emergency. Based on the data, the waiting time in Indonesian hospitals averages 2.5 hours for outpatient and 7 hours for inpatient. This is far when compared to the ideal waiting time which should be no more than 30 minutes (Kementerian Kesehatan Republik Indonesia, 2022).

From these problems, it is necessary to have a solution to overcome the problem of hospital service efficiency in Indonesia. Implementation lean in health services, it is one of the concepts that can be used to provide satisfactory service and efficiency of health services (Almutairi et al., 2020; Lima et al., 2021; Muthia et al., 2020). Lean is a method that helps generate maximum value for patients by reducing waste and wait. Concept lean aim to improve customer value through continuous improvement of the ratio between value added to waste (Kurniasih et al., 2021).

Lean Hospital is the application of philosophy lean in the hospital. Lean is a systematic approach to eliminate waste and increase efficiency (Isfahani et al., 2019; Mouzani & Bouami, 2019). Lean Hospital aims to improve the quality of patient care by reducing errors and waiting times (Dewi et al., 2023). Application Lean Hospital requires commitment from all parties, from management, staff, to patients (Ramori et al., 2021; Shortell et al., 2021). With good commitment and cooperation, the application of Lean Hospital can have a positive impact on the time of health services in hospitals.

This study aims to determine the effect of lean management on the efficiency of hospital services in Indonesia. The results are expected to give readers more insight regarding the level of Indonesian hospitals' service efficiency and, further, how to improve its implementation.

METHOD

This study applies a structured research approach in analyzing and compiling the results of various studies related to a special topic. This evaluation is quantitative, which relies on statistical tools to combine data from various studies. This approach is often known as a meta-analysis. In searching for articles, researchers use the basis of PICO. P: Hospital Management, I: Hospitals that implement Lean Management, C: Hospitals that do not implement Lean management, O: Service Efficiency. Data sources in this study were found from various databases containing full text from various publication sources such as Google Scholar, Garuda Portal, Rajawali, PubMed, and Researchgate with keywords including "Lean Management" AND "Service Efficiency" AND "Hospital" AND "Cross Sectional" by using a PRISMA flow chart. The articles taken are articles published in the last 3 years (2020-2023).

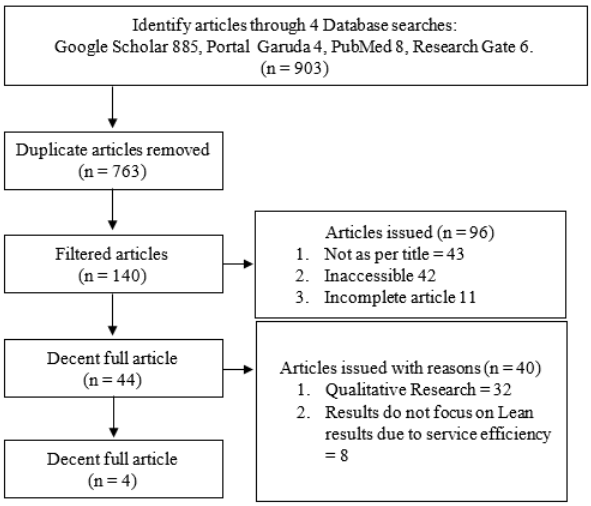

Figure 1. PRISMA Method Diagram of Article Search and Selection

RESULTS AND DISCUSSION

After going through the selection stage, four articles related to the research objective, namely the impact of lean hospital management on service efficiency, have been identified. Evaluation is then carried out in each journal based on PICO.

Table 1. Description of the primary study of lean management included in the meta-analysis

No.	Researchers	P	I	C	O
1	(Yulianingsih et al., 2022)	Hospital Management	Hospitals that implement Lean management	Hospitals That Do Not Apply Lean Management	Service Efficiency
2	(Lestari et al., 2020)	Hospital Management	Hospitals that implement Lean management	Hospitals That Do Not Apply Lean Management	Service Efficiency

3	(Winarno et al., 2022)	Hospital Management	Hospitals that implement Lean management	Hospitals That Do Not Apply Lean Management	Service Efficiency
4	(Pinta et al., 2022)	Hospital Management	Hospitals that implement Lean management	Hospitals That Do Not Apply Lean Management	Service Efficiency

To explore the quality of the article further, researchers utilize JBI's Critical Appraisal Tools specifically designed for Analytical Cross Sectional research which can be downloaded from the JBI.global website.

Table 2. JBI's Critical Appraisal Tools

	Sample criteria can be clearly defined	The subject of the study is described in detail	There is a Validity & Reliability Test	Standard &; objective criteria are used to measure conditions	Confounding Factors Found	Strategies for Overcoming Confounding Factors Have Been Mentioned	Results are measured in a valid & reliable way	Precise Statistical Analysis	Total
Article 1	1	1	1	1	1	1	1	1	8
Article 2	1	1	1	1	1	1	1	1	8
Article 3	0	0	1	1	1	1	1	1	6
Article 4	0	0	1	1	1	1	1	1	6

The results of the research quality evaluation identified four articles that have a descriptive study design that will be used as the basis for a meta-analysis on the effect of implementing lean on service efficiency in hospitals. These articles are then extracted and summarized according to the PICO research framework. Table 2 reflects studies relating to the effects of implementing lean on service efficiency in hospitals that will be the subject of a meta-analysis. This study consisted of four articles conducted in locations in Indonesia.

Table 3. Result Systematic Review What to Do

Researchers	Research Sites	Intervention	Research Methods	Result
Article 1	Emergency Intallation Unit of Universitas Gadjah Mada Academic Hospital	Lean	Action Research	The results showed that there was an increase in efficiency after the implementation of lean management in the emergency room of UGM Academic Hospital.
Article 2	Outpatient unit of RSUD Dr. Soeratno Gemolong	Lean	Exploratory Descriptive Through Direct Observation	Lean can identify and eliminate waste on outpatient services. Thus, they can reduce waiting duration and improve service quality.
Article 3	Outpatient Unit RSU PKU Muhammadiyah Delanggu	Lean	Action Research	The results of the study after improvements were made with the concept of lean hospital, there was an increase in service efficiency seen from the decrease in lead time.
Article 4	Emergency Installation Unit at RSUD Cilincing	Lean	Operational Research	Lean in the emergency room results in improved emergency room service performance by reducing non-value added activities and increasing value-added activities.

Based on the four research results, it can be concluded that the implementation of Lean hospital can improve the efficiency of hospital services. The efficiency of hospital services can be seen from several indicators, such as: Decreased patient waiting time, Improved service quality, and Decreased service costs.

Below are the results of testing Forest Plots using Revman.

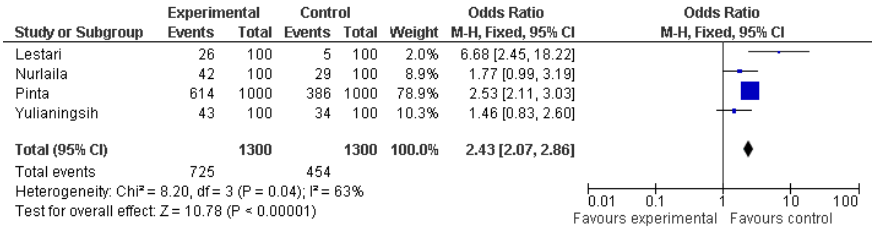

Figure 1. Forest Plot of Lean Implementation to Improve Service Efficiency

The results above show that the application of Lean hospital can improve the efficiency of hospital services. This is indicated by an odds ratio of 2.43 (95% CI: 2.07, 2.86). This significant improvement in hospital service efficiency can be seen from the 95% confidence interval which does not include a value of 1. A value of 1 indicates that there is no difference between implementing Lean hospital and not implementing Lean hospital in improving the efficiency of hospital services. These results are consistent with the results of previous studies that show that the application of Lean hospital can improve the efficiency of hospital services. In addition, the p value in the heterogeneity test is 0.00001 smaller than 0.05 which indicates if there is no hethonogenicity problem.

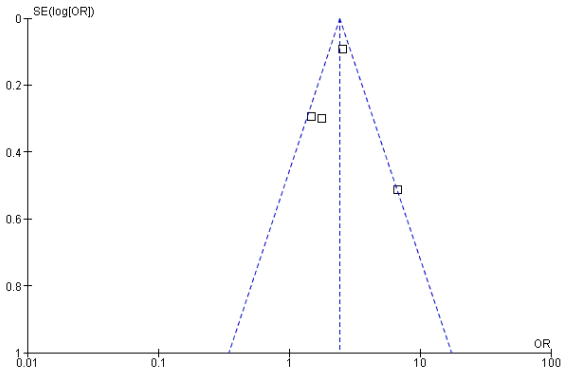

Figure 2. Funnel Plot Lean Implementation Improves Service Efficiency

The funnel plot in Figure 2. shows a balanced distribution of effect estimates between studies to the right and left of the estimated mean vertical line. The figure above shows no publication bias. The left plot has 2 plots with standard errors between 0 and 0.6, the right *plot* has 2 *plots* with standard errors between 0 and 0.6.

Discussion

Health care is a very important and complicated sector. This sector involves many departments, and failure in one department can have a negative impact on overall patient care. Lean is an approach to eliminating waste and increasing the added value of a product, good, or service. This approach is carried out continuously to provide better value to customers or patients. One of the causes of problems in health services is waste in the process of patient service. Waste is an action that does not add value to patients. One of the major problems in healthcare is patient waiting time, which is the most common problem in healthcare practice.

With the implementation of Lean, hospitals can increase the value provided to patients, increase process efficiency, and increase the productivity of health workers. Lean can also reduce or eliminate waste, thereby increasing added value.

In the first article conducted by Yulianingsih (2022), the lean method was applied to the emergency room unit of the Academic Hospital of Universitas Gadjah Mada. The research was motivated by an increase in waiting times during the Covid-19 pandemic. This study describes the implementation of lean management in the emergency room of Universitas Gadjah Mada Academic Hospital (UGM), measures the efficiency of the admission process at the emergency room of UGM Academic Hospital and implements solutions to increase efficiency in the admission process of admission at the emergency room of UGM Academic Hospital. The method used is Action Research with four stages, namely planning, implementation, observation and reflection. The study succeeded in concluding that after the implementation of Lean management in the emergency room of UGM Academic Hospital, there was a decrease in Lead Time of Sub Process 1 (starting from screening patients to doctors writing medical records) from 121 minutes to 120 minutes, an increase in

Lead Time of Sub Process 2 (ie laboratory examination to radiological examination) from 278 minutes to 431 minutes, and a decrease in Lead Time of Sub Process 3 (from patient education for hospitalization to with inpatient handover) from 193 minutes to 159 minutes. The VAR value showed an increase in process efficiency, with an increase in Sub Process 2 from 23.00% to 31.00% and Sub Process 3 from 8.50% to 10.70%. Sub Process 1's VAR value decreased from 43.00% to 34.00%.

In the second article conducted by Lestari (2020), the lean method was applied to the outpatient unit of Dr. Soeratno Gemolong Hospital. This research was motivated by the results of a patient satisfaction survey for the speed of service conducted by Dr. Soeratno Gemolong Hospital in 2017 obtained only 14.6% which stated that the service was on time. The high number of patient complaints and patient dissatisfaction occurs because of the long waiting time that must be passed by patients. This study aims to identify waste in outpatient services with Lean. This study used a qualitative descriptive approach by conducting direct observation of 20 patients who came to outpatient services, in-depth interviews and focus group discussions with several employees. The results showed that waste was found in services, including defects, overproduction, transportation, waiting, inventory, movement, overprocessing, and untapped talent. This research proves that lean principles, tools, and methods can identify and eliminate waste in outpatient services. So as to reduce the duration of waiting and improve the quality of service.

In the third article conducted by Winarno et al. (2022), the Lean method is applied to the Outpatient Unit of PKU Muhammadiyah Delanggu Hospital. The research was motivated by the awareness that pharmaceutical installations are the last door in health services in hospitals. Good and bad service in pharmaceutical installations determines the level of patient satisfaction in general. Therefore, pharmaceutical installations are always required to improve quality that focuses on patient satisfaction by eliminating waste that occurs in the service process. This study aims to improve the efficiency of prescription services at outpatient pharmacy depots by reducing lead times using the lean hospital concept. The research was conducted with action research design with Participatory Action research (PAR) approach. The results of the study after improvements were made with the lean hospital concept, there was an increase in service efficiency seen from a decrease in lead time from 54'35" to 39'23".

The latest research conducted by Pinta et al. (2022) applies Lean to the emergency room at Cilincing. The research was motivated because the service performance in the emergency room of the Cilincing Regional General Hospital was still below the Minimum Service Standard of the Ministry of Health No. 129 of 2008, namely response time and customer satisfaction. This research uses operational research. The results showed that most of the service time was non-value added (waste) by 65.39% while value added activities amounted to 34.61%. After the implementation of the Lean method in the emergency room, it resulted in an improvement in emergency room service performance by reducing non-value added activities to 38.6% and increasing value-added activities to 61.4%. Improved response time from 30.37 to 10.4 minutes and customer satisfaction from 60.28% to 77.78%.

CONCLUSION

Based on the results of research that has been conducted, it can be concluded that the application of Lean in health services can improve service efficiency, and increase patient satisfaction. The application of Lean in health services is still relatively new in Indonesia. Therefore, it is necessary to increase understanding of Lean in health services, both for health workers and hospital management. The Lean tools and methods that exist today are mostly developed for the manufacturing industry. Therefore, it is necessary to develop more specific Lean tools and methods for healthcare.

The research that has been done so far is still limited to certain aspects, such as the efficiency and effectiveness of services. More comprehensive research is needed to examine the impact of implementing Lean in overall healthcare, including cost, quality, and patient satisfaction.

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