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IMPLEMENTATION LEAN HOSPITAL IN PHARMACY UNIT : LITERATURE REVIEW

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ABSTRACT
Introduction: Lean Hospital is a management approach designed to enhance the efficiency and quality of hospital services by eliminating waste and improving work processes. The implementation of Lean in hospital pharmacy units holds significant potential for improving workflow, reducing waiting times, and ensuring the optimal availability of medications for patients.
Research Methods: This study uses a narrative literature review as the research method. The inclusion criteria selected were articles published within the last five years, from 2020 to 2024, with full access available, relevant to the keywords, and focused on hospitals in Indonesia. The exclusion criteria were articles that were not fully accessible and those published outside the specified time frame.
Findings/Results: From several articles implementation of Lean Hospital practices in pharmacy units resulted in an increase in Value Added Ratio (VAR) and a reduction in Lead Time (LT) for both concoction recipe and non-concoction recipe, positively affecting patient wait times. These outcomes improve the efficiency and quality of services provided by the pharmacy unit. Several approaches used to identify problems and reduce waste include the 5W-root cause analysis method, fishbone analysis, and the application of the 5S methodology within the hospital setting.
Keywords: Lean Management, Hospital, Pharmacy Unit
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INTRODUCTION

Pharmaceutical services in a hospital are an inseparable part of overall hospital services. Quality pharmaceutical services are one indicator for assessing hospital performance in terms of quality control and costs. The demand for patient satisfaction requires an expansion of the old product-oriented paradigm (drug oriented) into a new patient-oriented paradigm with a pharmaceutical service philosophy (pharmaceutical care). (4)

Pharmacy installations in hospitals must meet several indicators, one of which is the level of patient satisfaction (minimum standard of 80%) and waiting time for prescription services (maximum 30 minutes for ready-made medicines and 60 minutes for formulated medicines). From these standards, the level of efficiency, effectiveness and continuity of pharmacy installation services will be obtained through waiting times for prescription services, as well as the level of comfort and perception of pharmacy unit services through patient satisfaction. The waiting time for prescription services affects patient expectations of hospital services, especially in pharmacy unit services. If patients are dissatisfied with the services provided, then patients as consumers will be reluctant to return to the hospital, which can affect the number of hospital visits (27). Apart from that, it is hoped that 25% of the patient's recovery will be obtained from good service and comfort, while the 75% figure will be obtained from the drugs used by the patient.(25)

Key factors that need to be considered in pharmacy unit services are fast, friendly service, guaranteed availability of good quality medicines, competitive prices, collaboration with other elements in the hospital such as doctors and nurses, other factors such as location, comfort, and diversity (4) to achieve this, a management approach is needed to streamline and reduce unnecessary things (waste) with the concept of lean thinking. The concept of lean thinking is the use of resources as efficiently as possible by eliminating waste aspects and improving work processes. Lean is a tool, management system and philosophy of a hospital that allows hospitals to improve the quality of service to patients by reducing errors, waiting times and cost efficiency.

The implementation of lean in pharmacy units in several hospitals has been successful in improving service quality. By carrying out research stages of observing service flows in the form of value stream mapping, it is known that several critical wastes can be found, such as overproduction waste, waiting waste, inventory , waste extra processing, motion, defects,

transportation, Human Potential. Hospitals in Indonesia that have successfully implemented lean, namely RSIA (Mother and Child Hospital) Kemang Medical Care, has succeeded in reducing the number of drugs in the perinatal unit by 58% from 90 items to 38 items, and for six months of the implementation of a lean hospital can save monthly costs of Rp. 90,524,887. (11)

Various efforts have been made to reduce waste in pharmaceutical units. It requires a lot of consideration to carry out and implement lean concepts in order to maximize resources and eliminate waste. This study aims to review existing literature regarding the implementation of Lean Hospital practices in pharmacy units, identify key factors that contribute to successful implementation, and evaluate their impact on operational efficiency and service quality.

LITERATURE REVIEW

1. Lean Management

Lean is a continuous effort to eliminate waste and increase the added value (value added) of products (goods or services) in order to provide value to customers (customer value). Lean is a management system and methodology that aims to improve the quality, safety and efficiency of a service process. Lean focuses on identifying and eliminating non-value adding activities in design, production (manufacturing) or operations (services) because the goal of lean is to increase customer value through efforts to increase the ratio of added value to waste (the value to waste ratio) continuously. (26)

Lean applied throughout the company is called enterprise lean, lean in manufacturing is called lean manufacturing, while what is applied in hospitals is called lean hospital. Lean hospitals are needed so that hospitals can optimally meet patient needs and provide health services as much as possible by reducing waste which will ultimately create added value for hospitals. (27)

2. Lean Management Principal

Whatever the type of application of lean, its main function is to eliminate waste that occurs in the area of application, increase productivity and reduce operational costs

so as to increase profits. There are five basic principles of lean, namely: (26)

1). Identify the value of products (goods or services) based on prospective customers, where customers want superior quality products (goods or services), with competitive prices and timely service.

2.) Identify value stream process mapping (process mapping of the value stream for each product (goods or services)).

3). Eliminate non-value added waste from all activities along the value stream mapping.

4). Organize so that materials, information and products flow smoothly and efficiently throughout the value stream process using a pull system.

5). Continuously seek various improvement techniques and tools to achieve excellence and continuous improvement.

3. Pharmacy Service Flow

A hospital pharmacy installation is defined as a department or unit or part of a hospital under the leadership of a pharmacist and assisted by several pharmacists who meet the requirements of applicable legislation and are responsible for all pharmaceutical work and services, which consist of complete services that include planning, procurement, production, storage of health supplies or pharmaceutical preparations, dispensing of drugs based on prescriptions for patients during inpatient and outpatient care, quality control and distribution control and use of all hospital health supplies.(26)

One of the main services of the pharmacy unit is drug prescription services for outpatients and inpatients. Of course, patients want fast and precise service, so it is based on government regulations in the Minister of Health Decree

No.129/Menkes/SK/II/2008. The standard time for prescribing ready-made medicines is no more than 30 minutes and for concocted medicine services is no more than 60 minutes. Based on the indicator, the waiting time for drug services is the time required from the receipt of the prescription until the prescription has been given to the patient. (9)

4. Value Added Ratio

The Value Added Ratio (VAR) is defined as the ratio that compares the total value-added time (VAT) with the total service process cycle time (CT). VAR is used to measure the efficiency of a process. The higher the VAR, the greater the proportion of activities that truly add value for patients compared to the waste that occurs during the service process (2).

According to the Decree of the Minister of Health of the Republic of Indonesia Number: 129/Menkes/SK/II/2008 regarding Minimum Service Standards for Hospitals in pharmacy services, the following indicators must be met: (a) the waiting time for compounded medication is <30 minutes and for non-compounded medication is <60 minutes; (b) zero medication administration errors (100%); (c) customer satisfaction >80%; and (d) 100% of prescriptions written must comply with the formulary (9).

5. Waste Identification

Waste identification in the pharmacy unit is a crucial process to detect non-value-added activities within the hospital's pharmacy service system. These activities have the potential to hinder the efficiency and quality of service delivery to patients. This process involves analyzing workflows, waiting times, and causes of inefficiencies across various service stages, such as in the provision of concoction and non-concoction medications (2). Several methods used to identify waste in the pharmacy unit include:

a. **Value Stream Mapping (VSM):** This method maps the workflow to identify areas of waste in pharmacy services. The goal of mapping the service process flow is to determine the root causes of issues. Poor service processes can harm patients, reduce patient satisfaction, and increase costs due to inefficient use of staff resources. VSM mapping is conducted to accurately describe the actual conditions, enabling the formulation of appropriate solutions. If a service shows that Non-Value Added (NVA)

activities exceed 30%, it indicates that the service is neither effective nor efficient and contains significant waste (17). Data time identified includes CT data (cycle time), VA (value added), NVA (non-value added), VAR (value added ratio), LT (waiting time). (3)

b. **Fishbone Analysis:** This method helps identify various factors contributing to waste, categorized into aspects such as personnel, methods, materials, and environment.
c. **Root Cause Analysis (RCA):** This method aims to answer questions such as what, how, and why an error occurred (Syahroni, 2015). One RCA technique is the 5 Whys Method, which is used to uncover the root cause of waste by repeatedly asking "why" until the fundamental cause is identified (23).

RESEARCH METHODOLOGY

This study uses a narrative literature review as the research method. Journal searches were conducted using Google Scholar and ResearchGate search engines. We found 20 journals that matched with inclusion criteria. The inclusion criteria selected were articles published within the last five years, from 2020 to 2024, with full access available, relevant to the keywords, and focused on the pharmacy unit in a hospital in Indonesia. The exclusion criteria were articles that were not fully accessible and those published outside the specified time frame.

RESULT AND DISCUSSION

The journals were obtained through search engines using keywords related to the implementation of lean healthcare in hospital pharmacy units in Indonesia. A total of 20 journals met the inclusion criteria. The goals of implementing lean healthcare and the solutions to the identified problems were then analyzed and examined using these selected journal sources. The journals reviewed are as follows:

NO	Title of Article	Author, Year	Method	Result
1	Improving the Quality of Pharmacy Services Through Lean Management Approach in the Outpatient Pharmacy Department at M. Yunus General Hospital, Bengkulu	Ferdi, Ani Nuraini, Dedi Nugroho, (2023)	Use of Qualitative Methods: Using interviews and direct observation	● Increased non-concoction recipe VAR from 29% to 48%, and concoction recipe VAR from 25% to 43%. ● Identified three types of waste: motion (17.32%), overprocessing (14.48%), and inventory (14.20%). ● Problem resolution involved the implementation of 5S (Seiri, Seiton, Seiso, Seiketsu, Shitsuke).
2	Lean Hospital Approach to Minimize Waste in the Outpatient Pharmacy Department at Pandan Arang District General Hospital, Boyolali	Tria Yuganingsi, Gunawan P. Widodo, Opstaria Saptarini (2021)	Qualitative method with interviews, observations, and questionnaires.	● After Lean implementation, concoction recipe VAR increased to 56%, and non-concoction recipe VAR increased to 50%. ● Identified waste: overproduction (63.3%), waiting (23%), and inventory (39.5%). ● Problem resolution involved the 5S method.
3	Lean Thinking Implementation to Reduce Waiting Time for Medication Services in the Outpatient Pharmacy Department at Panti Rini Hospital	Denny Widhiyanto Yanong, Erna Kristin, Firman, (2023)	Qualitative method using interviews, observations, and questionnaires.	● Increased concoction recipe VAR from 24% to 48%, and non-concoction recipe VAR from 30% to 55%. ● Identified waste: waiting, extra processing, motion, defect, and inventory.
4	Critical Waste in the Outpatient Pharmacy Department at Dr. Soeradji Tirtonegoro General Hospital: Lean Management Approach	Siti Feriani Rochimah, Ahmad Ahid Mudayana (2020)	Qualitative case study using interviews and observations.	● Non-compound prescription VAR before Lean intervention was 17.80%, and compound prescription VAR was 18.68%. Overprocessing was the largest waste (26%).

5	Lean Approach of Pharmaceutical Installations At Hospital ABC Purbalingga to Increase Pharmacy Service Efficiency (non BPJS)	Rani Aulia Imran, Debora Fransiska Panjaitan, Niko Siameva Uletika (2022)	Mixed method (qualitative and quantitative) using time study observation and in-depth interviews.	● The average service cycle for concoction medication was 1 hour, 3 minutes, and 3 seconds, while the ideal time was 33 minutes and 49 seconds. ● Non-value-added (NVA) activities reduced by 76.50%, with value-added (VA) activities increasing from 23.02% to 49.64%
6	Evaluation, Remedy of Waste, Lean Hospital Method, Process of Inpatient Pharmacy Services in Hospital	Yunilah Sukmadryan, Wiwin Herdwiani, Tri Wijayanti (2023)	Descriptive qualitative approach using observations, interviews, document review, and questionnaires.	● The VAR value after Lean intervention was 32.6%. ● The critical waste identified in this study was defect and waiting. ● Problem resolution included the 5S method.
7	Minimizing Waste in the Inpatient Pharmacy Department at Pandan Arang District General Hospital, Boyolali Through Lean Hospital Approach	Yohanes, Gunawan, Opstaria, Claudius, Mustika (2024)	Observational method using questionnaires.	● The VAR value before Lean intervention was 28.42%. ● Identified critical wastes were defects (43.34%), transportation (41.67%), and inventory (43.33%). ● Problem resolution included the 5S method.

8	Implementation of Lean Hospital Intervention in Outpatient Pharmacy Depot at the National Brain Center Hospital Prof.Dr.dr. Mahar Marjono Jakarta, Indonesia	Dwi Dharmaningsih, Helen, Andriani, Masyitoh Bashabih, Hadijah Tahir (2024)	Qualitative approach using observations, interviews, and document reviews.	● Increased non-compound prescription VAR from 24,84% to 24,92%, and compound prescription VAR from 27,30% to 38,15%. ● The highest wastes were waiting and overprocessing. ● Problem resolution involved the 5S method.
	Lean Hospital Approach for Improving The Process of Taking Drug Services in Outpatient Pharmacy Installations	Y Nina, IM Hakim (2020)	Qualitative method using observations and interviews. Analysis involved VSM, RCA for waste identification, and Fuzzy Failure Mode and Effect Analysis (FMEA) for risk identification.	● Increased non-concoction recipe VAR from 61% to 82%, and concoction recipe VAR from 74% to 87%. ● The highest waste was waiting. ● Problem resolution involved the 5S method.
10	Identifying potential Improvements in Drug Service Processes at RS X Semarang Pharmacy	Emy Novita Sari, Septo Pawelas Arso, Sutopo Patria	Descriptive-analytic qualitative method	● After Lean intervention, concoction recipe VAR was 50.06%, and non-concoction recipe

	Installation: Lean Management Approach	Jati (2023)	using observations, in-depth interviews, and stopwatch measurements for waiting time. Analysis involved RCA and Ishikawa diagrams.	VAR was 51.87%. ● The highest waste was materials and human resources.
11	A Lean Thinking Approach for Sustainable Improvement of Outpatient Pharmaceutical Service Processes in Hospital 'X"	Elsyahrani Rafika Intan, Chitra Astari, jasril (2023)	Qualitative, observational action process research using observations and in-depth interviews.	● The VAR value before Lean intervention was 63.64%. ● Identified wastes were waiting, excessive motion, and defects.
12	Waste Analysis in Outpatient Pharmacy Installation Using Lean Management Approach at PKU Muhammadiyah Bantul Hospital	Triyani, Firman Syarifuddin (2020)	Qualitative method using observations and interviews with triangulation analysis.	● The VAR value before Lean intervention was 31.79% for non-concoction recipes and 42.41% for compound prescriptions. ● Identified waste: waiting and overprocessing.
13	Evaluation of Waiting Time After Redesign and Lean Pharmacy Implementation in Outpatient Pharmacy Services	Fitri Yani, Syarifah Maraiyuna, Azizah Vonna (2022)	Quasi-experimental method using a one-group pretest-posttest design.	● The waiting time for prescription services significantly decreased from 86 minutes to 56 minutes after Lean Pharmacy implementation (a reduction of 30 minutes with a p-value of 0.000). ● Identified waste:

				waiting.
14	Lean Hospital Approach To Identify Critical Waste In Outpatient Pharmacy Installation of PKU Muhammadiyah Gamping Hospital	Baiq Sandi Kartika Sari, tri Ani Marwati, Muhammad Syamsu Hidayat (2021)	Qualitative method using questionnaires, in-depth interviews, and Borda analysis.	The most critical waste was patient waiting time (19%).
15	Lean Hospital Approach to Identify Critical Waste in Medication Services at Outpatient Pharmacy Installation of RSUD X Manna in 2020	Dinda Sri Rahayu, Titik Sunarni, Opstaria Saptarani (2020)	Qualitative approach using observations, questionnaires, and interviews with the 5 Whys method.	● The VAR value before intervention was 64% for concoction recipe and 53% for non-concoction recipe. ● Identified critical waste: motion (21.1%).
16	Lean Healthcare Approach to Minimize Waiting Time at the Outpatient Pharmacy Installation of Ungaran General Hospital, Semarang Regency	Alif Putra Yuda (2021)	Lean Healthcare approach using value stream mapping and root cause analysis (RCA).	● Identified wastes: waiting, transportation, motion, and inventory. ● The process cycle efficiency increased from 9% to 17% after the proposed Lean improvements were implemented.

17	Efforts to Implement Lean Thinking Method in Outpatient Pharmacy Services	Komang Adhi Restudana, Gede Sri Darma (2022)	Observational action process method using Lean approach with data collection through document review,	● Lean implementation increased VAR from 45.65% to 81.72%. ● Service speed improved, and patient complaints reduced by 50%, from 80% to 40%. ● Identified waste: waiting, reduced from 327 minutes to 91 minutes.
			direct observation, and interviews.	
18	The Impact of Lean Management Implementation on Inpatient Discharge Prescription Services at Pertamina Central Hospital	Ajitya Kurnia Hermawati, Erna Kristin Firman (2024)	Mixed method (quantitative and qualitative) with action research approach. Data collection included pre- and post-intervention observations, narrative analysis from focus group discussions (FGDs), and document studies.	● Lean management reduced non-concoction recipe waiting waste from 426 minutes to 25 minutes, with an increase in VAR from 18.9% to 27%. For concoction recipes, waiting time dropped from 67 minutes to 457 minutes, with a VAR increase from 25.2% to 37.9%. ● The Mann-Whitney U test showed a significant difference between waiting times before and after Lean management intervention.
19	Increasing Patient Satisfaction with the Quality of Outpatient Pharmacy Services Using the Lean Hospital Approach	Kartini, Nur Wulandari, Gunawan Pamudji, Widodo, Ismi Rahmawati	Qualitative case study using observations, interviews,	● VAR before intervention was 67% for compound prescriptions and 48% for non-compound prescriptions. ● Identified waste: motion

		(2023)	and questionnaires. Analysis used the BORDA method to identify critical waste and the 5-why method to determine root causes.	(53.3%) and waiting (33.8%).
20	Implementation of Lean Kaizen to Reduce Waiting Time for Indonesian Health Social Security Agency (BPJS) Prescription Services in Hospital Pharmacy Installation	Vera Yuliati, Helen Andriani (2021)	Mixed method (qualitative and quantitative) using direct observations with time and motion study techniques and interviews. Lean Kaizen was implemented using the PDCA cycle to identify and reduce waste.	• Lean Kaizen implementation reduced non-concoction recipe lead time from 135,31 minutes to 9,11 minutes in scenario 1, and 7,49 minutes in scenario 2. For concoction recipes, lead time decreased from 185,17 minutes to 31,09 minutes in scenario 1, and 29,15 minutes in scenario 2. • The largest wastes were waiting (53,3%), overprocessing (40%), and motion (67%).

Based on the journals researched, almost 100% found waste in waiting, the second and third wastes were motion and defects. While the least waste is in overproduction, transportation, and human potential. In this study, the implementation of Lean Hospital in the pharmacy unit was evaluated based on various related journals. The main focus of this

research is to identify the waste that occurred before and after the Lean Hospital intervention, as well as the proposed solutions to reduce waste. A study conducted at the Outpatient Pharmacy Unit of M. Yunus General Hospital Bengkulu (4) reported an increase in lead time efficiency of 12.12% for non-concoction recipes and 3.3% for concoction recipes after the implementation of Lean principles in the hospital. At the Outpatient Pharmacy Unit of Panti Rini Hospital (25), lead time efficiency was found to be 47.34% for non-compounded prescriptions and 37.76% for compounded prescriptions. At Prof. Dr. dr. Mahar Marjono Hospital (29), the implementation of Lean resulted in lead time efficiency improvements of 32.15% for compounded prescriptions and 28.69% for non-compounded prescriptions.

The implementation of Lean Management requires proper identification of waste to make effective changes. Several journals used the Value Stream Mapping approach to identify workflow areas where waste occurs, fishbone analysis to examine waste from the perspectives of Man, Methods, Material, and Environment, and Root Cause Analysis using the 5 Why approach. Each method has its own advantages for identifying waste in the unit.

Based on a review of several journals, the most dominant type of waste identified in the pharmacy unit is waiting waste. This occurs due to the limited number of employees in the pharmacy unit, causing long queues (11), frequent errors in the hospital information system (SIMRS) (12), manual label filling processes (12), and the simultaneous scheduling of doctors' practice times, leading to a prescription backlog (14). The second most identified waste is motion waste caused by inefficient layouts (1,19).

Motion waste was recorded at 17.32% before the intervention. This was due to inefficient movement within the pharmacy unit, particularly in managing the physical layout
(2). Motion waste was identified as one of the largest wastes because the suboptimal room layout forced pharmacy staff to move farther than necessary, disrupting workflow. Layout improvements were proposed as a solution to reduce motion, which proved effective after changes were made.

Another form of waste is overproduction at 63.33%, caused by excessive document production and unnecessary information, leading to an accumulation of non-value-added tasks (2). This waste was mainly due to redundant information and unnecessary document duplication. By implementing an integrated and computerized documentation system, this issue can be minimized, thereby increasing service process efficiency (2). The application of Lean methods can also help simplify this process by eliminating unnecessary steps (4).

After the Lean Hospital intervention, several journals reported a significant reduction in waste, as demonstrated by an increase in the Value-Added Ratio (VAR) after Lean implementation, reflecting improved operational efficiency in the pharmacy unit. This review shows that the application of Lean principles in the pharmacy unit has had a significant impact on reducing waste (20).

The Lean approach, with the 5S method (Seiri, Seiton, Seiso, Seiketsu, and Shitsuke), is a method of organizing the work environment that seeks to eliminate waste and create an effective, efficient, and productive workspace. 5S is a movement derived from the determination to organize the workplace through sorting, setting in order, cleaning, maintaining good conditions, and fostering the habits necessary to perform good work. The primary goal of 5S is to prevent problems and create a work environment that allows people to provide the best possible service to patients in the most effective way (7, 18).

Despite the positive outcomes of Lean implementation, challenges remain in maintaining long-term changes. Many organizations struggle to sustain these improvements over time. Continuous improvement efforts and strong management support are essential to embedding Lean principles into the hospital's culture. The identified barrier is the lack of resource allocation, both in terms of human resources and technology, such as inefficiencies in waiting times related to staff shortages.

One of the main recommendations across various studies is to improve pharmacy layouts to optimize workflow and reduce unnecessary movement. For example, the implementation of visual guides for staff and the redesign of workstations can help minimize motion waste. Additionally, increasing the use of automated prescription systems and improving the electronic health record (EHR) system were highlighted as important steps in reducing administrative burdens and accelerating service times. These improvements are considered critical for achieving sustainable progress in pharmacy operations.

CONCLUSION

Pharmaceutical companies have problems related to waste, among others waiting time, overproduction, overprocessing,motion, inventory, defect and transportation. The adoption of Lean Management in pharmacy units across multiple hospitals has shown potential to

reduce waste and improve service efficiency. However, success depends on continuous leadership support, staff training, and an incremental approach to change management. Sustainable improvements require not only changes in process design but also the incorporation of IT and human resource strategies.

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