

SYSTEMATIC REVIEW

Improving the Waiting Time in Outpatient Clinics Using Lean Approach in Hospital: A Systematic Review

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ABSTRACT

Introduction: The use of the lean approach in healthcare has rapidly gained popularity globally, although this approach was more routinely used in the manufacturing sector as opposed to health. Besides, recent studies confirm the suitability of the lean approach applications for improving the quality of medical care. This study aimed to determine the Lean approach's capacity to improve the waiting time in outpatient clinics in hospitals. **Methods:** The systematic review approach was employed to help in the research procedures. Search databases used included Ovid, Google scholar, PubMed, MEDLINE, and archive. Besides, search terminologies such as the Lean approach, Hospital-implementation, waiting time, and patient flow were used to help identify sources that best suited the investigation process. **Results:** The review revealed that the lean approach is suitable for the reduction of waiting times as well as for improving efficiency in the clinic. The outcomes provide a basis for reducing the average waiting time within the hospital. **Conclusion:** This study recommended that healthcare facilities and departments should take a keen interest in implementing the Lean approaches, as they are crucial for reducing waiting time.

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INTRODUCTION

Fundamentally, the outcomes of clinical procedures depend on quality service delivery. Therefore, the use of quality improvement procedures not only enhances the outcomes of medical processes but also improves patient satisfaction (1). The Lean approach is among the increasingly popular approach among most clinical practitioners in improving the quality of health care (2).

The Toyota Motor Corporation's manufacturing philosophy served as the foundation for the lean approach, which is a collection of ideas, techniques, and tools. Based on the work of industrial engineers Frederick Taylor and W. Edwards Deming, Toyota created Lean in the 1950s. Toyota utilises the Toyota Production System rather than the term "lean." Lean was first implemented in US auto manufacturing to replicate Toyota's success and has subsequently spread to other

manufacturers, such as Boeing, to the service industry, such as Tesco and the public sector, such as the UK National Health Service (3).

The Lean approach in medical service ensures the continuous improvement of service delivery as perceived by the patient through the elimination of wastes and maximization of patient safety and quality. Waste is anything that does not benefit the patient, such as doing the same tests more than once. Nonetheless, implementing the Lean approach requires an extensive transformation of an organisation's culture (4).

Six Sigma and the lean approach are occasionally combined. In order to eliminate errors in its operations, Motorola created the Six Sigma approach in the 1980s. Its objective was to perform at a level comparable to a Six Sigma environment, with a defect rate of 3.4 per million opportunities. Similar to how Total Quality Management, a key component of industrial engineering, gave rise to the Six Sigma approach used by Motorola Inc. in the 1980s. A data-driven approach to issue solving is called Six Sigma (5,6). The emphasis is placed on customer satisfaction, while the focus is on process

variations. The objective of this strategy is continuous process improvement with few faults. The techniques of Lean and Six Sigma are combined in Lean Six Sigma. Process wastes can be decreased or eliminated using lean concepts. Six Sigma emphasises process variation reduction. Thus, the Lean Six Sigma concepts increase the process's effectiveness and quality. Lean Six Sigma is an evidence-based, data-driven improvement methodology that prioritises fault prevention more than defect discovery. Lowering variance, waste, and cycle time and encouraging the adoption of work standardisation and flow boosts customer satisfaction and bottom-line results while giving businesses a competitive edge. It is relevant whenever there is variance and waste, and all employees should be involved (7).

Lean and Six Sigma integration results in a win-win situation. The Lean philosophy offers a plan and establishes the conditions for enhancing the flow and reducing waste. Staff members who feel empowered are encouraged to improve continuously in order to identify possibilities to add value. Contrarily, Six Sigma aids in the quantification of issues, the making of evidence-based judgments, the understanding and reduction of variation, and the identification of variation's underlying causes in order to develop long-lasting solutions. It also calculates the savings and financial advantages. Potentially, this might raise efficiency, improve quality, lower costs, enhance speed, make the workplace safer for patients and staff, and surpass consumer expectations (8).

The Lean methodology and Lean Six Sigma can aid in reducing waiting times in hospital outpatient facilities regarding patient care. Due to the detrimental effects that waiting has on patients' satisfaction with their medical care, the issue of lengthy patient wait times has gained more and more public attention. Patient satisfaction with several features of their service was inversely correlated with actual waiting times (9). The situation in the emergency rooms is more concerning. According to a study, the average length of stay for comparable patients during the same shift in the emergency room increased with the probability of adverse outcomes. The adjusted odds ratio (95% confidence interval) for death for mean length of stay > 6 v < 1 hour patients were 1.79 (1.24 to 2.59), and for admission, it was 1.95 (1.79 to 2.13), and for low acuity patients, it was 1.71 (1.25 to 2.35) and 1.66 (1.56 to 1.76) (10). Hence, the study's goal is to investigate how the Lean methodology might reduce patient wait times for services, especially for hospital outpatient services.

METHODOLOGY

A systematic review was conducted, which involved the search of studies in relevant electronic databases: Ovid, Google scholar, PubMed, MEDLINE, and archive.

Searches were carried out using the following terminologies: "Lean approach", "hospital", "waiting time", and "patient flow". Boolean operator "OR" was applied in combining search keywords, whereas "AND" was applied in combining title and abstract. English was used to collect data from the fully published study. To complement the computerised searches, relevant review article bibliographies were also reviewed.

The following criteria were used to determine which articles should be included in this review: (i) original research papers; (ii) prospective or retrospective studies, including cohorts; (iii) use of the Lean approach with or without Six Sigma; (iv) in the English language; and (v) full-text accessibility. Duplicate papers were manually or electronically excluded when the articles were electronically transferred into reference management software. Studies published prior to 2010 were excluded due to the limited research conducted on Lean and Six Sigma in healthcare before that year (Rathi et al., 2022). Additionally, considering the evolving nature of the field, these earlier studies were considered outdated for the purposes of this review. The preferred reporting items for systematic review and meta-analysis (PRISMA) were employed to help in the research procedures, as shown in Fig. 1.

Two steps of article selection were conducted. The first researcher initially checked the eligibility of the identified studies' titles and abstracts. The complete texts of studies that were thought to be potentially pertinent for the review were then retrieved and compared to the inclusion and exclusion criteria. Two scholars independently worked on the full-text screening. A discussion was used to settle any disputes.

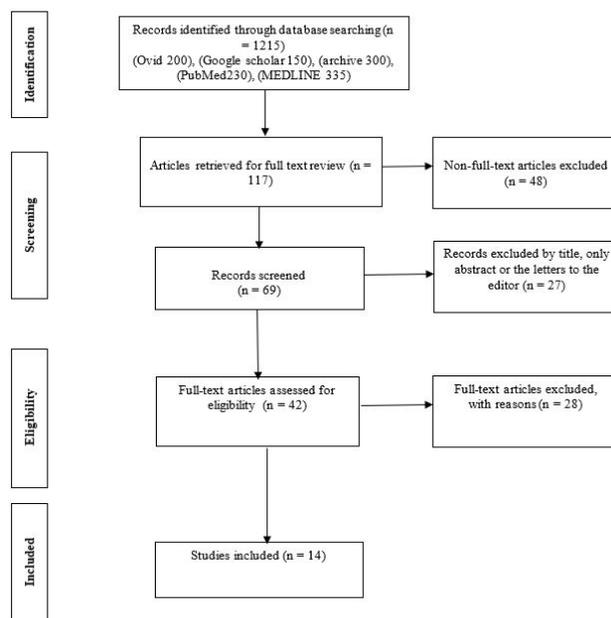


Figure 1: Articles selection process

Data were extracted using a standardized data extraction sheet (Excel spreadsheet). Title, author, journal, year, nation, study site, research aims, design, findings, and conclusion were all used as descriptive information.

The quality of articles used in the systematic review was determined using the "Quality Assessment Tool for Before-After (Pre-Post) Studies with no Control Group" by the National Heart Lung and Blood Institute (11). The tool comprises 12 items, each with a score of 1 for a positive answer. The quality of the study is based on the risk of bias rating; the lower the risk score and the higher quality of the study. The low-risk score range is 75-100%, the moderate risk score is 25-75%, and the high-risk score is 0-25%.

RESULTS

A total of 1215 titles were initially identified. After screening the titles based on the inclusion criteria, the number of articles chosen was 117. Of this, duplicate titles were discarded. This resulted in 69 articles remaining and their abstracts screened. Of these, eligible articles were then extracted and assessed. After a detailed assessment, only 14 articles were included in the final analysis. A summary of the selected papers is presented in Table I. Of the 14 articles, ten were of good quality, three were of moderate quality, and one was of poor quality as assessed by the aforementioned quality assessment tool.

The studies presented in the systematic review above were conducted in different countries in which most of the countries are developed countries. The studies sought to establish the trends that influence the quality of medical service delivery concerning waiting time (Table II). Overall, the review examined 14 articles that address the implementation of the Lean methodologies (seven studies), Six Sigma management methodologies (two studies), and Lean methodologies combined with Six Sigma management methodologies (five studies) in healthcare.

Characteristically, the studies used distinct research methodologies to generate and analyse data. These distinct research methodologies were using a prospective or retrospective studies, including cohorts to study trends over a long period with the analyses occurring in waves, and the creation and analysis of value stream mapping to determine the work processes involved in an activity, some of which can be eliminated to reduce the waste of resources.

In the context of patient waiting time in health care facilities from admission to discharge, many work processes could result in increased waiting time. As evidenced in the reviewed studies, the value stream maps helped assess and identify the sources of waste and reduce the variations that lead to the increase in waiting time.

Table I: Articles that address the implementation of the Lean and Six Sigma management methodologies in healthcare

Author, Year and Reference	Title	Journal	Country	Study site	Study design	Quality of articles
Gijo and Antony (2014) (12)	Reducing patient waiting time in the outpatient department using Lean six sigma methodology	Quality and Reliability Engineering International	India	Hospital (outpatient department (OPD))	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate
Cima et al. (2011) (13)	Use of Lean and six sigma methodology to improve operating room efficiency in a high-volume tertiary-care academic medical centre.	Journal of the American College of Surgeons,	United States of America	The Operating Room (OR) of a Tertiary-Care Academic Medical Centre	Randomised control trial	Jadad Score = 5 (Good Quality), sample size not adequate
Sullivan et al. (2014) (14)	Using Lean methodology to improve productivity in a hospital oncology pharmacy	American Journal of Health-System Pharmacy	United States of America	Hospital oncology pharmacy	Randomised control trial	Jadad Score = 4 (moderate quality), sample size adequate
Lin et al. (2013) (15)	Use of Lean Six Sigma principles in a tertiary care otolaryngology clinic to improve efficiency.	The Laryngoscope	United States of America	Otolaryngology clinic	Randomised control trial	Jadad Score = 5 (Good quality), sample size adequate
Duska et al. (2015) (16)	Lean methodology improves efficiency in outpatient academic Gynecologic Oncology clinics	Gynecologic Oncology	United States of America	Clinic	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate
Lamm et al. (2015) (17)	Using Lean principles to improve outpatient adult infusion clinic chemotherapy preparation turnaround times.	American Journal of Health-System Pharmacy	United States of America	Clinic	Randomised control trial	Jadad Score = 5 (Good Quality), sample size not adequate
Ahmed et al. (2013) (18)	Effects of Lean Six Sigma application in healthcare services: a literature review	Reviews on Environmental Health	Malaysia	Healthcare sector	Randomised control trial	Jadad Score = 3 (moderate quality), sample size adequate

Table I: Articles that address the implementation of the Lean and Six Sigma management methodologies in healthcare (continued)

Author, Year and Reference	Title	Journal	Country	Study site	Study design	Quality of articles
Liberatore (2013) (19)	Six Sigma in healthcare delivery	International Journal of Health Care Quality Assurance	United States of America	Healthcare sector	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate
Gijo et al. (2013) (20)	Reducing patient waiting time in a pathology department using the Six Sigma methodology	Leadership in Health Services	India	Pathology Department	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate
Skeldon et al. (2014) (21)	Lean methodology improves efficiency in outpatient academic uro-oncology clinics.	Urology	Canada	Uro-oncology clinic	Randomised control trial	Jadad Score = 5 (Good quality), sample size adequate
Chan et al. (2014) (22)	Lean techniques for the improvement of patients' flow in the emergency department	World Journal of Emergency Medicine	China	Emergency Departments	Randomised control trial	Jadad Score = 5 (moderate quality), sample size adequate
Vermeulen et al. (2014) (23)	Evaluation of an emergency department Lean process improvement program to reduce the length of stay	Annals of Emergency Medicine	Canada	Emergency Departments (ED)	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate
Drotz and Pokinska (2014) (24)	Lean in healthcare from employees' perspectives	Journal of Health Organization and Management	Sweden	Hospitals	Qualitative method was utilised. Data was collected through literature analysis, interviews, and observation.	Jadad score = 2 (Poor quality), sample size not adequate
Lot et al. (2018) (25)	Using Lean tools to reduce patient waiting time	Leadership in Health Services	Brazil	Clinic	Randomised control trial	Jadad Score = 5 (Good Quality), sample size adequate

Table II: Summary of findings on the use of Lean and/or Six Sigma methodologies in healthcare facilities

Method	Aim of study	Approaches and strategies	Findings	Reference
Lean	To determine the quality enhancement resulting from incorporating Lean methodology in the day-to-day medical processes.	Elimination of non-value-added steps and waste in the production process. Three workflow processes (order verification, compounding, and delivery) decreased overall turnaround time to about 70 minutes, compared with a baseline time of about 90 minutes.	The Lean methodology is effective for identifying, processing, and applying workflow changes in oncology. Further, the process resulted in an overall decrease in baseline time.	(14)
	To investigate the impact of Lean methodology on the variations in patient flow	A value stream map of the clinic process was created. After instituting process intervention, the wait time decreased significantly to 82 vs. 119 min.	The lean approach is suitable for the reduction of waiting times as well as improving efficiency in the clinic.	(16)
	To compare various elements of the study, such as blood result time, admission waiting time, triage waiting time, total processing time, length of stay at the emergency department, and consultation time.	Value stream analysis and a rapid improvement event were carried out, and significant changes were made to patient check-in, work areas, and nursing face time.	Implementing Lean management techniques can influence positive change in the emergency departments of healthcare facilities.	(21)
	To assess the capacity of the Lean process to improve medical programs and reduce the length of stay in an emergency department	A value-stream map that identifies all the steps in the patient pathway from order to delivery and time determinants of patient flow in ED were evaluated.	The Lean methodology could be considered an effective methodology for improving program performance as well as reducing the length of stay.	(22)
	To explicate the role and significance of Lean medical methodologies from the perspective of employees	Time series analyses before and after the program and difference-in-differences analyses comparing changes in program sites with control sites were conducted.	The implementation of Lean methodology is necessary for the positive transformation of the healthcare sector.	(23)
	To address the issues that affect the patient flow, such as waiting time in an outpatient liver transplant medical facility	Structural equation modeling techniques and multi-group analysis were used to examine the research's hypothesis, and to perform the required statistical analysis of the data from the survey.	The use of Lean tools in medical care effectively reduces waiting time in the various hospital/clinic departments.	(24)
	To address problems in patient flow and determine the cause of extensive wait time at a public liver transplant outpatient clinic through the use of Lean methodology	A value stream map was developed, improvement possibilities were identified, and non-value-added activities were attempted to be eliminated.	The waiting time was reduced by 4.5h, and the percent complete and accurate increased by 50%	(25)

Table II: Summary of findings on the use of Lean and/or Six Sigma methodologies in healthcare facilities (continued)

Method	Aim of study	Approaches and strategies	Findings	Reference
Six Sigma	To conduct a comprehensive review and assessment of the extant Six Sigma healthcare literature	About 42.1 percent of the applications have error rate as their driving metric, with the remainder focusing on process time (38 percent) and productivity (18.9 percent). While 67 percent had initial improvement in the key process metric, only 10 percent reported sustained improvement. Only 28 percent reported cost savings, and 8 percent offered revenue enhancement	Results from the reported applications of Six Sigma in healthcare facilities showed limited implementation in many applications. Thus, it does not favorably assess Six Sigma's overall effectiveness and the value it offers in healthcare.	(19)
	To investigate if the Lean methodology could be implemented in healthcare in a bid to improve efficiency in patient care	The Six Sigma DMAIC (Define-Measure-Analyze-Improve-Control) methodology was adopted to reduce the average waiting time and variation in waiting times.	The application of the Lean methodology could help improve the efficiency of patient care.	(20)
Lean Six Sigma	To address the issue of longer patient waiting time in the outpatient department of a super speciality hospital attached to a manufacturing company in India through the Lean Six Sigma methodology	The process, starting from patient registration to medicine dispensing, was included in the project. The non-value added steps in the process were identified, and actions were initiated. A cause and effect diagram was prepared for high patient waiting time, and causes were validated with the help of data collected from the process. Statistical tools such as the Kruskal-Wallis test, Box-Cox transformation, Control charts, normality test, etc., were used within the LSS methodology not only to identify the causes but also to sustain the improvements	The average waiting time was reduced from 57 min to 24.5 min, and the standard deviation was reduced to 9.27 from 31.15 min.	(12)
	To apply Lean Six Sigma methodology across an entire surgical suite to improve efficiency	Lean and Six Sigma methodologies were developed in the manufacturing industry to increase efficiency by eliminating non-value-added steps. We applied Lean and Six Sigma methodologies across an entire surgical suite to improve efficiency	The use of Lean Six Sigma methodology increased operating rooms' efficiency and financial performance across an entire operating suite.	(13)
	To apply Lean Six Sigma to improve the efficiency of patient flow in a large tertiary otolaryngology clinic	Process mapping, engagement of leadership and staff, and elimination of non-value-added steps or processes were key to improvement through the Lean Six Sigma methodology	Significant decrease in time from the point of admittance to the beginning of the medical examination	(15)
	To analyse the use of a Lean Six Sigma approach to optimise efficiency and workflow for patient adult infusion programs in chemotherapy	A Kaizen event describes an approach to continuous improvement by eliminating activities that do not add value to a process.	Lean Six Sigma is effective in improving waiting times in clinics. The implementation of the methodology enhanced workflow and improved efficiency significantly at the clinic.	(17)
	To establish the effects of implementing Lean Six Sigma in the healthcare sector	The brainstorming, process mapping, standardization, and mistake-proofing were applied	The Lean Six Sigma is an effective methodology for implementation in the healthcare sector as it guarantees the delivery of quality services and the assumption of relevant strategies and principles that help sustain the sector	(18)

Apart from eliminating process waste, the reviewed studies also determined ways of improving workflow to reduce waiting time. Results of the studies showed that work schedule, staff motivation and commitment of staff members and the management, have a significant bearing on the overall performance of healthcare facilities.

Of the seven studies which applied the Lean methodology without Six Sigma, three were conducted in the clinic setting; two were in the emergency department, one at the pharmacy and one was conducted among the hospital staff. All these listed studies were quantitative, while the last was qualitative. Five studies used Lean methodologies in combination with Six Sigma: three were in the clinical setting, one in the operating room, and one in the hospital's Pathology Department.

All the studies that used Lean methodologies showed

positive results in terms of reduction of patients' waiting time at healthcare facilities. In the clinic setting, Duska et al. (16) aimed to show that Lean methodologies could reduce patient waiting time in outpatient clinics. The study outcomes showed that patient satisfaction was an integral part of the work process and indicated the quality of care. The study's results showed that the Lean approach was suitable for reducing waiting times. Similarly, Skeldon et al. (21) found that the use of Lean methodology resulted in a shorter cycle time for the oncology patients, which meant there was more time for the nurses to assess the patients, and the value-added time for the patients increased by about 36%. Also, Lot et al. (25) showed that by using lean methodology, the waiting time at a clinic in a liver transplant facility could be reduced up to 50% or more than 4 hours, all due to redesigning the workflow.

Chan et al. (22) identified Lean techniques as the

most efficient way of streamlining operations in the emergency department setting. Their study proved that Lean methodology reduced the turn-around time for blood results and admission waiting time by up to 50%. Likewise, Vermuelan et al. (23) showed that there was a reduction in time-to-physician assessment, a reduction in left-without-being-seen rates, and a reduction in 72-hour emergency department revisit rates.

In the pharmacy setting Sullivan et al. (14) reported a significant reduction or enhancement of various processes by using the Lean methodology. The workflow, denoted in large part, by productivity in oncology, recorded substantial changes that functioned to improve the quality of services in chemotherapy. For instance, after eliminating six non-value-adding steps, the workflow was reduced to about 14 steps. Effectively, the schedules and resources were realigned to coincide with the changes. Again, the time for order verification, product verification, and medication delivery reduced significantly by 33%, 52%, and 47%, respectively. In addition, the baseline turn-around time was reduced by 20 minutes to 70 minutes. In a qualitative study, Drotz and Poksinska (24) revealed that the characteristic reductions in the time wasted resulted in fewer medical errors, thereby ensuring patient safety.

Correspondingly, all the studies that used Lean methodologies in combination with Six Sigma (Lean Six Sigma) showed positive results in terms of reduction of patients' waiting time. At the clinics, Lamm et al. (17) reported a positive relationship between implementing Lean Six Sigma and chemotherapy preparation turn-around times at the outpatient adult infusion clinic. Also, Lin et al. (15) revealed that by using Lean Six Sigma, there was a significant decrease in time from the point of admittance to the beginning of medical examination by at least 12.2 %, on-time starts for medical examinations improved by about 34% and excessive motion among patients reduced significantly 34% (approximately 74 feet for each participating patient). Likewise, at the Pathology Department, Gijo et al. (20) reported that the average waiting time reduced significantly to 24.5 (SD 9.27) minutes from 57 (SD 31.15) minutes.

Cima et al. (13) implemented Lean Six Sigma in the operating room and examined three domains; time, information processed, and personnel. The three domains directed the analysis process and revealed the Lean Six Sigma approach's effect on the various facets of surgical processes. Effectively, the results indicate that the optimisation processes implemented in the survey positively influenced time and case frequency. Also, the on-time starts for surgical processes improved significantly. Similar improvements were reported for staff overtime and non-operative time. The study showed that the Lean Six Sigma approach effectively enhances the efficiency of operating room surgical processes, including time reduction and increasing efficiency.

Moreover, the study revealed that factors such as leadership support, process mapping, performance metrics, and staff engagement are essential for improving efficiency in medical operating rooms.

This review also noted that apart from improving waiting time for patients to obtain services, the use of Lean methodology also resulted in improved patient satisfaction with the services and even retention and loyalty (16, 22).

DISCUSSION

Japanese manufacturers had a bad reputation for quality in the 1950s, but because to a culture of methodical and analytical transformation, Japan was able to improve from last to first. The nation's capacity to produce affordable, high-quality goods helped them take control of several important industries starting in the 1970s. Western firms, starting with Motorola, started implementing Japanese practices to compete with this astonishing advancement. Nowadays, practically all Western businesses support continuous development. Two of the most used continuous improvement approaches are Lean and Six Sigma. The hybrid of which is known as Lean Six Sigma.

In the healthcare sector, researchers on the Lean/Lean Six Sigma Approach support the findings in this review. They expressed opinions suggesting that Lean is a viable remedy for most of the challenges medical practitioners endured, such as the ever-increasing patient volume, decrease in budget, as well as staff shortage, and Lean methodology aimed to enhance the safety and quality of healthcare and held the patient in high regard (26). In terms of patient wait times, the successful application of the principle of Lean methodology results in patients spending fewer minutes in the ER before a physician attend to them and facilitates the reduction of time taken to complete medical records to allow for the analysis of other elements of medical procedures (26). The use of the Lean methodology in healthcare also positively impacted bed availability owing to the reduction of waiting time (19). Good quality health services ultimately improve patient satisfaction, retention and loyalty (18).

Nonetheless, because the Lean approach involves the change of work habits, workflow and works culture, its successful and sustainable implementation requires immense institutional culture change combined with innovative leadership and motivated frontline healthcare professionals (1). It is challenging to transform institutional cultures. The research was carried out in specific hospital areas rather than the whole establishment, as shown by the publications in this review. In fact, a detailed analysis of international studies in this area that discussed the difficulties encountered and the factors that contributed to success when applying the lean approach discovered that while

many promising results were noted in the studies, few of them succeeded in putting the lean principles into practise at the organisational level unless the approach was ingrained in the organisation's DNA (27).

Given the capacity of Lean and Six Sigma approaches to address specific challenges and requirements in individual countries, it is highly recommended that further studies be conducted in diverse healthcare facilities across various countries. These studies would examine the effectiveness of Lean and Six Sigma approaches within different healthcare contexts. Developing countries such as the Kingdom of Saudi Arabia can implement and adapt these methodologies to address the specific needs and challenges faced by the country's healthcare providers. By doing so, significant progress can be made in achieving the objectives outlined in the Health Sector Transformation program of Vision 2030, which aims to restructure the healthcare sector into a comprehensive, effective, and integrated system that prioritizes the well-being of individuals and society as a whole.

However, it is essential to acknowledge that each country has its own unique set of policies and regulations. Implementing Lean and Six Sigma approaches that have proven successful in other nations may present challenges due to these contextual differences. Therefore, a careful adaptation of these methodologies is necessary to ensure their effectiveness within the healthcare context of Saudi Arabia and other countries. By conducting such adaptations, valuable insights can be gained, contributing to a broader global understanding of how these methodologies can be optimally applied to enhance healthcare systems worldwide.

CONCLUSION

Effectively, each study aimed not only to define but also to determine the capacity of both Lean and Six Sigma approaches in improving the activities in the healthcare sector, as these approaches were more routinely used in the manufacturing sector as opposed to health. This review concludes that the Lean approach, with or without the concurrent use of Six Sigma, is effective in the reduction of waiting times and improving efficiency at the hospital outpatient services, the operating theatre and the pharmacy. Nevertheless, the commitment of the management team and staff members to execute and sustain this continuous improvement method is crucial for its long-term success.

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