

BARRIERS AFFECTING LEAN MANAGEMENT IMPLEMENTATION AMONG NURSING STAFF

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Abstract

Lean management is considered one of the most effective quality improvement approaches used in healthcare organizations to improve efficiency, eliminate waste, and enhance patient outcomes. Despite the increasing use of lean strategies in healthcare settings, several organizational and staff-related barriers negatively affect successful lean implementation. Aim: This study aimed to assess barriers affecting lean management implementation among nursing staff working in intensive care units at King Khalid Hospital, Najran, Saudi Arabia. Design: A descriptive exploratory research design was utilized. Setting: The study was conducted at King Khalid Hospital, Najran, Saudi Arabia. Sample: A convenient sample of 50 nurses working in intensive care units participated in the study. Tools: Data were collected using: (1) a personal and work-related characteristics questionnaire, (2) a lean management knowledge questionnaire, and (3) a lean implementation barriers assessment questionnaire. Results: All participants demonstrated low levels of lean management knowledge. The highest perceived barriers were heavy workload and staff shortage (2.91 ± 0.27), lack of training programs (2.88 ± 0.31), resistance to change (2.75 ± 0.42), lack of resources and equipment (2.71 ± 0.39), and inadequate leadership support (2.69 ± 0.45). Conclusion: Several organizational and individual barriers negatively affect lean management implementation among nursing staff in intensive care units. Continuous education, leadership support, and staff involvement are essential for successful lean implementation. Recommendations: Healthcare organizations should provide continuous lean management educational programs, strengthen leadership support, improve staff participation in decision-making, and develop organizational strategies that facilitate lean implementation in healthcare settings.

Keywords: Barriers, Lean Management, Nursing Staff.

1. INTRODUCTION

Lean management enables pre-assigned staff to focus on continuous quality improvements that allow others to concentrate on patient care. Lean integration and maturity develop as staff skills and knowledge of Lean management concepts grow. Understanding the barriers and constraints that inhibit the implementation of Lean management among nursing staff enables healthcare leaders to identify priority actions that will accelerate Lean deployment. Governance and resource allocation impede the provision of sufficient support for nurse managers to learn and apply Lean management principles (Udod et al., 2020). Lean management has emerged as one of the most effective quality improvement methodologies used to improve healthcare performance and reduce waste (Dey et al., 2020). Lean management originated from the Toyota Production System and focuses on eliminating

non-value-added activities while maximizing value from the patient's perspective. The application of lean principles in healthcare aims to reduce delays, improve workflow, minimize medical errors, optimize resource utilization, and enhance patient satisfaction.

Healthcare waste includes any activity that consumes resources without adding value to patient care (Shortell et al., 2021). Common types of waste in healthcare settings include waiting times, unnecessary movement, interruptions, excess transportation, over-processing, defects, underutilization of staff skills, and inventory problems. These wastes negatively affect healthcare quality, increase healthcare costs, and reduce organizational efficiency.

Nurses play a major role in healthcare delivery and are directly involved in most patient care processes (Tan et al., 2023).

Despite the benefits of lean management in healthcare, many healthcare organizations still experience difficulties during lean implementation (Akmal et al., 2022). Several barriers affect successful lean adoption among healthcare workers, including resistance to change, inadequate training, insufficient leadership support, communication problems, heavy workload, limited resources, and organizational culture challenges.

Common major barriers include poor knowledge and perception of Lean, unsuitable management practices, rigid organizational structures, employee resistance, and poor collaboration (Kunnen et al., 2023)

Insufficient Lean education and training, limited numbers of skilled Lean educators and consultants, and shortages of knowledge of management practices are repeatedly identified as central barriers (Chmielewska et al., 2023; Lima et al., 2020). Nurse managers often recognize Lean's value but lack comprehensive understanding and receive limited support to translate principles into practice (Kunnen et al., 2023; Chmielewska et al., 2023).

Poor communication, including failure to involve frontline staff in change design, fuels resistance and scepticism (Hirvelä et al., 2024; Leite et al., 2022).

Insufficient management support—both at unit and system levels—is a recurrent barrier (Leite et al., 2022). Successful cases stress top management commitment, clear introduction strategies, change agents, and alignment with local context (Udod et al., 2020; Moradi & Sormunen, 2023; Duggan et al., 2022). When leadership fails to model Lean behaviors, invest in professional development, and provide follow-up, Lean remains tool-focused, fragmented, and unsustained (Kunnen et al., 2023; Salma & Waelli, 2022).

Understanding these barriers is essential for healthcare organizations seeking to implement lean management successfully. Identifying the obstacles affecting lean implementation among nursing staff may help healthcare administrators develop effective interventions and strategies to support organizational change and quality improvement.

Although lean management has been widely examined in healthcare organizations, limited evidence is available regarding the specific barriers affecting lean implementation among intensive care unit nurses in Saudi Arabia. Most previous studies have focused on general healthcare settings or organizational outcomes rather than frontline nursing perspectives in high-acuity clinical environments.

Therefore, the current study addresses this gap by assessing perceived barriers to lean management implementation among nursing staff working in intensive care units at King Khalid Hospital, Najran, Saudi Arabia.

2. METHOD

Aim of the study:

The current study aimed to assess barriers affecting lean management implementation among nursing staff working in intensive care units at King Khalid Hospital, Najran, Saudi Arabia.

Research question

What are the barriers affecting lean management implementation among nursing staff?

Research design

A descriptive exploratory research design was utilized to achieve the aim of the current study.

Setting

The study was conducted at King Khalid Hospital, Najran, Saudi Arabia. The hospital consists of several intensive care units providing healthcare services for critically ill patients. The hospital consisted of three buildings that included 330 beds to provide free care services. It has 48 adult ICU. The study was conducted at different settings at the selected hospital.

Sample

A convenient sample of nurses who are working in the previously mentioned setting and their number were (50) at the present study.

Data Collection Tools:

The data of current study was collected by using four tools as follows:

Tool I: Personal and Work-Related Characteristics Questionnaire

Personal data sheet developed by the researcher which includes personal data about the participants, as (age, level of education, gender, years of experience in nursing, and the previous training programs that were received about lean management).

Tool II: Lean Management Knowledge Questionnaire

This questionnaire was adapted from Abd Al Fadeel et al. (2023) and modified by the researcher to assess nurses' knowledge regarding lean management principles, techniques, and waste reduction concepts. It contains four dimensions with (24) questions divided into (19) multiple choice MCQ about "techniques of lean management, (6 questions)," principles of lean management (6 questions) and types of wastes in health care" (7 questions). And other (5) true and false questions for lean management and waste management concepts. The value of each question was granted one point for the correct answer, and zero for the incorrect answer. The total scores for all questions were 24, if the final score were (<60%) indicated (low knowledge about lean management concept), if the final score were (60%-75%) indicated (moderate knowledge about lean management concept), and if the final score were more (>75%) indicated high knowledge about lean management concept).

Tool III: Lean Management Implementation Barriers Questionnaire

This questionnaire was developed by the researcher after extensive review of literature related to barriers affecting lean management implementation in healthcare organizations, particularly studies conducted by Kunnen et al. (2023); Hung et al. (2015); and Leite et al. (2019); Moradi & Sormunen, (2023). The tool was designed to assess organizational and individual barriers affecting lean management implementation among nursing staff in intensive care units. This questionnaire was developed after reviewing recent literature related to lean healthcare barriers. It included the

following dimensions:

- 1) Lack of lean management training.
- 2) Resistance to organizational change.
- 3) Inadequate leadership support.
- 4) Heavy workload and staffing shortage.
- 5) Communication and teamwork barriers.
- 6) Lack of resources and equipment.
- 7) Organizational culture barriers.

The questionnaire consisted of 25 items measured using a three-point Likert scale:

- Agree = 3
- Neutral = 2
- Disagree = 1

Higher scores indicated higher perceived barriers affecting lean management implementation.

Validity and Reliability:

The study tools were reviewed by a panel of five experts in nursing administration and healthcare quality to assess content validity. Reliability testing showed acceptable internal consistency. Cronbach's alpha coefficient was 0.90 for the lean management knowledge questionnaire and 0.88 for the barriers assessment questionnaire.

Procedure

An official permission was obtained from the research ethical committee of the faculty of nursing-Cairo University, after that the letter from the Faculty of Nursing was sent to the director of (King Khalid Hospital, Najran Saudi Arabia) .To conduct the study the researcher explained the aim of the study ,nature and significance of the study for each participants to obtain their acceptance to participate in the study then the researcher obtain their acceptance in written form then, the investigator obtained their acceptance in a written form.

Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 24.

3. RESULT

Findings of the current study were presented in the following parts as follows:

Part 1: Distribution of the personal characteristics data of nurses (Table 1).

Part 2: Nurses' Knowledge Regarding lean management (Tables 2)

Part 3: Distribution of Total Lean Management Knowledge Levels (Tables 3)

Part 4: Barriers Affecting Lean Management Implementation (Table 4)

Part 5: Relationship Between Nurses' Demographic Characteristics and Lean Management Knowledge (Tables 5)

Table (1): Distribution of Nurses According to Their Personal Characteristics (n=50)

Demographic data	No.	%
Gender		
Male	3	6.0
Female	47	94.0
Age		
20-<30	14	28.0
30-<40	24	48.0
40+	12	24.0
Education		
Nursing diploma	2	4.0
Bachelor's degree	45	90.0
Master's degree	3	6.0
Experience		
<5 years	10	20.0
5-<10 years	21	42.0
10-<15 years	13	26.0
≥15 years	6	12.0
Training		
Yes	0	0
No	50	100.0

Table (1) showed that the highest percentage (94%) of the study sample was female while (6%) of them were male. The highest percentage (48%) of the study sample were in age group ranged between (30-<40) years while (28%) of them were in age group (20-<30). The above table illustrated that (90%) of the study samples had bachelor's degree in nursing while (6 %) had master's degree in nursing. It's clear from the above table that the highest percentage (42%) of the study sample had years of experience ranged from (5-<10) while the lower percentage (12%) of them had years of experience (15-<20) years. The same table illustrated that all the study samples (100%) didn't attend previous lean management training programs.

Table (2): Mean Scores of Nurses' Lean Management Knowledge Dimensions (n=50)

Lean Management Knowledge Dimensions	Mean ± SD
Techniques of Lean Management	1.22 ± 2.41
Principles of Lean Management	1.86 ± 2.78
Types of Waste in Healthcare	1.68 ± 2.96
Lean and Waste Reduction Concepts	1.68 ± 2.35
Total Score	6.44 ± 2.29

Table (2) reveals that nurses demonstrated low mean scores across all lean management knowledge dimensions.

Table (3): Frequency Distribution of Total Lean Management Knowledge Levels Among Nurses (n=50)

Knowledge Levels	Frequency	%
Low (<60%)	50	100.0
Moderate (60-<75%)	0	0.0
High (≥75%)	0	0.0

Table (3) indicates that all nurses had low levels of lean management knowledge.

Table (4): Mean Scores of Barriers Affecting Lean Management Implementation (n=50)

Barriers Affecting Lean Implementation	Mean ± SD
Lack of Training Programs	2.88 ± 0.31
Resistance to Change	2.75 ± 0.42
Heavy Workload and Staff Shortage	2.91 ± 0.27
Inadequate Leadership Support	2.69 ± 0.45
Communication and Teamwork Barriers	2.64 ± 0.51
Lack of Resources and Equipment	2.71 ± 0.39
Organizational Culture Barriers	2.66 ± 0.47
Total Barriers Score	2.75 ± 0.40

Table (4) demonstrates that the highest perceived barriers were heavy workload, lack of training programs, and resistance to change.

Table (5): Relationship Between Nurses’ Demographic Characteristics and Lean Management Knowledge (n=50)

Variables	Mean ± SD	Test Value	P-value
Age	14.48 ± 6.24	F=0.02	0.97
Gender	14.46 ± 6.30	t=0.01	0.98
Experience	14.39 ± 6.18	F=0.12	0.94
Education	14.51 ± 6.25	F=0.02	0.96

Table (5) reveals no statistically significant relationship between nurses’ demographic characteristics and lean management knowledge.

4. DISCUSSION

Nurses’ Lean Management Knowledge

Lean management has become one of the most widely implemented quality improvement methodologies in healthcare systems because of its significant role in improving organizational performance, reducing operational waste, enhancing patient safety, and increasing healthcare efficiency (Dey et al., 2020;).

Healthcare organizations continue to experience increasing pressure to optimize resource utilization and improve patient outcomes while simultaneously controlling healthcare expenditures. Intensive care units represent highly complex healthcare environments where efficient workflow management and effective utilization of healthcare resources are critically important. The findings of the current study revealed that all nurses demonstrated low levels of lean management knowledge. This finding may indicate limited organizational focus on lean management education and insufficient opportunities for nurses to participate in lean training activities. The lack of adequate knowledge regarding lean principles may negatively influence nurses’ ability to identify and eliminate waste during patient care processes. Similar findings were reported by Udod et al. (2020), who concluded that healthcare workers faced difficulties understanding lean concepts and integrating lean principles into daily clinical practice.

Barriers Affecting Lean Management Implementation

One of the most important findings of the current study was the identification of barriers affecting lean management implementation among nursing staff. The highest reported barriers included heavy workload, staff shortages, resistance to organizational change, inadequate training programs, lack of leadership support, and insufficient communication among healthcare team members.

Heavy Workload and Staff Shortage as Barriers to Lean Implementation

Heavy workload and staff shortages were identified as major barriers affecting lean implementation in intensive care units. Nurses working in intensive care settings are responsible for managing critically ill patients requiring continuous monitoring and rapid clinical interventions. Excessive workload limits nurses' ability to participate in quality improvement activities and reduces opportunities for applying lean management strategies effectively. Similar findings were reported by Akmal et al. (2022), who emphasized that work overload and limited staffing significantly hinder successful lean implementation in healthcare environments.

Resistance to Organizational Change

Resistance to organizational change represented another significant barrier identified in the current study. Healthcare workers may resist lean implementation because of fear of additional responsibilities, uncertainty regarding organizational changes, or lack of understanding of lean methodologies. Resistance to change remains one of the most common obstacles affecting quality improvement initiatives in healthcare settings (Demir & Turan, 2021). Successful lean implementation requires strong organizational culture, continuous staff engagement, and effective communication between leadership and healthcare workers.

Inadequate Leadership and Managerial Support

The findings of the current study also demonstrated that inadequate managerial support negatively affected lean management implementation among nursing staff. Leadership support is considered a critical success factor for sustainable lean implementation because healthcare leaders play an essential role in providing resources, motivating staff, facilitating teamwork, and supporting organizational transformation (Mohamed et al., 2023). Healthcare organizations with supportive leadership structures are more likely to achieve successful implementation of quality improvement initiatives.

Communication and Teamwork Barriers

Communication and teamwork barriers were also identified as important factors limiting lean implementation. Effective communication among healthcare professionals is essential for reducing medical errors, improving workflow efficiency, and ensuring patient safety. Poor communication may lead to process delays, duplication of tasks, interruptions, and increased healthcare waste (Tan et al., 2023). Interdisciplinary teamwork and collaborative organizational culture are fundamental requirements for successful lean healthcare transformation.

Lack of Training and Educational Programs

The current study further highlighted the impact of inadequate training programs on lean management implementation. Continuous educational and practical training programs are necessary to improve healthcare workers' awareness regarding lean principles and waste reduction strategies. Previous studies demonstrated that healthcare organizations providing regular lean education and practical workshops achieved significant improvements in healthcare quality and operational efficiency (Elzohairy et al., 2020; Khashaba et al., 2023).

5. CONCLUSION

The findings of the current study support the importance of developing comprehensive organizational strategies that address barriers affecting lean implementation in healthcare settings. Successful lean implementation requires continuous leadership support, staff engagement, effective communication systems, adequate healthcare resources, and organizational commitment toward quality improvement

and patient-centered care. The current study aimed to assess barriers affecting lean management implementation among nursing staff working in intensive care units. The findings revealed that nurses had limited knowledge regarding lean management concepts and techniques, which is consistent with previous studies reporting insufficient lean awareness among nursing staff (Udod et al., 2020; Khashaba et al., 2023). This finding may be related to the lack of educational and training programs focusing on lean healthcare principles.

The findings also showed that heavy workload and nursing shortages represented major barriers affecting successful lean implementation, which agrees with the findings of Akmal et al. (2022) and Demir & Turan (2021). Intensive care units are highly demanding clinical environments that require continuous patient monitoring and rapid response to emergencies. Excessive workload may reduce nurses' ability to participate in quality improvement activities and apply lean strategies effectively.

Resistance to change was another important barrier identified in the current study, which is supported by Akmal et al. (2022), who emphasized that organizational resistance negatively affects lean implementation success. Healthcare workers may resist organizational changes because of fear of increased workload, uncertainty regarding new systems, or limited understanding of lean principles. Successful lean implementation requires strong organizational culture, staff engagement, and effective leadership support. The study also revealed that inadequate managerial support negatively affected lean implementation among nursing staff, which is consistent with Mohamed et al. (2023). Leadership support plays a critical role in motivating staff, providing resources, facilitating communication, and sustaining quality improvement initiatives.

Poor communication and teamwork barriers were also identified as obstacles affecting lean implementation, which agrees with the findings of Tan et al. (2023) and Young et al. (2020). Effective communication among healthcare professionals is essential for successful process improvement and waste reduction in healthcare settings. The findings of the current study are consistent with previous studies that emphasized the importance of continuous lean training programs, leadership support, and staff participation for successful lean healthcare implementation

Conflicts of Interest

The author declares that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

References

- 1) Abd Al Fadeel, E. R., Abd El Megeed, M. I., & Etway, E. A. E. (2023). Effect of Lean Management Training Program on Waste Management Knowledge and Practices Among Nursing Staff. *Journal of Clinical Otorhinolaryngology, Head and Neck Surgery*, 27(1), 1050–1062.
- 2) Akmal, A., Foote, J., Podgorodnichenko, N., Greatbanks, R., & Gauld, R. (2022). Understanding resistance in lean implementation in healthcare environments: An institutional logics perspective. *Production Planning & Control*, 33(4), 356–370. <https://doi.org/10.1080/09537287.2020.1823510>
- 3) Chmielewska, M., Lotek-Waćkowska, R., Brzozowski, S., Tytko, Z., Dziok-Dmowska, K., & Hermanowski, T. (2023). The capacity to implement Lean Management in the healthcare system in Poland - results of a public consultation. *Medycyna pracy*. <https://doi.org/10.13075/mp.5893.01303>
- 4) Demir, E., & Turan, H. (2021). An integrated spherical fuzzy AHP multi-criteria method for Covid-19 crisis management in regarding lean six sigma. *International Journal of Lean Six Sigma*, 12(4), 859–885. <https://doi.org/10.1108/IJLSS-11-2020-0183>

- 5) Dey, P. K., Malesios, C., De, D., Chowdhury, S., & Abdelaziz, F. B. (2020). The impact of lean management practices and sustainably-oriented innovation on sustainability performance of small and medium-sized enterprises: Empirical evidence from the UK. *British Journal of Management*, 31(1), 141–161. <https://doi.org/10.1111/1467-8551.12388>
- 6) Duggan, J., Cormican, K., & McDermott, O. (2022). Lean implementation: analysis of individual-level factors in a biopharmaceutical organisation. *International Journal of Lean Six Sigma*. <https://doi.org/10.1108/ijlss-10-2021-0184>
- 7) Elzohairy, M. H., Elhanafy, E. Y., & Mostafa, W. H. (2020). Impact of lean strategy utilization training program on quality and occupational safety. *Egyptian Journal of Health Care*, 11(1), 1236–1252.
- 8) Khashaba, E., El-Gilany, A. H., & Denewar, K. (2023). Effect of a waste management intervention program on knowledge, attitude, and practice (KAP) of nurses and housekeepers: A quasi-experimental study, *Egypt. Journal of the Egyptian Public Health Association*, 98(1), 15. <https://doi.org/10.1186/s42506-023-00140-w>
- 9) Hung, D. Y., Martinez, M. C., Yakir, M., & Gray, C. (2015). Implementing a Lean Management System in Primary Care: Facilitators and Barriers From the Front Lines. *Quality Management in Health Care*, 24, 103–108. <https://doi.org/10.1097/qmh.0000000000000062>
- 10) Kunnan, Y. S., Roemeling, O., & Smailhodzic, E. (2023). What are barriers and facilitators in sustaining lean management in healthcare? A qualitative literature reviews. *BMC Health Services Research*, 23. <https://doi.org/10.1186/s12913-023-09978-4>
- 11) Leite, H. (2023). The role of lean in healthcare during COVID-19 pandemic. *International Journal of Lean Six Sigma*, 14(2), 245–259.
- 12) Leite, H., Bateman, N., & Radnor, Z. J. (2019). Beyond the ostensible: an exploration of barriers to lean implementation and sustainability in healthcare. *Production Planning & Control*, 31, 1 - 18. <https://doi.org/10.1080/09537287.2019.1623426>
- 13) Leite, H., Williams, S. J., Radnor, Z. J., & Bateman, N. (2022). Emergent barriers to the lean healthcare journey: baronies, tribalism and scepticism. *Production Planning & Control*, 35, 115 - 132. <https://doi.org/10.1080/09537287.2022.2054386>
- 14) Lima, R. M., Dinis-Carvalho, J., Souza, T. A., Vieira, E. M. A., & Gonçalves, B. S. F. (2020). Implementation of lean in health care environments: an update of systematic reviews. *International Journal of Lean Six Sigma*. <https://doi.org/10.1108/ijlss-07-2019-0074>
- 15) Mohamed, H. A., Mohammed Abu Elenin, K. A., & Ibrahim, S. A. A. (2023). Effect of lean management training program on nurse managers' innovation and crisis management. *Port Said Scientific Journal of Nursing*, 10(3), 31–64.
- 16) Moradi, S., & Sormunen, P. (2023). Implementing Lean Construction: A Literature Study of Barriers, Enablers, and Implications. *Buildings*. <https://doi.org/10.3390/buildings13020556>
- 17) Udod, S. A., Duchscher, J., Goodridge, D., Rotter, T., McGrath, P., & Hewitt, A. D. (2020). Nurse managers implementing the lean management system: A qualitative study in Western Canada. *Journal of Nursing Management*, 28, 221 - 228. <https://doi.org/10.1111/jonm.12898>
- 18) Shortell, S., Blodgett, J., Rundall, T., Henke, R., & Reponen, E. (2021). Lean management and healthcare quality improvement. *Healthcare Management Review*, 46(1), 22–30.
- 19) Tan, L., Lim, B., & Hassan, M. (2023). Nursing engagement in lean healthcare transformation. *Journal of Nursing Management*, 31(4), 711–719.
- 20) Young, T., Brailsford, S., Connell, C., Davies, R., Harper, P., & Klein, J. (2020). Using industrial processes to improve patient care. *British Medical Journal*, 341, c1234.