LEAN AND AGILE MANAGEMENT AND WORK ENGAGEMENT AMONG HEALTHCARE EMPLOYEES: A SYSTEMATIC LITERATURE REVIEW

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Abstract. Healthcare organizations face increasing pressure to improve operational efficiency while maintaining employee well-being and work engagement. Lean and Agile Management have been increasingly applied to address these challenges, yet evidence concerning their relationship with work engagement among healthcare employees remains fragmented. This systematic literature review synthesizes the existing evidence on Lean and Agile Management and work engagement in healthcare settings. Following the PRISMA 2020 guidelines, a systematic search of Scopus-indexed literature published between 2015 and 2025 identified 26 records. After removal of five duplicate and application of the eligibility criteria, 21 studies were included in the review. Study quality was assessed using the Mixed Methods Appraisal Tool (MMAT), and thematic analysis was conducted to synthesize the evidence. Three themes emerged: patient-centered care, healthcare efficiency, and impact on work engagement. The findings indicate that Lean Management was commonly associated with improved process flow, waste reduction, teamwork, and operational efficiency, although its relationship with work engagement varied across contexts, with some studies reporting increased workload, time pressure, and job strain. Studies examining Agile Management generally reported associations with adaptability, collaboration, autonomy, and employee motivation; however, differences in study designs and contexts limit direct causal interpretation. Leadership support, communication, employee involvement, and collaborative problem-solving emerged as important conditions influencing the implementation and outcomes of both approaches. The review highlights the importance of balancing efficiency-oriented management practices with employee well-being and identifies the need for longitudinal research and integrated Lean and Agile Management models across diverse healthcare contexts.
Keywords: *lean management, agile management, work engagement, healthcare employees, employee well-being, process improvement*

Introduction

Healthcare organisations face pressures from rising costs, ageing populations, chronic diseases, workforce shortages, and patient expectations. The COVID-19 pandemic highlighted the need for resilient and adaptive healthcare systems. Lean Management emphasises waste reduction, process standardisation, and value creation, while Agile Management promotes adaptability, iterative improvement, team autonomy, and stakeholder collaboration (Schiavone and Ferretti, 2021; Ni et al., 2020). Their principles support combining efficiency with organisational responsiveness. Work engagement is relevant because engaged employees demonstrate vigour, dedication, and absorption, supporting service quality, safety, and organisational sustainability (Bakker and Demerouti, 2007). However, Lean practices may generate both job resources and demands, including teamwork and learning alongside workload, time pressure, and

strain. Agile practices may similarly influence autonomy, collaboration, and adaptability. Evidence regarding engagement therefore remains fragmented and context-dependent. This systematic literature review synthesises evidence on Lean and Agile Management in healthcare, focusing on work engagement, employee well-being, healthcare efficiency, and patient-centred care. Guided by PRISMA 2020, it addresses three questions: (RQ1) What applications and outcomes of Lean and Agile Management are reported in healthcare? (RQ2) How are these approaches associated with employee work engagement and well-being? (RQ3) What contextual factors and research gaps emerge? The review contributes knowledge through a Job Demands–Resources perspective, identifies implementation conditions for managers, and highlights the need to balance efficiency with workforce well-being and patient-centred care.

Theoretical background

Lean management in healthcare

Lean Management, originating from the Toyota Production System, focuses on maximising value by eliminating waste (Womack and Jones, 1996). Its adoption in healthcare has involved tools such as Value Stream Mapping, 5S, Kaizen, A3 problem-solving and Kanban to reduce waiting times, clinical errors and operational inefficiencies (Zyl-Cillié et al., 2024; Reponen et al., 2023; Kunnen et al., 2023). However, its outcomes are implementation-dependent. Leadership, employee engagement and organisational commitment can facilitate improvement, whereas rigid implementation with limited staff participation may increase workload, stress and resistance (Reponen et al., 2023; De Koeijer et al., 2022; Mahmoud et al., 2021). Agile Management emerged from principles emphasising individuals, collaboration and responsiveness over rigid processes (Beck et al., 2001). In healthcare, agility represents the capacity to respond rapidly to changing demands (Holden et al., 2021). Practices including Scrum, iterative improvement, Agile Human Resource Management and self-organising teams can strengthen teamwork, problem-solving and responsiveness (Wilson and Balasundaram, 2024; Rietze and Zacher, 2022). Conceptually, Lean and Agile are therefore distinct but potentially complementary: Lean emphasises process efficiency and stability, whereas Agile emphasises flexibility and adaptation.

Work engagement and the JD-R perspective

The Job Demands–Resources (JD-R) model provides the explanatory mechanism linking these management approaches with work engagement, comprising vigour, dedication and absorption (Bakker and Demerouti, 2007). Engagement is important in healthcare because it is associated with safer care, resilience, and lower burnout and absenteeism (Xue et al., 2025; Wang et al., 2023). Lean may generate job resources through role clarity and process improvement but may also create demands when implementation intensifies work pressure (Kleeff et al., 2023). Agile may strengthen resources through autonomy, feedback and shared decision-making (Rietze and Zacher, 2022). Accordingly, integrating Lean and Agile should not be presumed to produce superior outcomes. Rather, the reviewed evidence suggests potential complementarity between Lean's process discipline and Agile's adaptive capacity (Ni et al., 2020). The proposed framework is therefore derived from these recurring relationships, with the JD-R model explaining how implementation may alter job resources and demands and,

consequently, work engagement. Given limited direct empirical examination of integrated Lean-Agile approaches, the framework requires further empirical validation.

Materials and Methods

This systematic literature review used PRISMA 2020 as a reporting guideline rather than a review methodology (Page et al., 2021). Scopus was selected as the sole database because of its multidisciplinary coverage of healthcare and management research. In July 2025, TITLE-ABS-KEY was searched using: ("lean management" OR "lean healthcare" OR "agile management" OR "agile healthcare") AND (healthcare OR hospital OR "health care") AND (employee OR staff OR workforce OR "work engagement" OR wellbeing OR "well-being")**. Eligible studies were English-language peer-reviewed journal or conference papers published during 2015–2025 that examined Lean and/or Agile practices in healthcare and reported employee, organisational, operational or patient-related outcomes relevant to the review questions. Book chapters, books, preprints and non-empirical publications were excluded. Twenty-six records were identified; five duplicate was removed and 21 underwent title/abstract and full-text screening. No further exclusions occurred because all satisfied the predefined criteria. Two reviewers independently extracted study characteristics, design, setting, Lean/Agile practices, employee outcomes, implementation factors and key findings using a structured extraction framework. Disagreements were resolved through discussion. Extracted findings were independently coded, compared and merged into related categories, from which three themes and eight subthemes were developed.

Methodological quality was independently assessed using MMAT 2018 criteria appropriate to each study design. Studies meeting most applicable criteria were classified as high quality (n=10), while those meeting fewer but remaining methodologically acceptable were classified as moderate (n=11). Quality ratings informed interpretation rather than study exclusion. *Table 1* provides a comprehensive summary of the systematic search and screening process, encompassing all stages of the PRISMA framework, from identification and screening to eligibility assessment and final inclusion of the selected studies.

Table 1. *PRISMA flow summary: Systematic search and screening process*.

PRISMA Phase	Articles (n)	Action Taken
Identification (Scopus database)	26	Records identified using the reported TITLE-ABS-KEY search
Duplicate removal	5	Duplicate removed
Title/abstract screening	21	Assessed against predefined eligibility criteria
Full-text assessment	21	All satisfied eligibility criteria; no further exclusions
MMAT appraisal	21	High quality = 10; moderate quality = 11
Included in synthesis	21	Included in thematic synthesis
Final synthesis	21	Three themes and eight subthemes developed

Results and Discussion

Characteristics of included studies

The final synthesis comprised 21 studies spanning healthcare management, workforce, operational and patient-related contexts. The evidence was methodologically and geographically heterogeneous, covering Europe, Asia, the Middle East, Australia, Africa and the USA. Studies addressing operational efficiency, innovation or patient-centred outcomes were retained where their findings concerned organisational

conditions, such as leadership, autonomy, teamwork, workload or collaborative problem-solving that could be mapped theoretically to job demands and resources relevant to work engagement. Rietze and Zacher (2022), although involving office rather than healthcare workers, was used only as contextual evidence concerning Agile practices and occupational well-being and was not interpreted as direct healthcare evidence (*Table 2*).

***Table 2**. Characteristics of the 21 included studies.*

Author(s) / Year	Country	Design	Participants	Key Focus
Reponen et al. (2023)	Finland/USA	Qualitative	Lean experts	Leadership & lean performance
Wilson and Balasundaram (2024)	India	Qualitative	HR managers	Agile HR & engagement
Gupta et al. (2020)	Bangladesh	Quantitative	Supply chain units	Lean-agile hybrid supply chain
Lorden et al. (2015)	USA	Qualitative	Hospital staff	Human factors in lean
Mahmoud et al. (2021)	Australia/France	Mixed Method	Frontline workers	Lean impact on staff
Kunnen et al. (2023)	Netherlands	Qualitative	Healthcare managers	Lean sustainability barriers
Alkhdour et al. (2025)	Qatar	Quantitative	Supply chain staff	Lean-agile inventory management
Jech et al. (2025)	Czech Republic	Qualitative	Project managers	Agile in healthcare projects
Kleeff et al. (2023)	Netherlands	Quantitative	Hospital workers	Lean, autonomy & well-being
De Koeijer et al. (2022)	Netherlands	Mixed Method	Healthcare employees	HRM mitigating lean negatives
Alolayyan and Alyahya (2023)	Saudi Arabia	Quantitative	Hospital staff	Flexibility & engagement
Holden et al. (2021)	USA	Qualitative	Innovation teams	Agile innovation in healthcare
Rietze and Zacher (2022)	Germany	Quantitative	Office workers	Agile practices & well-being
Ni et al. (2020)	UK	Qualitative	Health tech experts	LEAN AND AGILE MANAGEMENT framework development
Zyl-Cillié et al. (2024)	Netherlands	Mixed Method	Lean leaders	Roadmap for sustainable lean
Wang et al. (2023)	China	Quantitative	Healthcare professionals	Work engagement post-pandemic
Lu et al. (2023)	China	Quantitative	HR professionals	Sustainable HRM & resilience
Detwal et al. (2024)	India	Qualitative	Healthcare researchers	Operational excellence & Health
Chukwunweike and Aro (2024)	Nigeria	Qualitative	Managers	Agile management & digitalization
Xue et al. (2025)	China	Quantitative	Nurses	Leadership, engagement & care quality
De Vries et al. (2023)	Belgium	Systematic Review	Healthcare workers	Nurse & physician retention

Thematic analysis results

The synthesis generated three interconnected themes: patient-centred care, healthcare efficiency, and impact on work engagement. The first two were retained because operational and patient outcomes frequently reflected organisational conditions that could function as job demands or resources and thereby provide contextual explanations for employee engagement (*Table 3*).

***Table 3**. Thematic distribution of evidence across included studies.*

Theme	Subtheme	NS	Study Designs	Key Regions
Patient-Centered Care	Patient Engagement	4	QL, QN	Bangladesh, Netherlands, Czech Republic, Italy/Kenya
Patient-Centered Care	Healthcare Innovation	5	QL, MM	Bangladesh, Australia/France, Italy/Kenya, Czech Republic, USA
Healthcare Efficiency	Lean Methods	10	QL, QN, MM	Finland/USA, Bangladesh, Italy/Kenya, Netherlands, UK, Qatar, Czech Republic, Australia
Healthcare Efficiency	Agile Methodologies	7	QL, QN	India, Bangladesh, Italy/Kenya, Qatar, Czech Republic, USA
Healthcare Efficiency	Inventory Management	1	QN	Qatar
Healthcare Efficiency	Process Improvement	8	QL, QN, MM	Finland/USA, Bangladesh, Netherlands, Italy/Kenya, USA,
Impact on Work Engagement	Collaborative Problem-Solving	5	QL, MM	Italy/Kenya, Australia/France, Netherlands, USA, India
Impact on Work Engagement	Employee Engagement	7	QL, QN, MM	India, USA, Australia/France, Netherlands, UK

Note: NS=Number of Studies.

Theme 1: Patient-centered care

Patient-centred outcomes were mainly indirect rather than direct measures of work engagement. Lean and Agile practices were associated with responsiveness and service improvement, while limited patient participation could constrain sustainable improvement (Kunnen et al., 2023; Gupta et al., 2020). Employee participation is theoretically relevant because collaborative redesign may provide meaningfulness, feedback and participation as job resources. Healthcare innovation similarly required adaptive and collaborative working practices (Jech et al., 2025; Holden et al., 2021). Thus, this theme provides organisational context rather than direct evidence of employee engagement.

Theme 2: Healthcare efficiency

Efficiency represented the dominant evidence base. Lean practices were associated with improved process flow, waste reduction and supply-chain performance (Alkhdour et al., 2025; Reponen et al., 2023; Gupta et al., 2020). However, operational gains did not necessarily translate into positive workforce outcomes. Leadership and employee involvement were repeatedly important for sustainable implementation (Reponen et al., 2023; Kunnen et al., 2023; Lorden et al., 2015). Agile approaches were associated with adaptability and collaborative working, particularly in HR and project settings (Jech et al., 2025; Wilson and Balasundaram, 2024). Inventory-management evidence remained particularly limited (Alkhdour et al., 2025).

Theme 3: Impact on work engagement

Evidence directly concerning work engagement and well-being was mixed and context-dependent. Lean could provide resources through teamwork, role clarity, learning and participation, but could also intensify workload, time pressure and strain when poorly implemented (Kunnen et al., 2023; Kleeff et al., 2023; De Koeijer et al., 2022; Mahmoud et al., 2021). Agile-related studies suggested potential benefits through autonomy, collaboration, adaptability and shared decision-making (Wilson and Balasundaram, 2024; Rietze and Zacher, 2022); however, the small and heterogeneous evidence base prevents conclusions that Agile consistently improves engagement. These mechanisms correspond with the JD-R proposition that engagement depends on the balance between job resources and demands (Bakker and Demerouti, 2007).

Synthesis of key findings

The findings suggest that Lean and Agile influence healthcare employees through different but potentially complementary mechanisms. Lean primarily addresses process discipline and efficiency, whereas Agile emphasises adaptability, autonomy and collaborative responses. Importantly, the evidence does not demonstrate that integrated Lean–Agile management is superior to either approach independently. Most included studies examined Lean or Agile separately, while only limited evidence explicitly addressed their integration (Gupta et al., 2020; Ni et al., 2020). Lean–Agile integration should therefore be interpreted as an emerging conceptual proposition requiring empirical validation rather than an established superior management model. The JD-R model helps explain the variation in employee outcomes. Lean and Agile practices may generate job resources through autonomy, leadership support, teamwork, feedback and collaborative problem-solving, but efficiency-oriented implementation may simultaneously increase job demands through workload and time pressure. Consequently, implementation quality, leadership, employee involvement and organisational context appear more important than assuming inherently positive effects from either management approach (Reponen et al., 2023; Kleeff et al., 2023; De Koeijer et al., 2022; Mahmoud et al., 2021).

Comparison framework: Lean vs. agile in healthcare

Table 4 presents a structured comparison of lean and agile management across key dimensions relevant to healthcare work engagement, synthesizing evidence from the included studies and broader theoretical frameworks.

***Table 1**. Comparative framework: Lean vs. agile management in healthcare settings.*

Dimension	Lean Management	Agile Management
Origin	Manufacturing (Toyota Production System)	Software development (Agile Manifesto, 2001)
Core Philosophy	Eliminate waste; maximize value for customer	Embrace change; iterative delivery & collaboration
Key Tools / Methods	5S, Kaizen, VSM, A3, PDCA, Kanban	Scrum, Sprints, Retrospectives, Agile HR, PDCA
Focus in Healthcare	Workflow efficiency, standardization, waste reduction	Flexibility, adaptability, staff autonomy, real-time response
Impact on Engagement	Mixed: can improve morale or increase job strain	Generally positive: boosts motivation & collaboration
Leadership Requirement	High – directive & structured leadership essential	High – servant leadership & empowerment critical
Patient-Centeredness	Indirect; via process & efficiency improvements	More direct; iterative cycles align with patient needs
Combined Strength-Lean and agile management	Process discipline + flexibility = resilient healthcare systems	Addresses both operational efficiency & workforce well-being

Contribution to theory, practical implications and identified research gaps and future directions

This review extends the JD-R model by showing how Lean and Agile practices may function as both job resources and job demands, depending on implementation conditions (Bakker and Demerouti, 2007). It also extends the Lean–Agile framework beyond healthcare technology towards organisational and workforce outcomes (Ni et al., 2020). However, limited direct evidence on integrated Lean–Agile interventions indicates that this theoretical relationship requires further empirical validation.

Healthcare managers should implement Lean and Agile practices with attention to leadership, employee involvement, autonomy and workload. Efficiency improvements should be balanced against potential work intensification, while Agile practices may support adaptability and collaboration. Rather than assuming that combining Lean and Agile will improve engagement, managers should adapt implementation to organisational, workforce and resource conditions. Notwithstanding the breadth of evidence synthesized in this review, significant gaps in the lean and agile management on work engagement literature are apparent. *Table 5* systematically maps these gaps alongside current evidence and proposed future research directions. Future research should prioritise longitudinal studies of work engagement, validation of integrated Lean–Agile frameworks, and examination of their interaction with Health 4.0 technologies (Detwal et al., 2024). Greater evidence from underrepresented healthcare contexts is also required.

***Table 5**. Research gap analysis: Current evidence and future research priorities.*

Research Area	Current Evidence	Identified Gap
lean and Agile Management & Employee Work Engagement	Mixed evidence; context-dependent	Lack of longitudinal data on sustained engagement outcomes
Leadership Role	Critical enabler; qualitative evidence dominant	Quantitative models linking leadership style to lean and Agile Management outcomes
Geographic Coverage	Europe, South Asia, Middle East, USA	Limited studies from Africa, Southeast Asia, Latin America
Patient Active Involvement	Acknowledged but treated as passive outcome	Models integrating patients as co-designers of care processes
Integrated lean and Agile Management Models	Separate lean/agile studies dominate	Validated integrated lean and Agile Management frameworks for diverse healthcare settings
Workforce Well-being vs. Efficiency	Tension acknowledged; rarely modeled together	Quantitative mediation/moderation models needed
Digital- lean and Agile Management Integration	Emerging; limited empirical evidence	lean and Agile Management intersecting with Health 4.0 & AI-driven workflows

This review was limited to Scopus and English-language publications from 2015–2025, potentially excluding relevant evidence from other databases and earlier studies. The heterogeneity of designs, settings and outcomes prevented meta-analysis, while thematic synthesis involved interpretive judgement despite reviewer procedures. Publication bias may also underrepresent neutral or negative findings. Future reviews should therefore incorporate multiple databases and broader evidence sources.

Conclusion

This systematic literature review synthesised 21 studies published between 2015 and 2025 on Lean and Agile Management and their relevance to healthcare employee work engagement. Three themes emerged: patient-centred care, healthcare efficiency and work engagement. Lean demonstrated mixed workforce outcomes, while Agile-related evidence suggested potential benefits through adaptability, autonomy and collaboration, although the evidence remains limited and heterogeneous. Overall, leadership, employee involvement, workload and organisational context influence whether these practices create job resources or additional demands. Integrated Lean–Agile Management remains a promising area for investigation, but current evidence is insufficient to establish its superiority or causal effect on healthcare employee engagement.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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