

LEAN HEALTHCARE: A SUPPORT TOOL FOR THE PATIENT CARE TEAM

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ABSTRACT

Objective: to develop a technology in the format of an educational and instructional Guide with and for healthcare professionals regarding the applicability of Lean Healthcare in emergency and urgent care services.

Method: a technological development study with a qualitative approach, using Convergent Care Research as the methodological strategy. The study was conducted in the municipality of Manaus, Amazonas, Brazil. The participants were 13 healthcare professionals, and data collection was carried out through convergence groups and the execution of the phases: conception, instrumentation, scrutiny, and analysis.

Results: the Guide was developed based on content extracted from the categories of experience and knowledge regarding the Lean methodology, opinions, identified facilitators and barriers, and needs considered for evaluation and improvement of professional practice. The Guide was structured into 33 pages and 11 chapters, formatted with texts, flowcharts, and diagrams representing the stages, sequences, and decision-making processes within the workflow.

Conclusion: the technology developed in a participatory and collaborative manner between researchers and participants constitutes an important support tool for the team of professionals in emergency and urgent care services, especially for nurses, who hold broad technical capacity and responsibility in managing the workflow and Lean tools. It is noteworthy that Convergent Care Research was essential for team engagement and commitment in the pursuit of continuous evaluation and sustainability of the Lean methodology implemented in the institution. However, the technology produced still requires future steps for continuity, such as content validation and effectiveness assessment, to ensure its application and achieve the expected impacts.

DESCRIPTORS: Educational technology. Patient care team. Nursing. Emergency hospital service. Value-based healthcare.

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LEAN HEALTHCARE: INSTRUMENTO DE APOIO À EQUIPE DE ASSISTÊNCIA AO PACIENTE

RESUMO

Objetivo: desenvolver uma tecnologia em formato de Guia educativo e instrucional com e para os profissionais de saúde quanto à aplicabilidade do *Lean HealthCare* no serviço de urgência e emergência.

Método: estudo de desenvolvimento tecnológico e de abordagem qualitativa, tendo como estratégia metodológica a Pesquisa Convergente Assistencial. Realizado no município de Manaus, Amazonas, Brasil. Os participantes foram 13 profissionais de saúde, e a produção de dados foi realizada a partir de grupos de convergência e execução das fases concepção, instrumentação, perscrutação e análise.

Resultados: o Guia foi desenvolvido com conteúdo extraído das categorias experiência e conhecimento quanto à metodologia *Lean*, opiniões, facilidades e dificuldades identificadas, necessidades consideradas para avaliação e melhoria para a prática profissional. O Guia foi estruturado em 33 páginas e 11 capítulos, formatado com textos, fluxogramas e diagramas em representação das etapas, sequências e tomada de decisões do fluxo de trabalho.

Conclusão: a tecnologia desenvolvida de forma participativa e colaborativa entre pesquisadores e participantes constitui-se importante instrumento de apoio à equipe de profissionais do serviço de urgência e emergência, especialmente ao enfermeiro, que possui ampla capacidade e responsabilidade técnica na condução do fluxo e gerenciamento das ferramentas *Lean*. Destaca-se que a Pesquisa Convergente Assistencial foi essencial para o engajamento e comprometimento da equipe na busca pela avaliação contínua e sustentabilidade do *Lean* implantado na instituição. No entanto, a tecnologia produzida ainda requer a realização de etapas futuras de continuidade, como a validação de conteúdo e avaliação da efetividade, para que possa ser aplicada e obter os impactos esperados.

DESCRIPTORIOS: Tecnologia educacional. Equipe de assistência ao paciente. Enfermagem. Serviço hospitalar de emergência. Cuidados de saúde baseados em valores.

LEAN HEALTHCARE: UNA HERRAMIENTA DE APOYO PARA EL EQUIPO DE ATENCIÓN AL PACIENTE

RESUMEN

Objetivo: desarrollar una tecnología en formato de Guía Educativa e Instruccional con y para los profesionales de la salud, en relación con la aplicabilidad del *Lean Healthcare* en los servicios de urgencia y emergencia.

Método: estudio de desarrollo tecnológico con enfoque cualitativo, utilizando como estrategia metodológica la Investigación Convergente Asistencial. El estudio se realizó en el municipio de Manaus, Amazonas, Brasil. Participaron 13 profesionales de la salud, y la recolección de datos se llevó a cabo mediante grupos de convergencia y la ejecución de las fases de concepción, instrumentación, indagación y análisis.

Resultados: la Guía fue desarrollada con contenido extraído de las categorías experiencia y conocimiento sobre la metodología *Lean*, opiniones, facilidades y dificultades identificadas, y necesidades consideradas para la evaluación y mejora de la práctica profesional. La Guía fue estructurada en 33 páginas y 11 capítulos, con textos, diagramas de flujo y esquemas que representan las etapas, secuencias y toma de decisiones en el flujo de trabajo.

Conclusión: la tecnología desarrollada de forma participativa y colaborativa entre investigadores y participantes constituye un instrumento importante de apoyo para el equipo de profesionales de los servicios de urgencia y emergencia, especialmente para el enfermero, quien posee amplia capacidad y responsabilidad técnica en la conducción del flujo y gestión de las herramientas *Lean*. Se destaca que la Investigación Convergente Asistencial fue esencial para el compromiso y la implicación del equipo en la búsqueda de una evaluación continua y la sostenibilidad del modelo *Lean* implantado en la institución. Sin embargo, la tecnología producida aún requiere la realización de etapas futuras de continuidad, como la validación de contenido y la evaluación de la efectividad, para que pueda ser aplicada y lograr los impactos esperados.

DESCRIPTORIOS: Tecnología educativa. Equipo de atención al paciente. Enfermería. Servicio hospitalario de emergencia. Atención sanitaria basada en valores.

INTRODUCTION

The term Lean Thinking, translated into Portuguese as “pensamento enxuto,” originated in the 1980s from the Toyota Production System, which focused on cost reduction and minimizing waste in its manufacturing processes¹. As it proved effective, Lean Thinking expanded beyond the automotive industry and began to influence other sectors, including hospital services, where it became known as Lean Healthcare (LH). This approach aims to organize and optimize the patient care flow¹⁻².

Lean Healthcare, when implemented in the health sector and applied to emergency and urgent care services within hospital networks, promotes the reordering of work processes by introducing managerial methods and techniques. These are based on identifying waste and inefficiencies in care delivery that directly affect the patient flow, ranging from registration at reception to treatment outcomes and hospital discharge³.

In Brazil, the implementation of Lean has been documented since 2007, in services provided by the São Camilo Hospital Network and the Oncology Institute of Vale do Paraíba. Positive outcomes have been reported, such as a decrease in surgery cancellations, reduced waiting and hospitalization times, increased professional and patient satisfaction, and enhanced service capacity. Furthermore, it fosters engagement among the multidisciplinary healthcare team by incorporating standardized work tools that encourage problem-solving to improve the quality and efficiency of service practices⁴⁻⁵.

The high demand for hospital admissions in Emergency and Urgent Care Services (EUCS) is considered a global phenomenon, primarily characterized by bed overcrowding and prolonged patient stays due to factors that disrupt the care flow. These issues are also linked to bed shortages, understaffing, and infrastructure problems⁶.

Patient overcrowding in hospital units has remained a chronic and growing issue in many regions. In countries such as Nigeria and England, bed occupancy has exceeded 85% of capacity, surpassing the threshold at which hospitals can operate effectively and safely⁷⁻⁸. Longer wait times for hospital admission in emergency departments contribute to increased rates of hospital-acquired infections and even death, due to delays in care and decision-making. This has led countries like Canada and Australia to establish standards limiting the wait time from patient arrival to admission to a maximum of four hours⁹.

In Brazil, the overload of EUCS affects all states in a systemic and routine manner, occurring more frequently in large hospitals and major cities. This situation was reaffirmed during the COVID-19 pandemic, when bed capacity reached its maximum in several states, resulting in a complete overload of the public healthcare system, especially in the state of Amazonas, in the northern region of the country. Amazonas was the first to collapse due to the high number of cases, shortage of beds, insufficient infrastructure and human resources, as well as violence and socioeconomic vulnerability, which intensified the negative impact on the population¹⁰.

Given the need to reorganize work processes in managing patient flow in emergency and urgent care services, the incorporation of technological innovations is essential, particularly educational technologies (ET) and instructional technologies (IT) that can support healthcare teams in the implementation of Lean Healthcare (LH) methodology tools¹¹.

ET and IT in the healthcare field, as discussed within the teaching-service interaction, involve didactics and systemic approaches to the planning, development, use, management, and evaluation of the teaching and learning process both scientific and practical. Both have the potential to contribute to the mediation of health actions, aiming to improve care practices, especially when developed through participatory interfaces. That is, when the target audience itself becomes a co-creator, offering diverse perspectives on the problems of a given reality, which, through dialogical, socio-interactive, collaborative, and democratic relationships, can be transformed¹¹⁻¹².

In the implementation of the Lean Healthcare (LH) methodology in hospital management, studies show that gaps still exist in knowledge about its philosophy and the functioning of its tools. These gaps contribute to resistance among staff in carrying out Lean organizational activities or lead to limited and isolated applications in specific sectors, as well as a lack of preparedness to sustain the methodology over time¹³.

To overcome these knowledge and practice gaps, it is essential to understand the role of the healthcare team, especially the nurse, who is considered a key professional in leading the operationalization of Lean in hospital care. This is attributed to their leadership skills and training competencies, as well as their commitment to care. Moreover, nurses have a broader view of hospital systems, capable of integrating both service and patient perspectives, making them fundamental to the success of this methodological approach¹⁴.

Recognizing that a technical and technological product could be useful in supporting and facilitating the operationalization of the LH methodology by the healthcare team, the following guiding question was posed: what content will emerge from a methodological strategy based on Convergent Care Research (CCR), with the participation of healthcare professionals, for the development of an educational and instructional technology on Lean Healthcare?

Therefore, the objective of this study was to develop a technology in the format of an Educational and Instructional Guide, with and for healthcare professionals, regarding the applicability of Lean Healthcare in emergency and urgent care services.

METHOD

This is a technological development study with a qualitative approach, guided by the methodological framework of Convergent Care Research (CCR), which is primarily characterized by integrating care practice actions with research activities, aiming at the discovery of new phenomena and innovative changes in care delivery¹⁵.

The research was conducted in a hospital and emergency care unit in the municipality of Manaus, Amazonas, Brazil, and is part of a master's thesis from the Graduate Program in Public Health Nursing (ProEnSP) at the *Universidade do Estado do Amazonas* (UEA, State University of Amazonas). CCR was adopted due to one of the researchers being actively involved in care practice, which enabled the proposal of changes and innovations in health actions, focused on problem-solving and service improvement.

Data collection took place between July and October 2024, following the methodological pathway outlined in the consolidation stages of CCR, as illustrated in Figure 1.

Conception

In this stage, the study topic is defined, and it must emerge from the researcher's practice, with the research problem being delimited in confrontation with the lived reality. This phase also includes the formulation of objectives and the contextualization of the theoretical and scientific foundation of the subject under study¹⁶.

The problems identified in professional practice regarding the implementation of Lean at the study site emerged from the following observations: difficulties in managing patient flow, limited knowledge among staff, lack of effective communication, work overload, hospital overcrowding, and the absence of a facilitating tool for applying the LH method by the multidisciplinary team.

Given these problem situations, a technical and technological product was conceived in the format of an Educational and Instructional Guide, adapted to the local reality and developed with the participation of the healthcare team. For the theoretical, scientific, and technical foundation, the literature was consulted to identify the main documents and protocols outlining the LH methodology at both national and international levels.

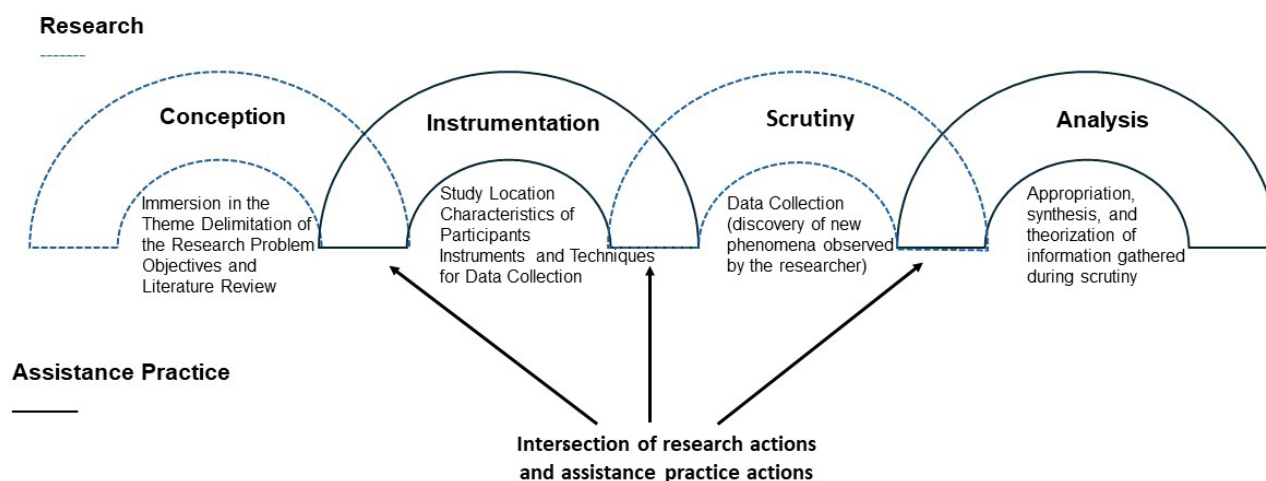


Figure 1 – Representation of the CCR movements – approach, distancing, and convergence between research and care practice – forming the intersection of both dimensions. Manaus, AM, Brazil, 2024.

Instrumentation

The study was conducted in the institution's meeting room, as suggested by the participants, who included 13 healthcare professionals: nine nurses, two nursing technicians, one social worker, and one pharmacist. The inclusion criteria focused on professionals involved in the care of hospitalized patients, with at least one year of experience following the implementation of the Lean Healthcare (LH) methodology. Those who were absent due to medical leave and/or vacation at the time of the meetings were excluded.

Prior to engaging with the professionals, the researchers held a preliminary meeting with the management team to present the project, aiming to align and clarify the research objectives and ensure the necessary support for its execution. The approach and negotiation/dialogue with participants were carried out through an invitation to join a WhatsApp group. Upon acceptance, a form created on the Google Forms digital platform was sent, collecting identification data, age, gender, educational background, length of service, and time since graduation.

In CCR, various data collection techniques may be adopted. In this study, Convergence Groups (CG) and Participant Observation (PO) were used to meet the study's objectives, within the perspective of collaboratively and participatively constructing the digital Guide. The CGs prioritized essential attributes for the use of this group technique, including coherence, respect, patience, communication, and empathy¹⁶. To make the CGs more creative and dynamic, materials such as colored paper and brushes, balloons, kraft paper, poster board, and a field diary for observation records were used.

Scrutiny

This stage marks the beginning of data collection and recording to guide the convergence process between research actions and care practices. For the execution of the CG, a study guide was used with the following trigger questions: 1. What is your experience with the Lean methodology? 2. What do you know about Lean tools, and how did you acquire that knowledge? 3. What is your opinion on the Lean methodology and its tools? 4. What are the facilitators and challenges you identify in applying the tools? 5. What do you consider necessary to evaluate the use of the tools? 6. What is needed to improve professional practice regarding the use of these tools?

Four meetings were held, each lasting approximately two hours. It is worth noting that all sessions were audio-recorded, photographed, and fully transcribed by the researchers. Additionally, short snacks were offered during the breaks to encourage moments of relaxation and interaction among participants.

The first CG meeting was divided into two parts: one focused on clarifying the study's objectives, methodology, relevance, and benefits for the team's knowledge and professional practices in constructing the Guide to support the applicability of the Lean methodology. Furthermore, key points were addressed regarding audio recordings, participant observation, field diary notes, and ethical aspects outlined in the informed consent form (ICF).

In another moment, a group activity was proposed to foster bonding among participants and promote team cohesion. The activity, titled "*Guess Who*", aimed to explore the participants' profiles and personal traits. Each professional received a balloon, a piece of paper, and a pen to write down their main characteristics. The paper was then placed inside the balloon, which was inflated. The balloons were scattered around the room so that everyone could touch and move them. Each participant picked a balloon, popped it, and read the traits written on the paper aloud, trying to guess who they belonged to. The main characteristics identified included: annoying, responsible, sincere, cheerful, fair, honest, empathetic, approachable, solution-oriented, productive, determined, proactive, communicative, charismatic, calm, a good listener, anxious, and restless.

During direct observation conducted at all meetings, dynamic and relaxed moments were noted, with all participants showing joy, enthusiasm, engagement, and gratitude for being part of the process. It was agreed that future meetings would follow the same format, with biweekly intervals whenever possible, to avoid interfering with work routines. The 15-day interval was chosen to ensure that ideas would not be lost over time.

Ten professionals participated in the second CG, divided into two subgroups. Each subgroup received colored markers and poster board with trigger questions 1 and 2. At the end of the dialogue and reflection on the questions and answers, one participant from each subgroup presented a summary of the discussion for collective review and feedback.

The same dynamic was used in the third CG to address questions 3 and 4. Trigger questions 5 and 6 were discussed in the fourth CG, which featured a special appearance by the unit manager, who welcomed the researchers and the healthcare team.

Analysis

In CCR, this stage involves three essential elements: apprehension, which consists of capturing information extracted during the scrutiny phase. After a careful reading of the transcribed data, field diary notes, and the knowledge synthesis presented by participants through posters during the meetings, the information is gathered and grouped by similar phrases and excerpts to construct the analytical categories. Synthesis refers to the configuration of subjective and meaningful information about the phenomenon under study, based on the identified categories. And theorization, in which the study's data/results go beyond proposing changes in care practice – they are not limited to being merely articulated with other findings in the literature, but rather contribute to the construction, deconstruction, and reconstruction of new theories.¹⁶ It is important to note that after each CG, the observations, notes, and transcriptions of the recordings, as well as the reading and synthesis, were carried out simultaneously by the researchers.

During the analysis process, the need arose to suggest a new meeting space to participants, one that would offer a more welcoming, relaxed, and comfortable environment, allowing them to focus on the proposed tasks without concern for their daily work routines.

Therefore, the fifth and final CG was held at UEA, in the Laboratory for Research in Health Promotion and Education (LAPPES). In this meeting, the researchers presented a draft of the Guide to the participants, containing the main content based on existing protocols related to the Lean methodology and the information that emerged from previous meetings with the healthcare team. Once again, participants were divided into two subgroups to collaboratively and participatively construct the Guide. Following this, the Guide was sent to a graphic designer for planning and organizing the visual and textual content.

The study was approved by the UEA Research Ethics Committee (REC) and all participants signed the ICF.

RESULTS

The document that supported the theoretical and scientific content of the Guide was the e-book *“Lean Healthcare: Strategies, Methods, and Techniques to Support Process Improvement in Hospital Management”*, a reference selected by the authors after a literature review that compiled and synthesized all relevant and up-to-date information on the study topic. This was complemented by empirical data that emerged from the Convergence Group (CG) meetings held with the study participants¹⁷.

During the scrutiny and analysis phases, conducted simultaneously, the results were examined and synthesized to enable the collaborative construction of the Guide with the participants. The first version of the Guide was titled *“Guide for the Applicability of Lean Healthcare Methodology for Health Professionals”*. It was structured into 33 pages, including a cover, technical sheet, introduction, table of contents, 11 chapters covering the main topics, references, list of figures, and list of acronyms and abbreviations. A clear and objective language was intentionally adopted.

The texts were written using a simple font style, with a size that ensured easy visualization and readability. The information in the Guide was organized into flowcharts and diagrams to represent the stages, sequences, and decision-making processes within the workflow, considering that LH is directly related to the participants' professional activities.

The Guide was divided into three domains, with content presented as follows: 1. Introduction: explanation of the Guide's purpose; 2. History and concept of LH methodology; 3. Tools that comprise the Lean process, including: 5S Methodology, Value Stream Mapping (VSM), Flow Manager, Kanban, Multidisciplinary Rounds (MR), Singular Therapeutic Project (STP), Daily Huddle, Full Capacity Protocol (FCP), Clinical Decision Unit, Fast Track, and Satellite Pharmacy, as described in Chart 1.

Based on the dialogue and critical reflection that took place in the CG regarding the trigger questions, a synthesis framework was developed with six investigative categories presented in Chart 2.

Figure 2 displays some pages from the first version of the Guide, showcasing an integration of conceptual and visual elements. It features tools such as flowcharts, tables, and mind maps, designed to help healthcare professionals easily understand and retain the key aspects related to the stages involved in LH.

Flowcharts were chosen to illustrate the stages, sequences, and decisions within the process or workflow, given that LH is closely interconnected with the participants' work activities in the development of the technology presented in the form of a Guide.

Chart 1 – Main Lean Tools and their descriptions, Manaus, AM, Brazil, 2024.

Lean Tools	Description
5S Methodology	Developed to improve discipline and workplace organization, it consists of five organizational steps: sense of use, organization, cleaning, standardization, and discipline. Its application over time aims to provide comfort, safety, and quality of life for workers.
VSM	A tool that helps to understand and analyze the production process of a service or product, highlighting the identified critical points. It allows for the identification of the departments the patient passes through and records the waiting time in each area until hospital discharge.
Flow Manager	A professional assigned to guide patients and eliminate unnecessary steps within a workflow.
Kanban	It is a visual management tool that is simple, easy to understand, and effective, based on the principles of standardized work and the 5S methodology.
MR and STP	A visit carried out jointly by the team at the patient's bedside, aimed at identifying possible actions to improve the patient's treatment.
<i>Daily Huddle</i>	A brief and frequent meeting among team members to align goals and prioritize challenges.
FCP	Supports decision-making in situations where demand exceeds the hospital's installed capacity.
Clinical Decision Unit	A department dedicated to determining the diagnostic decision and the patient's outcome within the hospital unit.
<i>Fast Track</i>	Rapid patient discharge. This tool ensures that a portion of emergency care users are assessed and released during the initial triage stage.
Satellite Pharmacy	A service that encompasses the receipt of prescriptions, pharmaceutical analysis, and the distribution of medications to each admitted patient.

Chart 2 – Description of the results according to the investigative categories, problematization/ contextualization, and changes in professional practice, Manaus, AM, Brazil, 2024.

Investigative Category	Perception/Contextualization	Change in professional practice
Experience with Lean methodology	Improvement in work processes and service organization. Greater synergy among professionals. Low-cost, high-impact tool that promotes multiple improvements in workflow. Reduction in the cancellation of surgeries and laboratory tests.	Identification and elimination of non-value-added activities, such as redundant steps in patient care, unnecessary tests, or bureaucratic procedures that delay processes. Team integration: improved communication between departments, optimizing the diagnostic and treatment process (e.g., integration of laboratory tests into the unit's system). Work time optimization through the use of value stream mapping.

Chart 2 – Cont.

Investigative Category	Perception/Contextualization	Change in professional practice
Knowledge about Lean methodology	Awareness of the Lean Project in emergency services through SÍrio-Libanês Hospital and PROADI-SUS. The management tools of the Lean methodology enable improvements in the organizational culture of institutions, aiming to standardize care, optimize patient flow and length of stay, reduce costs, and leverage the full potential of healthcare teams.	Optimization of resource use: minimizing waste of hospital supplies through the 5S tool. Strengthening the permanent education unit in disseminating information through training and capacity-building on the methodology. Standardization of work processes, preventing overload for the healthcare team, reducing waiting times, and promoting patient-centered care.
Opinions about a Lean and its tools	Facilitate and guide care delivery. Improve communication among team members. Standardize processes. Promote workflow organization and indicator monitoring.	Redesign of operational flows: mapping the steps the patient goes through from admission to discharge, aiming to eliminate bottlenecks and delays. Culture of continuous improvement: encouraging healthcare professionals to identify opportunities for enhancement and propose solutions.
Identified facilitators and challenges	Facilitators: Low cost. Improves standardization of care and organizational processes. Presence of consultants during the implementation of tools. Optimizes bed turnover. Reduces patient length of stay Enhances communication among teams. Challenges: Low team adherence. Complex departments with strong resistance to change and to the culture of continuous improvement. Limited involvement of senior management in sustaining the use of tools and the implemented project. Huddle scheduled during peak demand hours in the unit. Need to acquire knowledge and disseminate it throughout the institution. Ongoing monitoring of actions.	Greater engagement: commitment and involvement from organizational management and healthcare teams. Awareness-raising about the methodology among healthcare staff. Itinerant Huddle, promoting greater adherence from professionals. Development of a tool for indicator evaluation.
Needs considered for evaluating the use of Lean methodology tools	Provide feedback to staff on the outcomes of implemented actions, using visual management tools. Develop evaluation instruments, such as satisfaction surveys (e.g., Google Forms). Continuously monitor actions, making adjustments whenever necessary.	Improved experience: providing clear information and making care processes more transparent. Focus on quality: implementing audits and performance indicators to ensure excellence in care delivery.

Chart 2 – Cont.

Investigative Category	Perception/Contextualization	Change in professional practice
Need for improvement in professional practice regarding the Lean methodology	Active participation of management. Ongoing involvement in applied processes through meetings among stakeholders. Necessary human and material resources.	Evaluation and reorganization of the work schedule. Commitment from senior organizational management and department coordinators. Sector-specific material checklists to identify excesses and prevent waste.

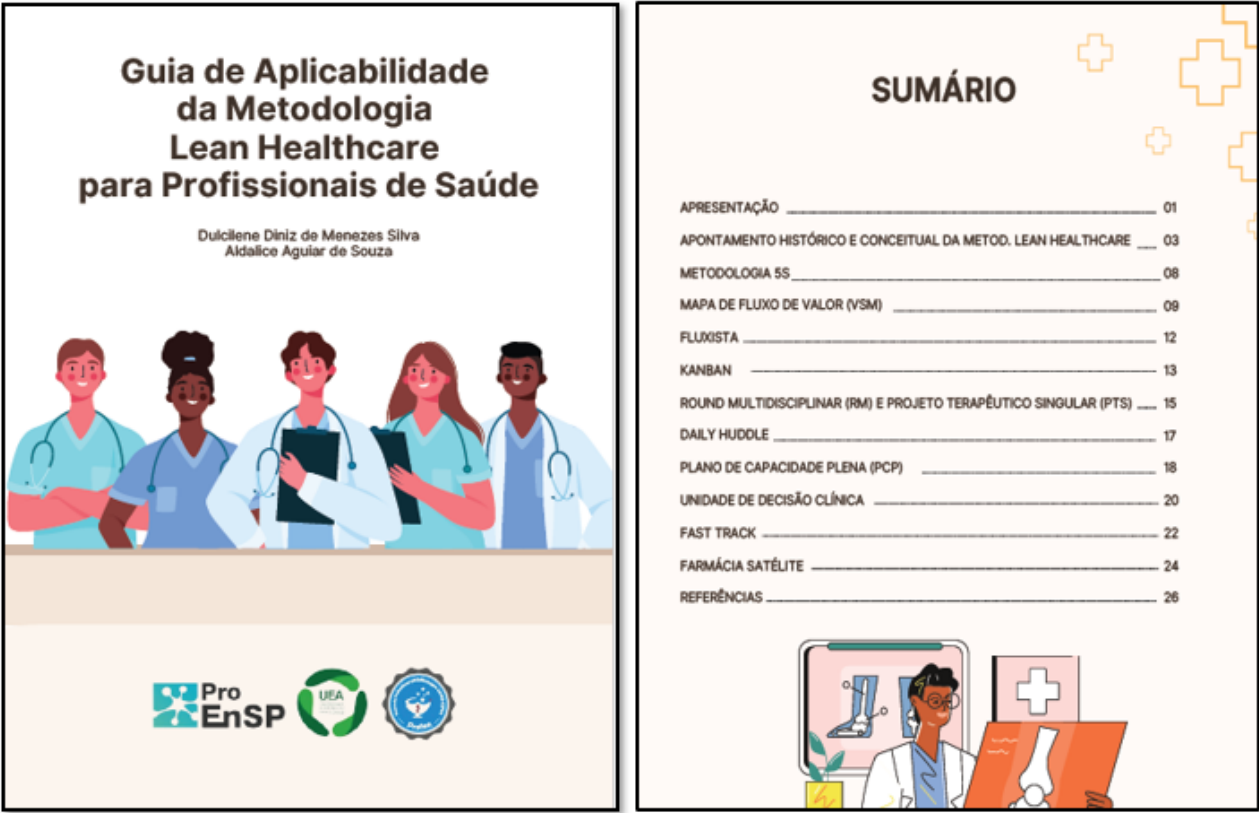


Figure 2 – Images of the Guide in its initial version. Manaus, AM, Brazil, 2024.

DISCUSSION

To organize the discussion on the experience of developing the technology through a PCA, key aspects will be analyzed, including the development context, the product generated in relation to the LH philosophy, the potential contribution of the study to the identified demands and literature insights, as well as the study's limitations.

Regarding the development context, it is important to highlight that the CG took place within a framework of affective relationships and interactions between the researchers and the participating healthcare team. This occurred through a democratic, dialogical, active, dynamic, and creative process

of sharing and learning about the tools that comprise the LH methodology. This environment enabled the convergence of research and professional practice, further facilitated by the researchers' immersion in the healthcare service¹⁵⁻¹⁶.

As for the participants, the study results showed that most professionals already had experience with the LH methodology and were familiar with some of its tools. Reported benefits included improved standardization of care, enhanced communication among team members, optimized bed turnover, and reduced length of hospital stays. In line with these findings, other studies have revealed additional facilitators from a more institutional perspective, such as improved management and reduced waste, leading to lower hospital costs^{4,17-18}.

The adopted method, PCA, proved to be appropriate for the study's objective and fostered strong integration and high engagement of participants in the development of the technology, an essential aspect from the initial stage of in-depth problem recognition. The proposal for the collective construction of technologies within methodological and technological development studies, articulated through participatory interfaces, has contributed to the understanding and critical reflection of healthcare practices. It has also enabled the pursuit of interventions tailored to the local healthcare context¹⁹⁻²⁰.

In this context, the Guide, developed with the active participation of professionals through the PCA methodological strategy, promoted the team's autonomy in making decisions regarding innovative and creative strategies aligned with patient needs and streamlined workflows guided by Lean principles.

The investigative categories outlined in the study's results, particularly those related to the evaluation of tool usage and improvements in professional practice, were contextualized by participants around strengthening interactions between frontline professionals, service management, and continuous action monitoring. The suggested changes were consistent with findings from other studies that highlighted feedback strategies from management, such as regular meetings and the encouragement of horizontal relationships within the team²¹⁻²³.

Regarding the product generated, based on the theoretical and conceptual foundations of the LH methodology and the insights, contextualizations, and suggestions for changes in professional practices expressed in the CG, the study successfully achieved its objective: the development of the first version of a digital Guide with educational and instructional purposes.

This initial version of the Guide demonstrates strong potential for supporting the application of tools such as: 5S Methodology, Value Stream Mapping, Flow Manager, Multidisciplinary Rounds, Singular Therapeutic Project, Daily Huddle, Full Capacity Protocol, Fast Track and Satellite Pharmacy. These tools are presented in the technology using accessible, practical, and technical language, making them easier to understand for the multidisciplinary team²⁴. The content and layout were evaluated by the participants themselves as complete, appropriate, and accessible. In future stages, the Guide should be the subject of continued study for validation and implementation in the actual healthcare setting and subsequently made available externally.

The importance of the Guide is particularly emphasized for the nursing team, which spends the most time directly involved in patient care. Given their training and competencies, which are strongly oriented toward management and leadership, nurses can provide crucial support in working alongside other professionals to implement Lean tools, thereby contributing to the proposal of improvements and the effective application of the methodology within the institution^{14,25}.

The product also aligns with two fundamental aspects: coherence with LH and responsiveness to the weaknesses identified in both the literature and the study itself. It is important to highlight that LH, before being a method, is a philosophy focused primarily on adding value to the patient by improving process management, patient flow, service organization, and safety through "lean" strategies

and practices. To achieve this goal, LH proposes various organizational and standardized measures that require the involvement of a multidisciplinary team on the front lines of care and within upper management.²⁶ In this sense, both the product and the process of its development were consistent with this philosophy, as they emphasized participation and co-creation.

For building an organizational culture based on the Lean philosophy, authors underscore the importance of team engagement, training, and qualification aimed at problem-solving and active participation in improvement processes. They also highlight the inclusion of the patient as an active agent in decision-making and the role of leadership in sustaining LH practices^{21–22,27–28}.

In parallel, both the process and the product addressed the difficulties reported by the participants in this study who, contrary to expectations, pointed out limited involvement from upper management in ensuring continuity, low team adherence, and challenges in monitoring the Lean tools implemented within the institution. Among the tools most frequently applied in daily workflows were Kanban, 5S, and the Huddle. Authors emphasize that implementing Lean in a University Hospital Emergency Service alone does not guarantee service improvement, as it consists of a set of rigid and flexible techniques and tools. Its success requires a collective and ongoing pursuit of improvements, team awareness and engagement, managerial support, and behavioral changes²⁰.

Beyond the contributions already highlighted, it is worth emphasizing the value of the product itself – a technology in the form of an Educational and Instructional Guide on the Lean Healthcare methodology, now available for validation, implementation, and effectiveness assessment across different settings. Moreover, an indirect contribution emerged through the development of the PCA, which fostered the competence of those involved in this type of intervention study and motivated them to pursue improvements in LH practices.

As for the study's limitations, it is important to note that the CG were conducted in the participants' workplace, where high task demands may have affected their level of engagement in the study. However, when an alternative location was proposed for the final meeting, greater involvement and engagement from professionals were observed. Another limiting factor was the study's focus on data generation for knowledge creation, without including content validation or effectiveness assessment of the Guide, both of which are planned for future research. Additionally, due to the relatively recent adoption of LH across Brazil, there is still a limited number of studies on its application, which restricts the comparison of experiences and outcomes.

CONCLUSION

The development of the Guide through a participatory approach using the PCA method enabled the consolidation of the intersection between research and healthcare practice, highlighting the significant contribution of this methodological framework to knowledge production in the field of technical and technological studies. Moreover, it had a tangible impact on transforming and improving practices among the participating professionals, as the CG fostered dialogue, critical reflection on healthcare actions, encouraged team engagement, and strengthened the commitment to continuous evaluation and sustainability of the Lean tools implemented in the institution.

The structure of the Guide is grounded in scientific literature and contextualized by the experiences shared by professionals, collectively materialized to present the main LH tools in a practical, creative, and systematized manner. However, to ensure its effective implementation in service settings and achieve the expected outcomes, future steps are required, including appearance and content validation, as well as an evaluation of the Guide's effectiveness.

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NOTES

ORIGIN OF THE ARTICLE

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AUTHOR'S CONTRIBUTION

Study design: Silva DDM, Souza AA.

Data collection: Silva DDM, Souza AA, Marques JFM.

Data analysis and interpretation: Silva DDM, Souza AA.

Results' discussion: Silva DDM, Souza AA.

Writing and/or critical review of the content: Silva DDM, Souza AA, Ramos FRS.

Review and final approval of the final version: Souza AA, Ramos FRS.

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CONFLICT OF INTEREST

The authors declare there are no conflicts of interest.

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The dataset supporting the results of this study is not publicly available.

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