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Leadership Requirements for Successful Implementation of Lean Management in Health Care: A Systematic Review of the Literature

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Abstract

Lean is a management philosophy aimed at increasing value for end users by controlling waste. As such, it is a promising approach for health-care organizations to improve quality and control costs. Yet the transition to Lean management often fails in health-care organizations, commonly due to a lack of specific Lean leadership skills. This research addresses a gap in the knowledge about leadership requirements for successful Lean implementation in health-care organizations. A systematic literature search was performed using the MEDLINE, EMBASE and Emerald databases, resulting in the selection of 23 articles. Analysis of these articles confirmed the five Lean leadership principles identified in the manufacturing literature—improvement culture, self-development, employee training, going to the *gemba*, and *hoshin kanri*—and identified specific leadership behaviors, skills, characteristics, and attitudes for each principle. A sixth leadership principle, that of customer value, was also identified. This research contributes to existing Lean literature by providing new insights into leadership requirements for Lean transitions in health care. A new leadership framework is suggested for Lean leadership requirements during Lean implementation. In practice, this research provides health-care leaders with a practical framework and guidance with which to successfully implement Lean in a health-care institution.

Keywords: lean, leadership, healthcare, review, leadership skills

1. Introduction

Lean is a management philosophy aimed at increasing value for end users by controlling waste [1]. It is a promising approach with which health-care institutions can improve quality and control costs. Lean has been used successfully in manufacturing and other

industries to improve processes, increase end user satisfaction, and reduce costs. Yet the majority of health-care institutions engaged in Lean practices do not implement Lean management successfully [2–4]. Lean implementation often fails when organizations begin to use Lean initiatives without understanding the importance of leadership in successful implementation [2, 5]. Too often, Lean principles are equated with Lean tools and implementation falls short of the cultural and behavioral changes required for comprehensive Lean implementation [6]. Effective leadership, however, can bridge the gap between Lean tools and Lean thinking [2, 3, 6, 7].

No scientific consensus has yet been reached on the leadership requirements for Lean implementation in health care [4, 8]. Several important principles of Lean leadership have been identified for the application of Lean in manufacturing and other industries. However, health care differs notably from manufacturing and other industries in its revenue models, structure, and environment. It is not known whether the principles of Lean leadership that are established in manufacturing apply to Lean transitions in health care.

As more health-care organizations attempt Lean transformation, the need to define Lean leadership principles in the health-care setting has become acute. This research seeks to fill that gap through a systematic literature review on leadership requirements important for implementation of Lean management in health-care systems. The study addresses the following research question: what are the leadership requirements needed for successful Lean management implementation in health-care organizations?

To our knowledge, a systematic literature review of leadership requirements in Lean transitions in health care has not been performed. Thus, this investigation has both practical and theoretical applications for practitioners and academics concerned with Lean transitions in health care.

2. Theoretical background

Lean, developed by the Toyota Motor Corporation in the 1970s, is a management philosophy that focuses on creating value for customers by eliminating waste and improving flow in processes [1, 9]. Lean is both a continuous improvement approach and an overall philosophy; hence, it is sometimes referred to as “lean thinking” [1]. When implemented well, Lean results in increased operational efficiencies, quality, customer value, and profits [9].

Lean is radically different from traditional production methods, since it focuses on adding value from the customer’s perspective, as opposed to the volume-oriented approach of mass production methods. The core principle of Lean is the removal of steps that do not add value, also referred to as “waste” [10]. Womack and Jones [1] identified five principles of Lean manufacturing: (1) define value precisely from the perspective of the customer; (2) identify the entire value stream for each product family and eliminate waste; (3) make the remaining value-creating step flow; (4) design and provide what the customer wants only when the customer wants it; and (5) pursue perfection.

When followed, these five principles eliminated waste, added value, and facilitated continuous improvement by the use of an ongoing iterative process [2]. Radnor et al. [10] added less process variation and good working conditions as two key elements of waste reduction, leading to an inclusive definition of Lean as “a management practice based on the philosophy of continuously improving processes by either increasing customer value or reducing non-value adding activities, process variation, and poor work conditions”.

3. Lean in health care

Health-care organizations face significant challenges, including rising numbers of chronically ill patients, infectious and environmental diseases, and aging populations, coupled with increasing demand for quality and decreased funding [11–13]. Simultaneously, health-care costs are rising [11], partly due to high prevalence of chronic and infectious diseases that require long-term care [14]. Costly new technologies and drugs also contribute to rising costs [11].

Lean thinking may help health-care institutions address this challenging environment [1, 15, 16]. Kruskal et al. [17] found that successful implementation of Lean management leads to reduced waiting times, lower postoperative infection rates, fewer mistakes, and higher patient satisfaction scores. The basic principles and applications of Lean in health care have been investigated extensively, and leadership has been shown to play a decisive role in successful Lean transitions for health-care organizations [3, 4, 8, 12].

Lean leadership in manufacturing industries has been extensively studied and shown to be essential for successful Lean implementation in manufacturing organizations [2, 3, 6, 18, 19]. However, health-care organizations have different characteristics and operate in a different environment than manufacturing companies [20, 21]. Whereas most manufacturing companies generate money directly from their customers, health-care organizations garner revenue largely through third-party payments [20]. Manufacturing often concerns standardized processes constructed around the making of a standardized product [21]. In health care, “the product” is restoring health and function to ill and diseased people, resulting in complex processes and wide variation in the procedures that are required. These factors make health-care sector unique and highly complex [21]. Thus, Lean leadership in health care is expected to require different leadership principles than does manufacturing.

4. Research framework

This investigation takes as a starting point Dombrowski and Mielke’s [2] five leadership principles for successful Lean transitions: improvement culture, self-development, employee training, going to the *gemba*, and *hoshin kanri*. **Figure 1** depicts their framework visually. *Improvement culture* comprises leadership behaviors and attitudes that contribute to a continuous improvement process. Failure is seen as an opportunity for process improvement

and learning, rather than blame, and the root cause of the problem is sought. The leader acts as a role model, stimulating continuous improvement and allowing current processes to be constantly challenged [18, 22]. Employees are empowered to improve activities and processes, and the leader should listen to them carefully while developing rules that support a culture of effective improvement [23].

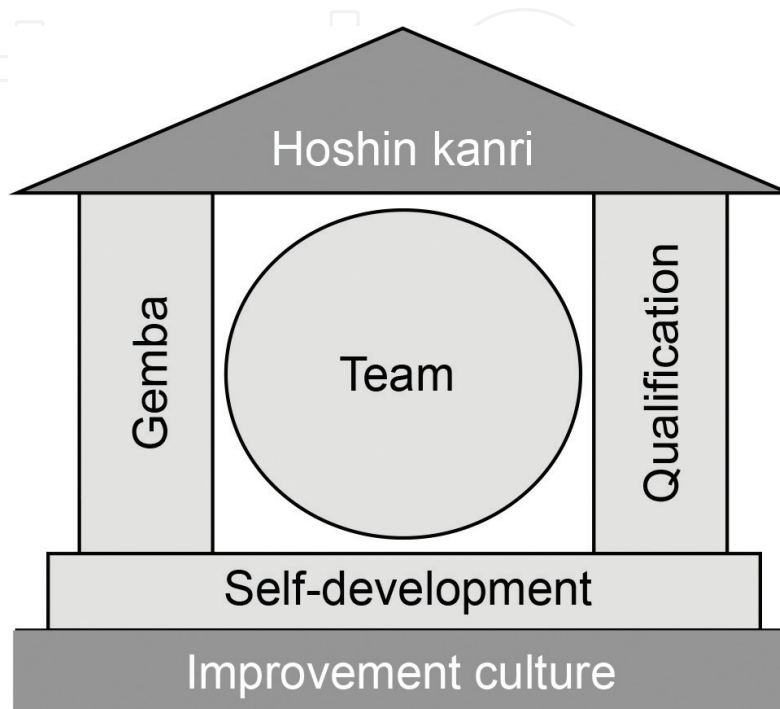


Figure 1. Research framework developed by Dombrowski and Mielke [2].

Self-development requires leaders to acquire new skills before teaching others about the Lean philosophy [24]. Self-development can be realized with the help of a *sensei*—a Lean coach who supports leaders involved in Lean transitions, often through short iterative learning cycles that are based on Plan-Do-Check-Act (PDCA) cycles [18]. The PDCA cycle, a central tenet of Lean, uses the scientific method to systematically assess and improve daily work; that is, developing a specific, measurable hypothesis about ways to improve a process, testing the hypothesis objectively, and standardizing any actions that lead to improvement [25]. The PDCA cycle is illustrated in **Figure 2**.

Employee training empowers staff to participate in the process of continuous improvement. Leaders encourage constant learning by inviting employees to solve problems. Leaders must also “go to the *gemba*,” sometimes referred to as “*gemba* walks.” The Japanese term *gemba* literally means “the real place” [22]. *Gemba* walks involve leaders going to the place where value is added, which is often the work floor. This enables Lean leaders to see possible errors and identify the root cause of problems. Direct observation helps leaders make the right decisions and shows their appreciation for the work done. *Hoshin kanri*, also known as target management or policy deployment, refers to a superior organizational vision that aligns all activities within an organization. In Lean organizations, improvement activities are often

decentralized. A shared organizational vision ensures that improvement activities of individual departments move in the same direction and work towards a shared goal. In *hoshin kanri*, all PDCA cycles in the organization are aligned.



Figure 2. The Plan-Do-Check-Act Cycle.

5. Methodology

We conducted a systematic narrative review of articles concerning leadership of Lean implementation in health care. Initial inclusion criteria were English language articles published in a peer-reviewed journal in the years 2000–2016. A systematic search was conducted using MEDLINE (accessed through PubMed), EMBASE, and Emerald databases. Search syntax was developed based on the Lean health-care taxonomy developed by Brandao de Souza [8] (see **Figure 3**) and consisted of the elements “leadership,” “lean management,” and “health care.” These elements were translated into the search terms “leadership,” “lean transition,” “lean implementation,” “lean management,” “health care,” and “hospital” and combined into the following search syntax: “leadership”[All Fields] AND (“lean transformation”[All Fields] OR “lean implementation”[All Fields] OR “lean management”[All Fields]) AND (“health care”[All Fields] OR “healthcare”[All Fields] OR “hospital”[All Fields]). Three articles were added during a snowball approach for supplementary materials.

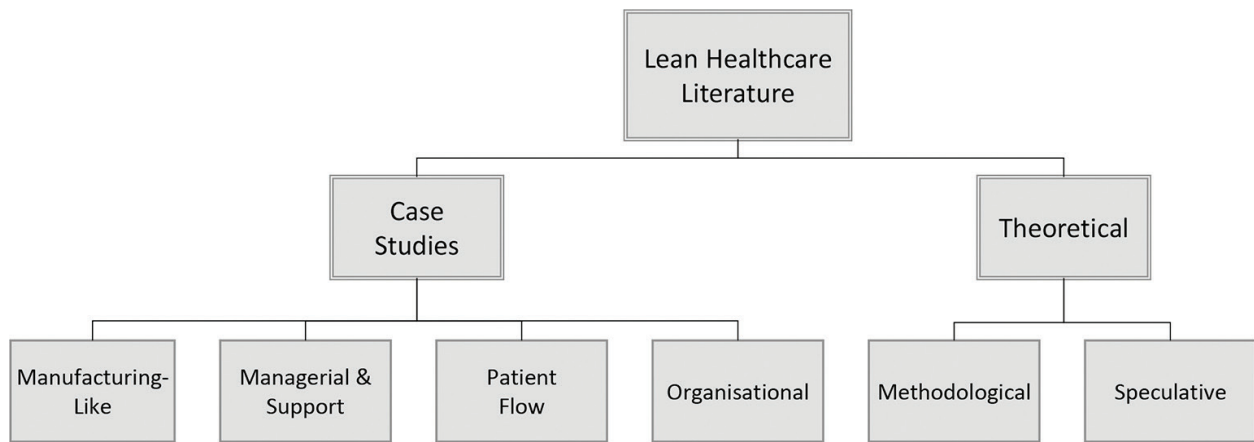


Figure 3. Lean health-care taxonomy developed by Brandao de Souza [8].

During the initial search, 136 articles were identified: 20 articles through MEDLINE, 91 through Emerald, 22 through EMBASE, and three through a snowball approach. Eighteen duplicate articles were excluded, and two articles were excluded because the full text was not available online. The titles and abstracts of these 118 articles were screened according to the Prisma guidelines for reporting reviews and meta-analyses (<http://prisma-statement.org>). Articles were excluded if they did not cover Lean management in health care or describe the role of leadership in Lean implementation [8]. Case studies as well as theoretical articles were included, whereas speculative articles were excluded. A full-text review was performed in cases where the title and abstract did not address inclusion or exclusion criteria. Ninety-three articles were excluded that did not meet the inclusion criteria. The final review included 23 papers. Figure 4 shows the procedure of article selection. Table 1 shows the full list of inclusion and exclusion criteria.

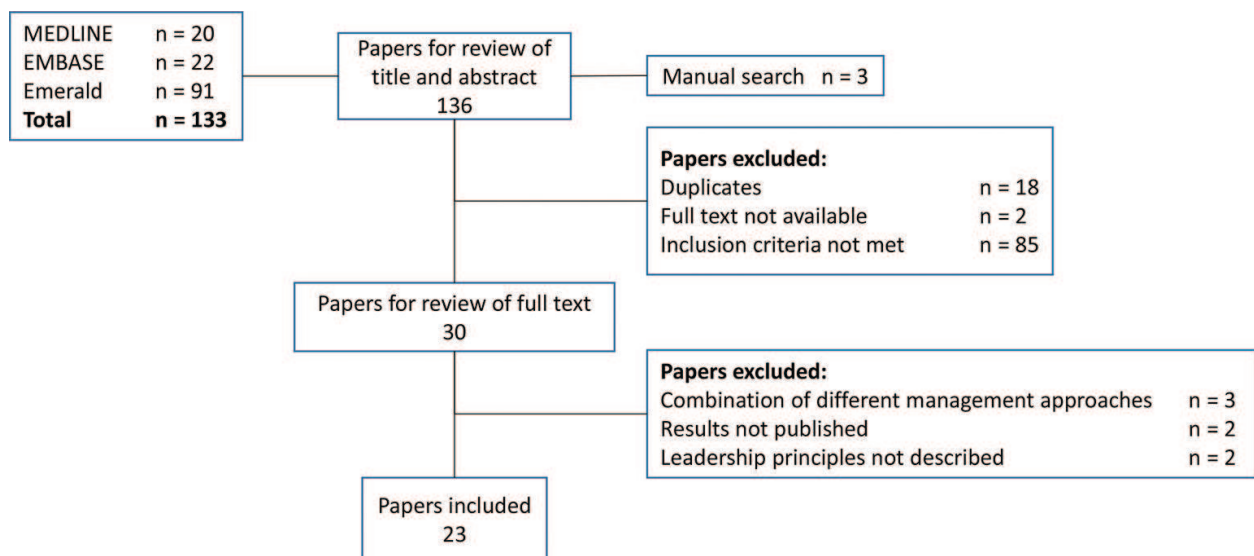


Figure 4. Article selection process.

Inclusion criteria	Exclusion criteria
Published January 2000–January 2016	Article written before January 2000
Article concerns Lean management in the health-care industry	Article does not cover Lean management in health care
Article describes the role of leadership in Lean implementation	Article does not describe the role of leadership in Lean implementation
The article is peer reviewed	Grey literature; theses and dissertations
English articles	Language other than English
Methodological, manufacturing-like, managerial and support, patient flow and organizational articles	Speculative articles

Table 1. Inclusion and exclusion criteria.

Thematic analysis was used to code these 23 papers based on leadership principles important for Lean implementation identified by Dombrowski and Mielke [2]: improvement culture, self-development, training, *gemba*, and *hoshin kanri*. These principles were used as the starting point for the coding process. For each principle, relevant behaviors, skills, and attributes were identified, conceptualized, and applied to health care.

6. Results

The 23 studies retrieved are summarized in **Table 2**. Although all research teams involved in these studies collected qualitative data, both qualitative and quantitative analyses were performed and are presented in these articles. Of the 23 studies, eight were case studies, five were based on primary data collected via interviews, surveys, and other methods, five were literature reviews, four were descriptive, and one relied on content analysis. Analytical methods used to parse primary data included qualitative analysis of ethnographic data, grounded theory, exploratory and descriptive approaches, a multi-stage approach, content analysis, nonparametric statistical analysis, and comparative analysis.

Results confirmed the five principles of effective Lean leadership identified by Dombrowski and Mielke [2]. An additional principle, that of *customer value*, also emerged. For each principle, specific leadership behaviors, skills, characteristics, and attitudes were also identified.

7. Continuous improvement culture

In all 23 articles reviewed, creation of an improvement culture was identified as an important leadership requirement for Lean transitions in health care (**Table 3**). In an improvement culture, continuous improvement and change are everyday procedures executed by employees and leaders as they mutually strive for perfection [26–28]. Creating an improvement culture is essential for overcoming the challenge of increasing quality while reducing costs [28].

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
Aij et al., 2013	Semi-structured, in-depth interviews	The Netherlands; University Medical Center	31 medical, surgical, and nursing professionals	Provide insight into barriers and facilitators encountered in implementing Lean within clinical practices	1, 1.1, 1.2 2, 2.1, 2.2, 2.3 3, 3.1 4, 4.1 5, 5.1, 5.2	<ul style="list-style-type: none"> Quality of care score does not reflect entire patient experience and may be narrow in scope Exclusion of all hospitals reporting quality of care measures from 25 patients or fewer Followers who were knowledgeable about the hospital's management system were more likely to respond accurately than those who were not, a potential source of bias
Aij et al., 2015a	Online survey	USA	CEOs and followers in 3 groups of 3 hospitals: 3 high-performing; 3 low-performing; 3 Lean	Impact of leadership traits of CEOs on hospital performance in USA	1 2.1 3.2, 3.4 4, 4.1, 4.2, 4.3 5	<ul style="list-style-type: none"> Qualitative study, the purpose of which was to explore experiences of leaders in the implementation of Lean in a teaching hospital; further multiple center studies are necessary to show causal links Most outcome measures are self-reported and may be influenced by information or recall bias
Aij, 2015b	Qualitative, ethnographic	The Netherlands; University Medical Center	Lead author; 6 other medical professionals	Identify and define leadership requirements and traits that are important in supporting organizations through Lean transformation.	1 2, 2.3 3, 3.2, 3.4 4, 4.1, 4.3	<ul style="list-style-type: none"> Reflects the first author's learning experience in implementing Lean and may not reflect the experience of other leaders and other medical centers
Al-Balushi, 2014	Systematic review	English language to January 2012	170 peer-reviewed articles pertaining to lean	Determine readiness factors critical to application and success of lean operating principles in healthcare organizations through a review of relevant literature.	1, 1.1, 1.2, 1.3, 1.4 3, 3.4 4, 4.1 5, 5.1, 5.2, 6, 6.1, 6.2	<ul style="list-style-type: none"> Readiness factors identified are based on review of published literature, not empirical studies

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
Arnheiter, 2005	Qualitative comparative study	n/a	Available literature, critical analysis, experience of authors	To eliminate many misconceptions regarding Six Sigma and lean management by describing each system and the key concepts and techniques that underlie their implementation	1, 1.1 2, 2.1, 2.3 3, 3.1, 3.2 6, 6.1, 6.2, 6.3	<ul style="list-style-type: none"> Relies on available literature, critical analysis, and knowledge and professional experience of the authors, not empirical evidence
Burgess, 2013	Content analysis	English general acute-care hospitals	Annual reports & websites	To present findings related to how Lean is implemented in English hospitals	1 5, 5.1	<ul style="list-style-type: none"> Relies on annual reports, which may be incomplete, biased, and distorted Hospital managers may use but not mention Lean methods in report Treated extracts as straightforward Lean-implementation indicators without performing inter-rater reliability tests
Clark, 2013	Descriptive Literature review	n/a	Lean literature, including peer-reviewed and grey literature	Describe the application of lean management systems to laboratory medicine	1 3, 3.1, 3.3 4	<ul style="list-style-type: none"> Description based on available literature, including grey literature written by Lean advocates, not empirical evidence. Introduces bias.
Dannapfel, 2014	Case study	Östergötland county council, Sweden	Document analysis and interviews with key individuals including 4 CCO directors	To contribute to knowledge about dissemination strategies for Lean thinking throughout multiple health-care organizations	1, 1.1, 1.2, 1.3, 1.4 2, 2.1, 2.2, 2.3 3, 3.2 5, 5.1, 5.2, 5.3	<ul style="list-style-type: none"> Did not evaluate success of Lean dissemination strategy Compared dissemination strategies in different health-care systems: regional, national, one large hospital
Dibia, 2013	Literature review	n/a	Existing models/reports from case studies (English language)	Present the Lean "Leadership People Process Outcome" implementation method	1, 1.1, 1.2, 1.3, 1.4 2, 2.1 3, 3.1, 3.2, 3.3 5, 5.1, 5.2 6, 6.1, 6.3	<ul style="list-style-type: none"> Based on existing literature and case studies, not empirical research

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
Dickson, 2009	Case series	USA	2 academic and 2 community 4 EDs	Describe the effects of Lean on quality of care in 4 EDs	1, 1.1, 1.3 3, 3.4 4 6, 6.3	<ul style="list-style-type: none"> Attempts to evaluate a real process in an uncontrolled environment (ED cannot be rigorously controlled for experimental purposes) EDs included because they had adopted Lean, leading to selection bias Length of stay not a reliable indicator of improvements in patient flow
Ghosh, 2015	Qualitative data analysis; grounded theory	USA; 140-bed general hospital in medium -sized community.	Data on 18 process improvement cases	To examine empirically why a systematic problem-solving routine can play an important role in the process improvement efforts of hospitals	1, 1.1, 1.2 4, 4.1	<ul style="list-style-type: none"> Conducted in one hospital setting using highly contextualized data. Findings may not be similar in other settings
Goodridge, 2015	Qualitative, multi-stage approach	Saskatchewan, Canada	Key informant consultation; documentary review; 26 audiotaped and transcribed interviews with health region personnel; stakeholder workshop, team discussions	What changes in leadership practices are associated with the implementation of Lean? When leadership practices change, how do the changed practices contribute to subsequent outcomes?	1, 1.1, 1.3 2, 2.1, 2.2, 2.3 3, 3.2 4, 4.1 5, 5.2 6	<ul style="list-style-type: none"> Realist approach rests on assumption that programs are “theories incarnate” and operate in specific contexts, therefore not exactly replicable
Hwang, 2014	Extant literature review and case illustration	USA; Hospital in Midwestern city, pop 300,000	Exploratory/ descriptive study based on observation and follow-up interviews	To present a model that identifies and defines the Lean implementation key success factors in health-care organizations	1, 1.2 2, 2.1 3, 3.4 5, 5.1, 5.2, 5.3 6, 6.1	<ul style="list-style-type: none"> Model is based on review of existing literature and a case illustration, not empirical research Case study may not be replicable in other settings

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
Kane, 2015	Case study	USA; Menlo Park, CA, large teaching hospital	Description of Lean implementation in ED	Report outcomes related to implementation of the Stanford Operating System (SOS) in the ED and 2-year outcomes reported on throughput metrics and patient satisfaction.	1, 1.1, 1.3, 1.4 3, 3.4 4, 4.3 6, 6.1, 6.3	<ul style="list-style-type: none"> Study conducted in one large university-affiliated teaching hospital and may not be generalizable to other settings
Kaplan, 2014	Case study	USA; Seattle, WA	Reflection on Virginia Mason experience	Summarize what is needed for the “arduous” Lean journey and explore why Lean doesn’t work for everyone.	1, 1.1, 1.2, 1.3 1.4 2, 2.1, 2.2, 2.3 3, 3.1, 3.3, 3.4 4, 4.1 5, 5.1, 5.2, 5.3 6, 6.1, 6.2, 6.3	<ul style="list-style-type: none"> Reports on experiences at one large hospital and may not be generalizable to other settings
Kim, 2006	Descriptive study/ case study	USA; Large teaching hospital, Ann Arbor, MI	Lean literature; case study	Describe basic philosophy and principles of lean production methods and how these concepts can be applied in the health-care environment	1 2, 2.1 3, 3.1, 3.2, 3.3 5, 5.3 6, 6.1, 6.2, 6.3	<ul style="list-style-type: none"> Relies on review of available literature and four case illustrations, not empirical research. Central case illustrations at major university-based teaching hospital; results may not be generalizable to other settings
Kruskal, 2012	Descriptive study	n/a	Lean literature	Describe basic principles and tools of the Lean approach and show how these principles and tools can be applied to radiology operations	1, 1.3 2, 2.1, 2.2, 2.3 3, 3.2 4, 4.1, 4.2, 4.3 5, 5.1, 5.2 6, 6.1, 6.3	<ul style="list-style-type: none"> Focus on Lean implementation in radiology department, not organization-wide Explanatory approach to existing literature, not critical analysis or empirical research
McIntosh, 2014	Systematic literature review	n/a	Lean literature relevant to health care	Critically evaluate the impact of Lean practices on informing health-care policy	1, 1.1, 1.3	<ul style="list-style-type: none"> Does not engage with Lean concepts related to employee empowerment and training Relies on existing literature, not empirical research

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
Mutwiri, 2016	Case study	Saskatchewan, Canada	Reflection on Saskatchewan Leadership Program	Describe the development, implementation, and evaluation of the Saskatchewan Leadership Program	1, 1.1, 1.2, 1.3 2, 2.1 5, 5.1, 5.2	<ul style="list-style-type: none"> • Behavior change self-assessed through questionnaires and reports, not actions • Impact on bottom line not evaluated • Results were in one county-wide setting and not necessarily generalizable to other settings
Poksinska, 2013	Case studies	Not specified	5 case studies in organizations considered successful Lean organizations: 1 manufacturing, 1 municipal elderly care, 2 primary care centers, 1 hospital physiology unit	Contribute to better understanding of managerial practices and leadership in Lean organizations.	1, 1.1, 1.2, 1.3, 1.4 2, 2.1, 2.3 3, 3.1, 3.2, 3.3, 3.4 Connection between Lean leadership and transformational leadership	<ul style="list-style-type: none"> • Results from 5 case studies, including only one unit in one hospital, and may not be generalizable • Participant observations made at meetings, not on the work floor • Company documents may be incomplete and biased
Simon, 2012	Description; case study	USA; Boston, MA	Lean project at Beth Israel Deaconess Medical Center	Provide steps for conducting a Lean process improvement project	1, 1.1, 1.2, 1.1 2, 2.1, 2.2, 2.3 3, 3.2, 3.3 4, 4.1, 4.3 5, 5.1, 5.2 6, 6.1, 6.2	<ul style="list-style-type: none"> • Descriptive study, not empirical research • Case study from one large health system; may not be generalizable to other settings
Toussaint, 2013	Description	Not specified	Define Lean and present 6 principles of Lean management	Provide a template for health-care leaders to use in considering the implementation of the Lean management system or in assessing the current state of implementation in their organizations	1, 1.1, 1.2, 1.3 3, 3.1, 3.3, 3.4 4, 4.1 5, 5.1, 5.2, 5.3 6, 6.1, 6.2., 6.3	<ul style="list-style-type: none"> • Findings based on collective experience of authors, not empirical research

Study	Design	Location	Participants/ organization	Purpose	Effective lean leadership behaviors *	Key limitations
White, 2013	Systematic review	U.K.; NHS	Lean Healthcare and Productive Ward: RTC literature	Reviews the Lean Healthcare and Productive Ward: RTC literature and extracts reported effects and impacts experienced by employees who implement it.	1, 1.1, 1.3 3.2, 3.3	Findings based on review of published literature, not empirical study

*Leadership characteristics associated with successful lean transitions:

1. Improvement culture
 - 1.1. Demonstrate support
 - 1.2. Show interest
 - 1.3. Commitment and involvement
 - 1.4. Change hierarchical setting
2. Self-development
 - 2.1. Develop leadership skills and competencies
 - 2.2. Lead by example
 - 2.3. In-company learning
3. Employee training
 - 3.1. Employee development and empowerment
 - 3.2. Create a learning environment
 - 3.3. Enlarge leadership capacity
 - 3.4. Encourage employee empowerment as a tool to overcome resistance to change
4. *Gemba* walks
 - 4.1. *Gemba* walks as tool to increase problem-solving capacity
 - 4.2. *Gemba* walks as tool for employee training
 - 4.3. *Gemba* walks to contribute to continuous improvement culture
5. *Hoshin kanri*
 - 5.1. Formulate strategic agenda
 - 5.2. Communicate strategic agenda to employees
 - 5.3. Break down barriers between departments
6. Customer value
 - 6.1. Adding value
 - 6.2. Identify customer groups
 - 6.3. Adopt a patient-centered view

**Abbreviations: RTC, releasing time to care; NHS, National Health Service, UK.

Table 2. Synthesis of studies.

Leadership principle	Leadership requirement	No. studies*
Improvement culture		23
	1.1 Demonstrate support	16
	1.2 Show interest	11
	1.3 Commitment and involvement	13
	1.4 Change hierarchical setting	6
Self-development		
	2.1 Develop leadership skills and competencies	13
	2.2 Lead by example	6
	2.3 In-company learning	9
Employee training		19
	3.1 Employee development and empowerment	9
	3.2 Create a learning environment	11
	3.3 Enlarge leadership capacity	8
	3.4 Encourage employee involvement as a tool to overcome resistance and change	10
Going to the <i>gemba</i>		13
	4.1 <i>Gemba</i> walks as tool to increase problem-solving ability	10
	4.2 <i>Gemba</i> walks as tool for employee training	2
	4.3 <i>Gemba</i> walks to contribute to continuous improvement culture	5
Hoshin kanri		14
	5.1 Formulate strategic agenda	9
	5.2 Communicate strategic agenda to employees	11
	5.3 Break down barriers between departments (silos)	3
Customer value		12
	6.1 Adding value	10
	6.2 Identify customer groups	6
	6.3 Adopt a patient-centered view	8

*Number of studies in which principle or requirement was listed as a finding.

Table 3. Frequency of leadership principles and requirements.

Leaders should actively create a culture in which problems are seen as opportunities for improvement instead of failures [26, 27], and people should be seen as problem solvers, not as problems [29].

Four leadership behaviors and attitudes were linked to effective creation of an improvement culture: (1) demonstrating support to and interest in Lean; (2) expressing commitment to and

involvement in Lean; (3) showing an understanding of Lean concepts; and (4) changing the existing hierarchy [17, 30, 31].

Findings from 16 studies indicated that leaders should demonstrate strong personal and visible support for Lean, including support for the person implementing Lean practices, and show interest in the Lean process. Visible and sustained support of health-care leaders is essential to encourage all staff to initiate and participate in improvement activities [30]. Likewise, leaders must openly communicate about improvement with staff [31].

Ten articles showed a need for strong commitment in the leadership team, and their full involvement, for a successful shift to an improved culture. In an analysis of the use of Lean in the emergency department in four US hospitals, Dickson et al. [32] found that leadership commitment was an important requirement for developing a culture of improvement. Leadership commitment also appeared to be an important factor in long-term sustainability of Lean [30]. In a systematic review of employee experience in Lean health, White et al. [31] identified active sponsorship and personal involvement of top-level executives, especially the chief executive officer, as key factors for successful Lean implementation.

Five research teams emphasized the importance of changing the hierarchical structure often present in health-care organizations. Al-Balushi et al. [30] clearly articulated this culture and the paradox it presents for Lean transformation. In many health-care systems, administrators rank above doctors, doctors rank above nurses, and nurses rank above other staff. Health-care professionals often experience difficulty accepting suggestions from employees lower in the hierarchy. In their review of five Lean transformation case studies, these authors found that nurses and doctors have the most difficulty with cultural and hierarchical change. In contrast, Lean thinking relies on the experience and knowledge of front-line workers and the equal involvement of all employees in creating high-value processes. Support, interest, and involvement from top management for Lean implementation are essential in overcoming resistance to change [30, 33–35].

8. Self-development

Leader self-development emerged as a central requirement for Lean transitions in health care, with 13 research teams identifying it as a core principle. To successfully lead Lean transitions, health-care leaders need to develop new skills and competencies in Lean [26, 35, 36]. Mutwiri et al. [36] identified specific skills and competences including awareness of one's own strengths, vision, and abilities. Leaders need to develop these personal capabilities and demonstrate character so that they may effectively manage others and address the dynamics of change. Likewise, leaders need to have a deep understanding of Lean principles before beginning the Lean implementation process [35].

Of the skills and competencies identified, excellent communication skills were most frequently mentioned. In a Lean organization, leaders need to communicate with people at all organizational levels, including top managers, project team managers, clinicians, and other employees [37]. Aij et al. [27] also found that modesty is an essential leadership characteristic

for successful transition. Leaders in their study who had a modest attitude and were able to express concerns and uncertainty established stronger relationships with employees, encouraging the same behaviors in employees. Leaders who showed modesty and vulnerability also helped to shape a culture of improvement that allowed concerns to be raised more easily.

Taken together, six articles in this review show how health-care leaders must function as role models during Lean transitions. Executives and other managers can act as effective role models by showing commitment and support throughout an implementation process. Finally, in nine studies, in-house training and education in Lean were found to be essential for health-care leaders.

9. Employee training

In 18 studies, employee training was identified as important or essential for successful Lean management transitions in health care. Senior management is responsible for development and empowerment of the workforce, so that employees can actively participate in the Lean improvement process [17, 27, 30, 35, 38]. Training should be embedded in the organizational culture through an iterative process of retraining and feedback [35]. Four components comprise the training of employees: (1) development and empowerment; (2) creating a learning environment; (3) increasing leadership capacity; and (4) empowering employees to overcome resistance to change.

Employee development and empowerment are the foundation of an improved culture: employees identify and resolve procedural problems, the health-care organization adopts an innovative mind-set, and an attitude of continuous improvement develops. Health-care leaders foster employee development and empowerment by providing the means and time for training of employees in Lean principles [28, 30, 39] and by acknowledging employees' insights [35]. When employees are empowered to solve problems, both the organization and patients benefit from their front-line expertise and knowledge [35, 38]. If employees experience the positive consequences of their problem solving, they are likely to continue and further improve this behavior.

The findings of 11 studies suggested that employee empowerment and education are fostered when leaders create a learning environment that supports the iterative and ongoing process of Lean management. Lean leaders create a learning environment by providing an appropriate structure, removing obstacles, and providing resources. In their investigation of the impact of leadership traits of executives on hospital performance in the United States, Aij et al. [26] found that employees at high-performing Lean hospitals perceived successful managers "as those who both deliver results and create a learning environment to help their employees in self-discovery". Likewise, employees at Lean organizations were significantly more likely to agree that "when things do not go according to plan, the manager's job is to develop corrective action in a learning environment". Other investigators found that leaders

who create effective learning environments shift roles, becoming coaches and mentors rather than being controlling “bosses” [31, 35].

Employee training must include leadership skills, especially for employees actively involved in Lean transition [31]. In addition, leaders should commit to practicing and coaching the PDCA cycle [28]. With training and support, employees can emerge as leaders, capable of identifying and solving problems on their own. In this environment, managers facilitate problem solving and manage employees rather than solving the problems themselves [31]. Likewise, empowerment is one of three key leadership principles crucial for effective Lean transition as identified by Aij et al. [26] Several authors identified resistance to develop a culture of improvement to be a barrier to effective Lean implementation [27, 30, 32]. Further, eight studies showed that employee empowerment can help overcome resistance to Lean implementation. Lean leaders should trust their employees with responsibility and include them in decision making, creating mutual trust between management and employees [26, 28, 30].

10. Gemba walks

Of the 23 articles reviewed, 11 identified “going to the *gemba*” or “*gemba* walks” as an important principle of Lean leadership in health care. The concept of *gemba* emerged as a core principle for effective Lean leadership. Findings suggest that leaders who regularly use *gemba* walks increase an organization’s problem-solving capacity, provide opportunities for employee training, and contribute to developing a culture of continuous improvement. Frequent *gemba* walks can also help to break down individually functioning units, or silos, as leaders must leave their “ivory towers” to visit the work floor.

Leaders who go to the *gemba* contribute to the organization’s problem-solving capacity [27]. When leaders visit the work floor, they can assess current work processes, identify possible errors and inefficiencies, and identify root causes of error or waste. This first-hand information helps frame effective decisions and solve recurring problems [17]. During *gemba* walks, health-care leaders can ask their staff for solutions, empowering them directly to solve problems [17]. Aij et al. [39] found that most employees wanted leaders to be present more frequently and concluded that daily presence of leaders on the work floor was a key factor in successful Lean implementation. Aij et al. [27] likewise confirmed the importance of *gemba* walks in their ethnographic case study of Lean leadership in a Dutch university medical center. All interviewees said they were able to solve problems more quickly and easily as a result of *gemba* walks. *Gemba* walks allow employees and managers to experience problems from the same point of view and work together to develop solutions.

Gemba walks can help health-care leaders provide opportunities for spontaneous, ongoing training of employees [17]. Aij et al. [26] described *gemba* walks as a tool for health-care leaders to solve problems in close cooperation with employees. Problems can be addressed and employees empowered while all-important stakeholders are together on the work floor.

In their study, *gemba* walks seemed to work best with small, uncomplicated problems, as opposed to complex ones.

Finally, *gemba* walks contribute to a culture of continuous improvement [17, 26, 29, 34]. By physically going to the work floor, health-care leaders can show support, interest, and commitment [30, 32, 34]. Simon and Canacari [29] identified *gemba* walks as an important strategy for direct observation and process improvement.

11. Hoshin kanri

Hoshin kanri is the principle of strategy and alignment. In 12 studies, research teams found a clearly communicated strategic agenda and a clear vision and mission statement to be highly important for successful Lean transition. The principle of *hoshin kanri* was enacted by leaders in three ways: (1) formulating a strategic agenda; (2) communicating that strategic agenda to employees; and (3) breaking down barriers between departments.

Ten studies demonstrated the importance of the leadership's ability to formulate a strategic agenda—including strategic goals, mission statement, and vision—and to align the steps of Lean implementation with that agenda. Aij et al. [39] also identified that a clearly formulated strategy facilitates Lean implementation. Al-Balushi et al. [30] noted that the strategic agenda should focus on actions required to achieve Lean objectives and create a learning organization. These findings are reinforced by those of Kruskal et al. [17], who noted that the iterative and ongoing process of Lean management requires the responsiveness of a learning organization. Clark et al. [28] proposed that the PDCA cycle be incorporated into the strategic agenda, and leaders should be skilled at using it. Hwang et al. [37] also emphasized the importance of the PDCA cycle in reducing costs and increasing both patient and employee satisfaction. They point out that increasing quality does not necessarily need to result in higher costs, correcting a common misperception about Lean implementation.

The ability to communicate the strategic agenda and its alignment with Lean goals, mission statement, and vision to employees emerged as a key leadership behavior in 10 studies. For instance, in a review of Lean literature, Al-Balushi et al. [30] found that employees of health-care organizations were more willing to accept the changes that Lean required of them when a long-term policy of Lean implementation was clearly communicated to them in the strategic agenda.

Six studies proposed that the organization-wide strategy, vision, goals, and objectives should be clear and known to everyone within the health-care organization. In their investigation of Lean implementation in a large US hospital, Hwang et al. [37] identified sharing goals and processes among managers, professionals, and other employees as a key success factor. Leaders who provide clear targets, they found, help the organization overcome the uncertainty and ambiguity of the initial Lean implementation phase.

Health-care organizations, especially hospitals, are often fragmented into several individually functioning units, or silos, that operate autonomously [12, 39]. Aij et al. [39] and Kaplan

et al. [35] identified these silos as a major barrier to Lean implementation. Effective Lean leaders break down these walls between departments [12, 30, 35]. Sustainable Lean implementation requires improved flow, both internally and across the organization [12, 30]. To overcome the problem of silos, Lean leaders must adopt an end-to-end view, often referred to as the “complete patient pathway” [30].

12. Service user value

A sixth leadership principle for successful Lean implementation was identified in this investigation: adding end user value. In 12 studies, findings indicated that health-care leaders’ ability to accurately identify customer value and waste is essential for a successful Lean management. Effective leaders live out the principle of customer value in three ways: (1) adding value by reducing waste; (2) identifying customer groups; and (3) adopting a patient-centered view.

Successful Lean leaders enact the principle of customer value by taking steps to identify and eliminate waste, as demonstrated in 10 studies. In Lean, waste is defined as all activities across the entire value chain that do not directly contribute to creating value [29]. When waste is eliminated, quality of care can be improved, costs reduced, and patient flow made efficient [9]. Simon and Canacari [29] emphasized that leaders must understand and identify waste for a successful Lean transition to occur. Waste is often deeply integrated with organizational culture and viewed by employees as “part of the way we work here.” Likewise, Toussaint and Berry [38] described value in health care as “few medical errors, fewer nosocomial infections, less nursing time away from the bedside, faster operating room turnover time, improved care team communication about patients and faster response time for emergent cases.” In addition to identifying waste in the value stream, senior management must communicate the added value of Lean clearly to their employees [30].

Lean leaders enact the principle of customer value by identifying customer groups across the organization [9, 12, 29, 30, 35, 38]. A patient’s value chain starts when he or she first enters the health-care organization [29]. Yet adding value does not only concern patients, who are the external stakeholders; internal stakeholders are also considered customers [29, 30]. Internal customers are employees in departments that are “customers” —that is, use the services of—other internal departments. For example, the operating theater is an internal customer of the central processing department, which supplies the instruments and equipment. Leaders should strive to optimize all value chains, adding value for internal as well as external customers. Correct determination of customer groups also allows leaders to assess value of work. Al-Balushi et al. [30] found that employees and leaders in health-care settings often have difficulties attributing the right customer group to a given improvement; adding value to a wrong customer group, they concluded, is a major cause for failure of Lean implementation in health care.

Adopting a patient-centered view is the third way in which effective leaders abide by the principle of customer value [9, 12, 17, 32–35, 38]. By examining processes from the patient’s perspective, Lean leaders can better identify and address waste—for instance, time spent in a waiting

room. Kaplan et al. [35] emphasize the importance of “unrelenting focus on the patient” (p. 3) in achieving Lean implementation. From the patient’s perspective, health care can be conceived as a balance of benefits versus burdens, according to Toussaint and Berry [38], with burdens being widely defined to include cost, health outcomes, and perceptions of the health-care experience.

13. Discussion

This systematic literature review provides insight into leadership requirements for effective Lean transitions in health care. It confirms the five Lean leadership principles identified by Dombrowski and Mielke [2] and identifies specific leadership behaviors for each principle. Additionally, we identified a sixth leadership principle of customer value, as well as specific leadership behaviors to support that principle.

Based on these findings, a new conceptual model is proposed in which all six leadership principles identified in this research are incorporated. **Figure 5** depicts the adjusted model of the Lean “house” proposed by Dombrowski and Mielke [2].

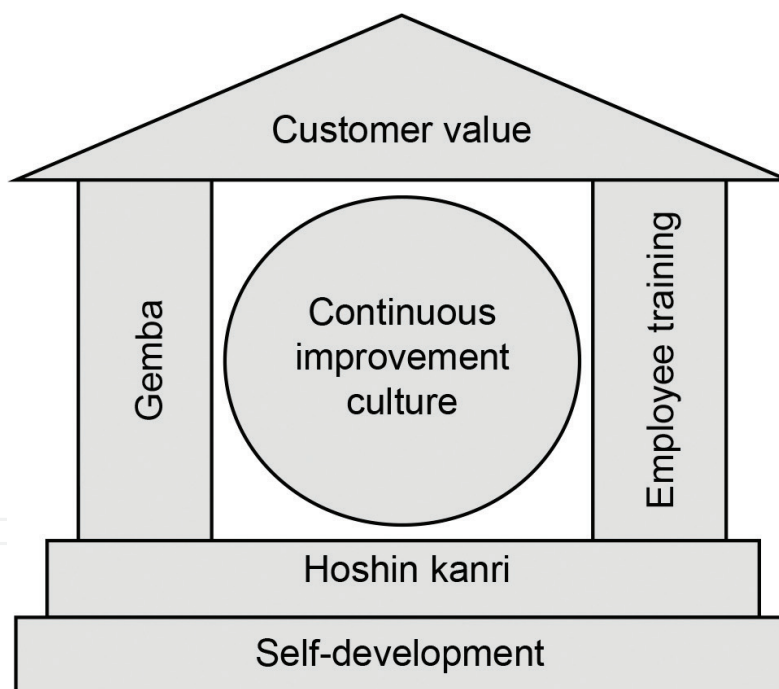


Figure 5. Updated framework for leadership principles in health care.

Notably, self-development of leadership lies at the base of this model. To lead a Lean transition effectively, health-care executives must undergo a change in mindset and gain the required skills. Furthermore, they need to obtain a comprehensive and all-inclusive understanding of Lean, including Lean tools and use of Lean as a management philosophy. In this model, *hoshin kanri* rests on top of leadership self-development. Leaders must align all required changes for Lean implementation with the health-care organization’s strategy. To overcome

resistance to change, this strategic agenda must be clearly communicated with the employees and a shared vision developed. Together, self-development and *hoshin kanri* can form a stable base from which Lean management can be implemented.

The pillars of the Lean house comprised “going to the *gemba*” and training of employees. Both can be seen as tools to facilitate Lean management implementation in health care. Health-care leaders should foster employee development by creating a learning environment and empowering staff. These actions enlarge the leadership capacity and facilitate accurate identification of customer value within the organization. Going to the *gemba* enables health-care leaders to assess the current state of work, to identify possible errors and inefficiencies, and to explore the root cause of problems.

The culture of continuous improvement is at the center of the Lean house. This culture constantly challenges all processes in the Lean organization and fosters improvement. Leaders need to keep developing themselves, keep challenging organizational mission and vision, continuously foster employee education and empowerment, visit the work floor frequently, and hone and share the organization’s strategic agenda. Customer value forms the roof of the house. All other elements of the Lean house support the goal of Lean management: value creation for customers through waste reduction.

These leadership principles are highly interrelated and cannot be seen as independent actors. They do not necessarily describe sequential steps in the process of Lean implementation. Further research is needed on whether it is possible to develop this into a model in which sequential steps of the implementation process can be described.

14. Strengths and limitations

Strengths of this research include the all-inclusive framework used to investigate Lean leadership and to identify specific behaviors, skills, characteristics, and attitudes, leaders can use to support sustainable Lean implementation. This differs from previous research, which often focuses on certain features or leadership principles.

However, this research has several limitations. Only literature concerning Lean management in health care was included. Successful Lean leadership principles in other industries could also have provided valuable insights into Lean management implementation in health care. Findings are limited to a review of published literature, not empirical research. The quality, design, and size of the studies in this review varied greatly, which could affect the validity, reliability, and generalizability of these findings.

15. Directions for future research

Empirical research is needed to validate the findings of this investigation. Leadership principles identified here need to be validated in all types of health-care organization and in multiple cultural and social settings. In addition, future research should investigate whether

adding value for internal customers in Lean contributes to overall improvement. No scientific consensus exists on whether value should only be added for external customers (patients) or whether value should also be added for internal customers. Since adding value is one of the basic principles of Lean management, evidence is needed to determine what kind of value can be given to each type of customer.

16. Conclusion

This research sheds light on six important leadership principles and their practical applications for health-care leaders in organizations making the transition to Lean management. A new conceptual framework is proposed that shows the interrelation of these six principles in Lean implementation in health care. The conceptual model can be used as a framework for health-care leaders to implement Lean management in their organizations.

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