

Implementing a Lean Management System in Primary Care: Facilitators and Barriers From the Front Lines

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Background: Although Lean management techniques are increasingly used in health care to improve quality and reduce costs, lessons about how to successfully implement this approach on the front lines of care delivery are not well documented. In this study, we highlight key facilitators and barriers to implementing Lean among frontline primary care providers. **Methods:** This case study took place at a large, ambulatory care delivery system serving nearly 1 million patients. In-depth interviews were conducted with primary care physicians, staff, and administrators to identify key factors impacting Lean redesigns in primary care. **Results:** Overall, staff engagement and performance management, sensitivity to the professional values and culture of medicine, and perceived adequacy of organizational resources were critical when introducing Lean changes. Specific drivers of change included empowerment of staff at all levels, visual display of performance metrics, and a culture of innovation and collaboration. Barriers included physician resistance to standardized work, difficulty transferring management responsibilities to non-physician staff, and time and staffing required for participating in improvement efforts. **Conclusion:** Although Lean offers a new approach to delivering care, the implementation process itself is both complex and crucial to success. Understanding early facilitators and barriers can maximize Lean's, potential to improve health care delivery.

Key words: delivery systems, implementation, Lean management, primary care redesign, qualitative research

The US health system faces increasing pressure to deliver higher value and more affordable care to a rapidly growing patient population. With these challenges comes an opportunity for health care organizations to discover and adopt solutions that have proven successful in other industries.¹⁻³ Originally developed in auto manufacturing to increase product quality and throughput,^{4,6} the Lean management system offers a promising approach to meet current demands in health care. Rather than a single prescription for management action, Lean is a varied set of organizational principles, practices, and problem-solving tools that ultimately aim to improve efficiency and quality.⁷ When implemented fully, it is intended to be a whole-system transformation of work processes that can also be used to address many of today's health care challenges.

Although still relatively new to the health care sector, Lean has shown early benefits in achieving quality and financial targets.^{8,9} Organizations using Lean have reduced patient wait times, hospital length of stay, and

costs associated with excess inventory and administrative overhead.¹⁰⁻¹⁹ In addition, Lean techniques have enabled increases in scheduling efficiency and productivity through redirected use of personnel.^{9,11,12,20} Most studies to date have been conducted in hospital or capitated outpatient settings rather than in ambulatory fee-for-service (FFS) environments where the vast majority of health care is delivered.^{15,21-25} Moreover, most organizations have used Lean tools narrowly to achieve isolated "pockets of best practice" rather than as a basis for system-wide change.²⁶⁻³¹ As a result, there are few accounts of the complex process of implementing Lean as a fully integrated management system, particularly among less tightly integrated delivery systems where incentives are not well aligned.

This study adds to our understanding of key facilitators and barriers of Lean transformation in a mainly ambulatory FFS care delivery system. Because of the professional complexity of medicine, application of Lean methodology as developed in other industries may encounter unique challenges in health care.³² Anticipating these challenges early on maximizes the potential for successful implementation and optimization of outcomes. This study examines factors affecting Lean implementation on the front lines of primary care delivery, with practical recommendations for organizations attempting similar change.

METHODS

This study was conducted in a large, not-for-profit, ambulatory care delivery system serving nearly 1 million patients in California. The payer mix for patients is approximately 70% commercial FFS, 12%

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commercial health maintenance organization, 13% Medicare/Medicaid, and 5% self-pay or other form of payment. In response to external market pressures for greater affordability and competitiveness in pricing, the organization adopted the Lean management system as a way to improve quality and operational efficiencies. Specific challenges included the need to decrease operating costs in order to lower prices and offset losses incurred by certain patient populations, while preparing for increasing patient volumes due to passage of the Affordable Care Act. Adoption of Lean was planned as a system-wide transformation, with redesign of clinical operations beginning in the area of primary care.

Lean redesigns in primary care began with standardizing equipment and educational materials in all patient examination rooms. Physician and medical assistant (MA) care team dyads were also physically co-located in a shared workspace, facilitating more efficient communication and continuous workflow. New standardized work processes were designed to optimize the flow of patients during clinic hours. These new work processes and redesigns included visual display of performance metrics; daily huddles between care team dyads to review patient schedules; increased MA responsibility over managing workflows as a newly designated "Flow Manager"; agenda setting with patients by the MA at the start of each visit; and shared management of physician electronic in-baskets containing patient messages, laboratory and imaging results, prescription refills, and referral requests. When these processes are implemented well, care teams are described as being "in-flow." Finally, call functions were redesigned to enable more efficient management and triage of patient calls.

In-depth interviews and focus groups were conducted among 34 primary care physicians, staff, and site leaders in a clinic location that was the first in the system to pilot Lean redesigns. The pilot site is a multispecialty clinic, with specialties ranging from allergy/immunology to general surgery, and provides care to approximately 86,000 patients. The patient demographic of this clinic is reflective of the surrounding community, with a median age of 37.3 years and 25.7% identified as white/Caucasian, 3.5% black or African American, 51.5% Asian and Native Hawaiian/Pacific Islander, 14.8% Hispanic or Latino, and 4.5% other race.³³ For this study of Lean redesigns in primary care, interviews focused on 3 clinical departments—Family Medicine, Internal Medicine, and Pediatrics—which employed a total of 45 physicians across the 3 departments.

Interview participants were identified for this study using purposeful and snowball sampling techniques.³⁴ All clinic site and primary care department leaders were initially contacted by members of the research team and asked to participate in one-on-one interviews. These were followed by additional focus groups with MAs and in-depth interviews with frontline physicians in primary care. All data collection activities were approved by the organization's institutional review board.

Participation was voluntary, and written informed consent was obtained prior to the start of each interview or focus group. Audio-recorded sessions lasted approximately 60 minutes and were transcribed verbatim by a professional transcription service. Semistructured interview guides were used to elicit perceptions of the Lean initiative, the context surrounding Lean activities such as organizational culture and the nature of local leadership, how specific redesigns impacted daily work, and major factors affecting the implementation and sustainment of new workflows.

All transcripts were entered into Atlas.ti software for qualitative data management and analysis. Transcripts were analyzed and coded using an inductive approach, which began by attaching summary labels to segments of text, followed by iterations of labeling that resulted in robust and theoretically grounded codes.³⁵⁻³⁷ To ensure reliability, we engaged in independent parallel coding, where another researcher independently coded randomly selected transcripts.³⁸ In this validation stage, particular attention was paid to factors impacting Lean implementation including those identified in the initial coding scheme. Any discrepancies were then discussed and reconciled. Codes were grouped together around clusters of themes, which resulted in broader conclusions about Lean as experienced by frontline care providers.

RESULTS

Facilitators and barriers of implementing Lean in primary care are categorized under 3 main themes: (1) leadership engagement of staff and management of performance metrics; (2) sensitivity to professional values and the culture of medicine; and (3) perceived adequacy of organizational resources to fully support the change effort. These 3 thematic groupings were developed inductively based on data analysis (Table 1).

Staff engagement and performance management

Respondents described a number of leadership activities that were critical to implementing Lean. This included engaging staff at all levels in the change effort and managing frontline performance using visual displays that are embedded in daily clinic operations.

Engaging and empowering staff

During the early stages of Lean implementation, interviewees stressed the importance that leaders solicit input from staff at all levels of the organization. This was frequently associated with a core principle of Lean thinking, which emphasizes respect for people and their knowledge of frontline work processes. An early message communicated by leadership that "everyone is an expert" resonated in a meaningful way with those interviewed. As one manager observed, "The way we should be looking at [improvement] is upside down . . . where we get the most value and the most education are from the frontline staff." Another noted the change in perspective that Lean brought:

Table 1. FACILITATORS AND BARRIERS OF LEAN IMPLEMENTATION IN PRIMARY CARE

	Lean Implementation	
	Facilitators	Barriers
Frontline engagement	Solicitation of expertise and input from all organizational members	Management-driven change
	Visual display of daily progress on performance metrics	Inadequate data collection or lack of visibility of progress
Professional values and culture	Partnered dynamic between physicians and medical assistants	Physician resistance to work standardization
	Culture of innovation, collaboration, creativity Provider-identified opportunities for continuous improvement	Difficulty transferring responsibilities to medical assistant as Lean "Flow Manager"
Organizational resources	Rapid training sessions to minimize time away from patient care	Lack of time for training, for absorption of new ideas
	Follow-up coaching to reinforce changes made	Staffing, cross-coverage of patient care during Lean improvement events

The people that we heard the most from, and that we really took their suggestions, were from the frontline staff. It was amazing. I don't think that we had ever done that in the organization before, so it was really powerful to hear from them.

Thus, solicitation of feedback from staff at all levels was viewed not only as a facilitator but also as a powerful driver for implementing Lean due to its inherent principles and values.

Engaging with performance metrics

Managing frontline performance using a range of metrics is central to another core principle of Lean, which is the pursuit of continuous improvement. This activity relies on regular measurements to establish a baseline by which progress can be continuously compared. For this purpose, managers frequently expressed the need for better data collection, with corresponding visual display of performance metrics posted in all work areas. This technique is known more formally in Lean terminology as the use of a "daily management" or "daily engagement" system. Eight of the 12 leaders interviewed noted that linking this system to frontline performance metrics was critical to sustaining redesigned work processes. As one site leader explained:

The daily management of it is important. . . . You can't assume that the process is stable. You have to manage to it and round on it, and you have to ask the direct questions regarding [Lean] workflow. It can't be, "How's it going?" It needs to be visible, "Are you in-flow? If you're not, why not, and how can we get you in-flow? What do you need?"

Many of the staff also believed that having this system directly tied to metrics would be effective in holding care teams accountable. According to one staff member, "Making performance visible is really key to the daily engagement system. I think this is a big part

of what Lean is—having everything visible and making visible how you perform."

Professional values and culture

Many respondents noted that Lean and its approach to organizing work may pose potential challenges for the medical profession due to its traditional values and the prevailing culture of medicine. Specific areas of difficulty involved not only Lean's focus on standardization as a means to enhance efficiency but also the elevated role of MAs as Lean "Flow Managers." Despite these challenges, an organizational culture of innovation and collaboration was believed to provide a more conducive environment for Lean changes.

Standardizing care

As one of the major components of Lean redesign, standardizing work processes to promote a higher level of care quality was difficult for physicians to accept. For a profession that has historically valued the practice of medicine as an art form, Lean was perceived as decreasing physicians' abilities to tailor their practices to the needs of patients. According to one physician,

You're trying to standardize to bring up the lower level, but at the same time, I think you're decreasing individuality. All the rooms are standardized, which is fine, but then certain doctors may have certain handouts they like to use or things on the wall they can't use because of standardization, so it does cut back on individuality and style . . . some doctors and patients may not like that.

The threat was so deep that 4 leaders noted the possibility of physicians eventually leaving the organization rather than succumbing to the new Lean standards. As one administrator speculated, "We're going to lose some doctors because they're going to feel like they can't practice medicine the way they feel is right." Yet, there was also recognition of the difference between caring for patients as a solo practitioner and caring for patients in the context of group practice. To that

end, leaders and physicians alike specifically acknowledged the trade-off of sacrificing individuality to achieve more collective standards of quality. As one physician summarized,

It's always a struggle to standardize because you're going to lose something you really want, but I think as far as getting the clinic ahead and really improving everybody's [clinical quality] scores and patient satisfaction, I think that standardization is inevitable.

Increasing the role of MAs as Lean "Flow Managers"

Another way that Lean aims to achieve efficiency is through more even distribution of work responsibilities. In this study organization, another major aspect of Lean redesign centered on the relationship between the physician and the MA. According to a Lean model of care delivery, the physician-MA dyad increasingly share work responsibilities to improve patient flow. As newly designated Lean Flow Managers, MAs are made responsible for managing tasks that previously fell under the physician's leadership. With this new arrangement, physicians must inevitably cede some control over their workflow to MAs, which can be challenging insofar as it differs from a more traditional dynamic between the two professional roles. As one interviewee noted:

I've been trained as a physician to think independently because I'm being held accountable legally for the work that I do. I put my name to this patient. . . . But we're being asked to give up some of that responsibility and trust to your medical assistant.

This Lean approach tends to create a more egalitarian relationship between physicians and staff and is not without challenges. According to one staff member, "Maybe it's just the hierarchy of things, and although part of the Lean work is to flatten that hierarchy, I think there's always the feeling that it's not equal [between doctors and MAs]." Fostering a more partnered work dynamic—while managing concerns regarding role appropriateness and potential liability—presents continuing challenges.

Fostering a culture of innovation and collaboration

Despite these obstacles, respondents strongly suggested that a culture valuing innovation and collabora-

tion is key to successful transitions to a Lean system. Some terms used to describe aspects of the organizational culture that facilitated Lean were "collaborative" and "creative." The organization as a whole had historically encouraged employees to identify ways that they could improve quality and efficiency, which participants noted had helped set the stage for a smoother introduction to Lean changes. As one interviewee remarked: "I think that the most important thing is the engagement and the belief in [continuous improvement] . . . it's essential that the care teams really adopt a spirit of enthusiasm around experimentation."

Adequacy of organizational resources

The most widespread barrier cited was a perceived inadequacy of resources such as time and staffing. This included time for training on redesigned work processes, for absorption of new ideas and ways of relating among physicians and staff, for cross-coverage of patient care, particularly if the clinic is short-staffed, and time to do one's regular work while designing and implementing new Lean changes. Respondents from multiple levels of the organization indicated that the pace of change when implementing Lean can easily be perceived as too fast and that adequate time is required not only for training but also for new concepts to take root psychologically among frontline physicians and staff. However, a rapid approach to implementation was also recognized as appropriate at times, helping minimize logistical problems from providers being taken out of clinic for extended amounts of time. If trainings are to occur rapidly, however, sufficient attention must be placed on follow-up coaching to reinforce the changes. As one frontline provider observed,

[Lean is] something that is truly important and we really need to understand, but it's happening too fast, not enough time is being dedicated to it. It was hard for people to take off of work to do this. [We need to] figure out ways to make sure that people are supported and coached in actually using it. Because what may happen is, you go to something like that [rapid training] and then you go back to your office and don't use it.

DISCUSSION

As Lean is increasingly being used to improve care quality and efficiency, greater understanding of how

Table 2. PRACTICAL IMPLICATIONS FOR IMPLEMENTING A LEAN MANAGEMENT SYSTEM

Recommendations and Future Directions

- Empower staff at all levels of the organization, visibly display progress, and provide adequate time and staffing for improvement efforts.
- In cultivating a culture of innovation and collaboration, new paradigms may need to be introduced that emphasize openness to experimentation and new ways of operating.
- Rather than changes being initiated and enforced by management, daily improvements to work processes are better accomplished with direct involvement from the workforce.
- Continued research should be devoted to understanding how medical professional norms and traditional models of care delivery can be more conducive to Lean management approaches, with a focus on communication-based interventions.

to effectively implement it in various settings is crucial to success (Table 2). This study used qualitative research methods to identify key facilitators and barriers of Lean implementation among frontline providers in primary care. Several overarching themes were identified, including leadership engagement of staff and performance management, sensitivity to professional values and the culture of medicine, and perceived adequacy of organizational resources to support change. Within these larger themes, specific drivers of Lean implementation included empowering staff at all levels of the organization, visually displaying daily progress, and fostering a culture of innovation and collaboration. Challenges included physician resistance to standardizing work as a means to achieving efficiency, difficulties transferring responsibility for managing workflows to non-physician staff, and time and staffing required for participation in change efforts apart from usual delivery of patient care.

Our findings are consistent with research in the general area of quality improvement.³⁹⁻⁴¹ In one study, Ferlie and Shortell³⁹ point to 4 major factors for successful quality improvement work, including leadership at all levels, a culture that supports learning, emphasis on the development of effective teams, and use of information for continuous improvement work and external accountability. In addition, in studies covering a wide range of health care quality and safety initiatives, commonly reported catalysts for improvement included visible support and endorsement from leadership, staff involvement, and sufficient time and resources.⁴²⁻⁴⁴ These themes are consistent with our study of Lean implementation per se, which highlights the need for expertise and feedback from all levels of the organization, a collaborative and innovative culture that supports continuous improvement, partnership between physicians and MAs as interdependent units of the care team, use of data to support progress and accountability to improvement efforts, and adequate organizational resources in the form of time and staffing. Thus, organizations attempting to implement a Lean management system can expect that enabling factors will be similar to those encountered when introducing other types of quality initiatives and perhaps more so due to the intrinsic values of Lean thinking.

Beyond these identified factors, there are specific aspects of Lean as an intervention that are unique. For example, there is not likely to be one singular way of operationalizing Lean concepts. Although there are a number of tools and techniques that are similar across Lean systems, the choice of which to use and how to use them can vary greatly and is perhaps reflective of the "toolbox" approach that has characterized uses of Lean in health care thus far.^{19,45-47} For example, choice of how to implement the daily engagement or management system may differ (e.g., whether or not metrics are displayed visually, and how this is done on the basis of local needs or physical layout of space), but the fact that there is some method for comparing performance is key to Lean continuous improvement. Related to this, a fully operating Lean model of continuous improve-

ment cannot be sustained from the top down. Rather, it must be characterized by frontline physicians and staff committing to improvements from the bottom up. This commitment can be facilitated by involving members early on in the implementation process, which also reinforces Lean tenets of respect for people and their knowledge of frontline work processes. To address entrenched views of roles and responsibilities that may no longer serve to deliver efficient care in today's pressurized environment, new paradigms may need to be introduced, emphasizing openness to experimentation and new ways of operating. All of these recommendations are supported by our findings on the importance of engaging and empowering staff in the early design process, drawing upon the expertise of the frontline staff to drive daily changes, and promoting a culture of innovation.

To further illustrate, a literature review of Lean implementation in hospitals reported frequent difficulties in convincing staff that Lean can work in health care and also the counterproductive nature of hierarchical structures inhibiting teamwork, collaboration, and good communication.²⁹ These challenges both reflect and affect the extent to which organizational members are open to different approaches in order to achieve collective goals. Similarly, our findings suggest that a practice environment emphasizing creativity and collaboration is most beneficial when implementing Lean in the increasingly pressurized area of primary care. As suggested by study participants, introducing changes to work processes while fostering cultural changes, if and where needed, can greatly improve frontline receptivity to Lean redesigns.

Finally, this study highlights areas for continued research. While physicians are pivotal players in the delivery of health care, professional norms and traditional models of care delivery may not be conducive to industry-based management approaches such as Lean. One way to begin addressing these challenges is to improve communication between health care professionals, which has also been found to improve patient care and patient satisfaction.⁴⁸ Understanding how different professional roles can be integrated with Lean principles, and how communication-focused interventions can create more productive relationships between care team members, will facilitate Lean applications in health care settings. Also, to achieve improvements in performance using Lean techniques, a reversal of perspective on work processes and continuous improvement may be required.⁴⁹ Rather than changes being primarily initiated and enforced by management, daily improvements to work processes will be better accomplished with more direct involvement from the workforce. As observed in this study, incorporating the perspectives and contributions of frontline providers will be critical to Lean as a transformative solution in health care.

REFERENCES

1. Swank CK. The Lean service machine. *Harv Bus Rev*. 2003; 81(10):123-129, 138.

2. Stojkic Z, Majstorovic V, Visekruna V, Zelenika D. Application of Lean tools and xRM software solutions in order to increase the efficiency of business processes. *Procedia Eng.* 2014;69:41-48.
3. Chen JC, Cheng CH, Huang PB. Supply chain management with lean production and RFID application: a case study. *Expert Syst Appl.* 2013;40:3389-3397.
4. Spear S, Bowen HK. Decoding the DNA of the Toyota production system. *Harv Bus Rev.* 1999;77:96-108.
5. Spear SJ. Learning to lead at Toyota. *Harv Bus Rev.* 2004;82(5):78-86, 151.
6. Bhuiyan N, Baghel A. An overview of continuous improvement: from the past to the present. *Manage Decis.* 2005;43(5):761-771.
7. Shah R, Ward PT. Defining and developing measures of Lean production. *J Oper Manag.* 2007;25(4):785-805.
8. Kim CS, Spahlinger DA, Billi JE. Creating value in health care: the case for Lean thinking. *JCOM.* 2009;16(12):557-562.
9. Womack JP, Byrne AP, Flume OJ, Kaplan GS, Toussaint J. *Going Lean in Health Care. IHI Calls to Action Series.* Cambridge, MA: Institute for Healthcare Improvement; 2005.
10. Panchak P. Lean health care? It works! (Cover story). *Industry-Week.* 2003;252(11):34-40.
11. Radnor Z. Implementing Lean in health care: making the link between the approach, readiness and sustainability. *Int J Ind Eng Manag.* 2011;2(1):1-12.
12. Graban M. The case for Lean hospitals. In: *Lean Hospitals: Improving Quality, Patient Safety, and Employee Satisfaction.* Boca Raton, FL: CRC Press; 2009:1-19.
13. Gaarde A, Utech J, Devery T, Singh S. Application of Lean principles positively impacts clinical efficiency in an ambulatory chemotherapy infusion site. *Oncol Nurs Forum.* 2007;34(2):498.
14. Cima R, Brown M, Hebl J, et al. Use of Lean and Six Sigma methodology to improve operating room efficiency in a high-volume tertiary-care academic medical center. *J Am Coll Surg.* 2011;213(1):83-94.
15. Dickson EW, Singh S, Cheung DS, Wyatt CC, Nugent AS. Application of lean manufacturing techniques in the emergency department. *J Emerg Med.* 2009;37(2):177-182.
16. Bielaszka-DuVernay C. Redesigning acute care processes in Wisconsin. *Health Aff (Millwood).* 2011;30(3):422-425.
17. Meyer H. Life in the "Lean" lane: performance improvement at Denver Health. *Health Aff (Millwood).* 2010;29(11):2054-2060.
18. Collar R, Shuman A, Feiner S, et al. Lean management in academic surgery. *J Am Coll Surg.* 2012;214:928-936.
19. Bahensky JA, Roe J, Bolton R. Lean sigma—will it work for health-care? *Healthc Inf Manage.* 2005;19(1):39-44.
20. Wojtys EM, Schley L, Overgaard KA, Agabian J. Applying Lean techniques to improve the patient scheduling process. *J Healthc Qual.* 2009;31(3):10-16.
21. Fairbanks CB. Using Six Sigma and Lean methodologies to improve OR throughput. *AORN J.* 2007;86(1):73-82.
22. Esimai G. Lean Six Sigma reduces medication errors. *Qual Prog.* 2005;38(4):51-57.
23. Kelly A-M, Bryant M, Cox L, Jolley D. Improving emergency department efficiency by patient streaming to outcomes-based teams. *Aust Health Rev.* 2007;31(1):16-21.
24. Leslie M, Hagood C, Royer A, Reece CP, Maloney S. Using Lean methods to improve OR turnover times. *AORN J.* 2006;84(5):849-855.
25. Sobek DK, Jimmerson C. Applying the Toyota production system to a hospital pharmacy. Paper presented at: Proceedings of the Industrial Engineering Research Conference; 2003; Portland, OR.
26. Burgess N, Radnor Z, Davies R. Taxonomy of Lean in healthcare: a framework for evaluating activity and impact. Paper presented at: 16th International Annual EurOMA Conference; June 2009; Goteborg, Sweden.
27. Brandao de Souza L. Trends and approaches in Lean healthcare. *Leadersh Health Serv (Bradf Engl).* 2009;22(2):121-139.
28. Jimmerson C, Weber D, Sobek DK. Reducing waste and errors: piloting Lean principles at Intermountain Healthcare. *Jt Comm J Qual Patient Saf.* 2005;31(5):249-257.
29. Poksinska B. The current state of Lean implementation in health care: literature review. *Qual Manag Health Care.* 2010;19(4):319-329.
30. Radnor Z, Boaden R. Editorial: Lean in public services—panacea or paradox? *Public Money Manage.* 2008;28(1):3-7.
31. Hines P, Holweg M, Rich N. Learning to evolve: a review of contemporary Lean thinking. *Int J Oper Prod Manag.* 2004;24(10):994-1011.
32. McNulty T, Ferlie E. *Reengineering Health Care: The Complexities of Organizational Transformation.* Oxford, England: Oxford University Press; 2002.
33. US Census Bureau. 2009-2013 American Community Survey 5-Year estimates. <http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>. Accessed March 25, 2015.
34. Gubrium J, Holstein J, eds. *Handbook of Interview Research: Context and Method.* Thousand Oaks, CA: Sage Publications; 2001.
35. Glaser BG, Strauss AL. *The Discovery of Grounded Theory: Strategies for Qualitative Research.* Chicago, IL: Aldine; 1967.
36. Charmaz K. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis.* Thousand Oaks, CA: Sage Publications; 2006.
37. Strauss A, Corbin J. *Grounded Theory in Practice.* Thousand Oaks, CA: Sage Publications; 1997.
38. Thomas D. A general inductive approach for analyzing qualitative evaluation data. *Am J Eval.* 2006;27:237-246.
39. Ferlie EB, Shortell SM. Improving the quality of health care in the United Kingdom and the United States: a framework for change. *Milbank Q.* 2001;79(2):281-315.
40. Silow-Carroll S, Alteras T, Meyer J. *Hospital Quality Improvement: Strategies and Lessons From U.S. Hospitals.* New York, NY: The Commonwealth Fund; 2007.
41. Meyer J, Silow-Carroll S, Kutyla T, Stepnick L, Rybowski L. *Hospital Quality: Ingredients for Success—Overview and Lessons Learned.* New York, NY: The Commonwealth Fund; 2004.
42. Ploeg J, Davies B, Edwards N, Gifford W, Miller PE. Factors influencing best-practice guideline implementation: lessons learned from administrators, nursing staff, and project leaders. *Worldviews Evid Based Nurs.* 2007;4(4):210-219.
43. Blake SC, Kohler S, Rask K, Davis A, Naylor DV. Facilitators and barriers to 10 National Quality Forum safe practices. *Am J Med Qual.* 2006;21(5):323-334.
44. Wagner EH, Austin BT, Davis C, Hindmarsh M, Schaefer J, Bonomi A. Improving chronic illness care: translating evidence into action. *Health Aff (Millwood).* 2001;20(6):64-78.
45. Kim CS, Spahlinger DA, Kin JM, Billi JE. Lean health care: what can hospitals learn from a world-class automaker? *J Hosp Med.* 2006;1(3):191-199.
46. Nelson-Peterson DL, Leppa CJ. Creating an environment for caring using lean principles of the Virginia Mason Production System. *J Nurs Adm.* 2007;37(6):287-294.
47. Lodge A, Bamford D. New development: using Lean techniques to reduce radiology waiting times. *Public Money Manage.* 2008;28(1):49-52.
48. Zwarenstein M, Goldman J, Reeves S. Interprofessional collaboration: effects of practice-based interventions on professional practice and healthcare outcomes. *Cochrane Database Syst Rev.* 2009;(3):CD000072.
49. Liker JK, Meier D. *The Toyota Way.* New York, NY: McGraw-Hill; 2006.