

Lean Health Care

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Principles of Lean management are being adopted more widely in health care as a way of improving quality and safety while controlling costs. The authors, who are chief executive officers of rural North Carolina hospitals, explain how their organizations are using Lean principles to improve quality and safety of health care delivery.

Health care delivery systems, including hospitals and physician practices, must respond to the new reality of public, governmental, and payer demands for improved outcomes at lower costs. A growing number of them are turning to the principles, practices, and philosophy of Lean manufacturing, which uses a process of continuous improvement to eliminate waste and improve efficiency and customer service. The rural hospitals that the 2 of us lead, Columbus Regional Healthcare System and Sampson Regional Medical Center, adopted Lean management systems about 2 years ago. We joined a collaborative of 6 rural hospitals that are all receiving support to adopt Lean management principles from the North Carolina Center for Rural Health in conjunction with Simpler Consulting, with funding assistance from The Duke Endowment and the Golden Leaf Foundation.

Over the years, there have been many initiatives and programs that have promised to help hospitals and providers “do more with less.” Why do we believe that Lean management is a better answer for our organizations?

First, unlike tactics that are designed solely to reduce costs, meet productivity goals, or address specific quality indicators, Lean management systems are designed to focus on meeting customer needs. A naturally occurring outcome of doing so is the provision of care that is of higher quality and that costs less. In other words, a Lean approach provides the “how” in the form of a new organizational focus on continuous improvement in meeting customer needs, whereas other initiatives often focus on “what” to do to reduce costs or to increase quality, using predetermined prescriptive tactics.

Second, Lean management includes a commitment to respect the people involved in health care delivery. Unlike the top-down tactics that frequently frustrate those of us in the health care industry, Lean management puts analysis, decision making, and process design back in the hands of the real experts, those on the frontlines: doctors, nurses, therapists, technicians, dieticians, registrars, environmental service personnel, and others. Lean management gives health care

providers and workers a means of retaking ownership of their health care delivery processes.

Third, Lean management provides a platform and creates an organizational appetite for continuous and proactive (rather than sporadic and reactive) improvement—and it does so in a way that is critical of processes, not people.

As health care organizations have started to implement Lean principles, we are overcoming any concern that such principles are only applicable to manufacturing. We are also learning key lessons that can accelerate health care’s adoption of Lean principles. John Toussaint and Roger Gerard, 2 national leaders of Lean health care, in their 2010 book *On the Mend*, share one such key lesson: the concept of middle flow. They say that they have found that delivery of health care generally occurs in 3 flows: upstream, middle, and downstream.

Upstream is everything that happens before a doctor sees the patient, from setting appointments to getting vital statistics, laboratory tests, and asking why the patient wishes to see the doctor. The downstream flow includes getting additional information to the patient, running follow-up tests, dispensing prescriptions, and setting new appointments.

Upstream and downstream flows, they say, are fertile ground for reducing waste and for improving quality through the efforts of Lean teams to redesign and standardize processes. The middle flow includes provider-patient interactions and decision making, areas in which improvement and standardization are generally best left to individual medical professionals [1].

Adoption of Lean principles in health care is still in its relative infancy, although tremendous results have already been achieved by national Lean leaders such as Denver Health, ThedaCare, and Virginia Mason Medical Center—organizations that are consistently achieving excellent outcomes at lower costs. Case studies from these and other nationally recognized organizations are available in an excellent recent discussion paper published by the Institute

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Lean Events at Columbus Regional Healthcare System and Sampson Regional Medical Center

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Lean methods, which emphasize continuous improvement to eliminate waste and improve efficiency and customer service, are increasingly being employed in the health care setting. Over the past 2 years, Columbus Regional Healthcare System and Sampson Regional Medical Center have held more than 50 Lean events, 2 of which are described here.

Improving Mammography Services at Columbus Regional Healthcare System

In November 2012, a rapid improvement event (RIE) team was convened to study and improve delivery of mammography services to patients receiving care at Columbus Regional Healthcare System. The RIE team was led by a frontline mammography assistant and also included leaders from the departments of imaging and patient financial services; frontline staff members from the departments of mammography, imaging, and pharmacy (for “a fresh set of eyes”); a staff member from a local obstetrics and gynecology practice; a radiologist; and a patient who had shown interest in sharing her experiences and helping to identify opportunities for improvement. Due to time constraints, the radiologist did not participate for the entire week but was consulted when process changes were identified that required radiologist input, buy-in, or design assistance.

In preparation for the event, team members gathered data about the delivery of mammography services, mapped out the current state of the process, and proposed balanced goals for improvement. The chosen goals were: to achieve an 86% reduction in the average time until the next available appointment for a diagnostic examination; to reduce the time from testing to delivery of results to the patient’s primary care physician by 90%; to increase weekly mammography volume by 15%; and to increase the gross margin of profit per mammogram by 15%.

The team mapped how the process should look from

the patient’s perspective; used this preparatory work to evaluate the current process map; and identified which components of the process were truly valuable for patients, which were wasted steps, and which steps involved a waste of resources. The team then created a series of experimental process changes intended to reduce waste and to ensure the inclusion of components that add value for patients. By midweek, the team had tested and tweaked most of these changes, and they were able to spend Thursday finalizing a new process and creating tools that would be used to train staff members once the new process was ready for broader implementation.

Many preconceived notions about problems in the process were dismissed during the course of the week, and unexpected opportunities were discovered. The biggest win came in the team’s discovery that time was being wasted due to hand-offs (transfers of reports between technicians, radiologists, and transcriptionists). This discovery dispelled the belief that technicians, transcriptionists, or radiologists were causing delays while working on the reports. In fact, the data showed that the hand-offs and resulting queues were the points at which time was being wasted, and the team was able to redesign the process to eliminate several hand-offs.

Real-time data collection during the event and during the first 2 weeks afterward revealed that Columbus Regional Healthcare System was approaching or achieving its quality and patient satisfaction goals: The amount of time from testing to delivery of results had decreased by 83% for diagnostic examinations and by 74% for screening examinations. The RIE team also received anecdotal validation of these improvements from a community gynecologist whose patient was scheduled for a screening mammography on the Thursday of the event, when new processes were being tested. Three hours after her test was completed, the results arrived in the gynecologist’s office, and the patient was informed of her results that same

of Medicine, titled “A CEO Checklist for High-Value Health Care” [2]. Columbus Regional Healthcare System, Sampson Regional Medical Center, and the other hospitals in our North Carolina collaborative are making great strides as well (see Table 1). Our early results are due both to events that focus on rapid improvement and to the deployment of Lean thinking and Lean tools across our organizations.

Our organizations started their Lean work by clarifying organizational needs and prioritizing areas of focus (called *value streams*); we then formed multidisciplinary teams to study each organization’s top priority value stream in order to understand the various processes within that value stream. Value streams provide a new way to look at health care delivery from the patient’s vantage point, as opposed

to the departmental or service-line viewpoint typically adopted by hospitals. For example, the emergency-care value stream at Columbus Regional Healthcare System includes all processes from patient entry into the emergency department through discharge, admission, or transfer, and includes multiple departments (registration, emergency, laboratory, imaging, cardiopulmonary, etc) because of their role in upstream, middle, and downstream flows. Sampson Regional Medical Center chose surgical care as its top priority value stream. Once we defined and evaluated the various processes within each organization’s top priority value stream, we embarked on the real work: rapid improvement events (RIEs).

RIEs are typically weeklong events for teams that are

day. This rapid turn-around not only allowed the practice to provide significantly better care but also avoided creating patient anxiety; even for a screening mammography, the longer a patient waits for her results, the more she may become concerned that something may be wrong. Indeed, one downstream benefit of the new process is the positive impact on the referring office. This gynecologist said that his staff was thrilled about getting the results so quickly because they knew that being able to report results promptly would save them from spending hours responding to phone calls from worried patients.

Improving Preoperative Visits at Sampson Regional Medical Center

Surgical services were strategically selected as the first area of focus for Lean intervention at Sampson Regional Medical Center. Despite strong performance in this area, it quickly became evident that there was ample opportunity to improve quality, cost, and service. In March 2011, a surgical services team embarked on a weeklong attempt to improve the presurgical process.

When nurses, surgical technicians, registrars, and a certified registered nurse anesthetist mapped the flow of the presurgical process, it became evident that patients were unnecessarily having to run through a maze of testing and waiting that created a less-than-favorable first impression of surgical services at the medical center. With the assistance of the surgery practices, the RIE team decided that preoperative visits should be scheduled. This was a change from the previous process of sending the patient from the surgeon's office directly to the hospital, which was a recipe for built-in delays and unnecessary spikes in volume.

By the middle of the RIE week, team participants had rearranged an examination room and established it as a one-stop location for all patients arriving for preoperative visits. Patients scheduled for preoperative visits now experienced no delays in service because the nurse, the electrocardiography technician, the phlebotomist, and the registrar came to the patient, rather than the patient having to go to them. By the end of the week, plans were under way to cross-train the nurse to perform electrocardiography and phlebotomy duties; anesthesia providers had

agreed to come to the examination room as necessary; and the registration staff had developed plans for bedside registration.

Today, preoperative visits are scheduled, and more than 90% of patients arrive on time for their appointment, which eliminates unnecessary waits. Visits that had previously taken 2 hours have been shortened to less than an hour, including the time spent in radiology. Surgery practices have reported an increase in patient cooperation since patients can usually schedule preoperative visits at their convenience, rather than having to go from the surgeon's office directly to the hospital. Press Ganey (a company that works with health care organizations to improve clinical and business outcomes) now consistently ranks Sampson Regional Medical Center as being in the top decile of medical centers in North Carolina with regard to patients' satisfaction with the entire surgical experience [1]. Also, the surgeons and anesthesiologists at Sampson Regional Medical Center have become very engaged in the hospital's Lean transformation after witnessing the improved quality, improved patient satisfaction, and reduced expense that have resulted from this RIE. NCMJ

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made up, predominantly, of the frontline staff members who are most involved in the particular process being improved. Through the application of various Lean tools and intensive data gathering and analysis, the RIE team studies the existing process in order to identify waste and variation, and then the team develops a series of rapid experiments to improve the process. The RIE team is empowered to test and refine these experiments and, based on the results, to develop and implement a new process by the end of the week, complete with a means to follow up and measure success after the event. Improvement goals for these events are typically balanced across quality, safety, human development, financial, and growth domains, and they are rarely incremental. In fact, these teams generally strive for break-

throughs: for 30% to 50% improvement in the goals they set out to achieve.

Our 2 organizations have together held more than 50 Lean events across 6 value streams to date (see our other article in this issue, on pages 134-135, for brief descriptions of 1 event at each facility). Based on the improvements we have achieved, both of our organizations are rapidly expanding our RIE capacity, with long-term goals of holding multiple improvement events each month. We have also both been working to spread Lean thinking and concepts beyond focused improvement events into day-to-day operations at the departmental level, so that we can engage greater numbers of frontline staff members more rapidly. We are also beginning to apply Lean concepts to strategic planning at

TABLE 1.
Selected Accomplishments Attributable to Adoption of a Lean Management System at
2 Rural Hospitals in North Carolina

Columbus Regional Healthcare System Whiteville, North Carolina	Sampson Regional Medical Center Clinton, North Carolina
- The number of patients seeking emergency care who leave the emergency department without being seen has been reduced by more than 50%. - Emergency department "door to doc" time has been reduced by 40%. - Twenty-two months have passed during which there have been no cases of ventilator-associated pneumonia. - National ranking of employee engagement improved from the 62nd percentile in 2011 to the 89th percentile in 2012.^a - More than \$2 million in operating and capital costs have been eliminated.	- The number of occasions on which the usual 7:30 AM start time in the operating room has been delayed has been reduced by 90%. - The proportion of surgeries that missed their scheduled operating room start time has decreased from 50% to less than 10%. - The proportion of surgeries that were preceded by a preoperative appointment has increased from 62% to 90%. - The length of preoperative appointments has been cut in half; they now last less than 60 minutes, and 91% of patients arrive on time. - All preoperative antibiotics are administered an hour or less before surgery commences.

^aAs measured by The Jackson Group against their employee engagement survey database.

the executive and board levels.

Although the specific accomplishments we have achieved to date at Columbus Regional Healthcare System and Sampson Regional Medical Center are significant, the real power of the Lean approach rests in its empowerment of the people actually doing the work and in its focus on continuously improving value to patients. The Lean philosophy has a cumulative impact as it begins to define an organizational culture.

We recognize that we are still just planting the seeds for broader transformation. We believe that we can achieve sustainable breakthrough results broadly across each of our organizations. And we believe that this higher level of performance is where the organizations we lead and other health care delivery systems can begin to positively influence the cost, quality, and service curves in health care. NCMJ

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