

**Applying Production Principles from Toyota to Improve Patient Care
Park Nicollet Health Services
2004 Acclaim Award Recipient**

In 2003, Park Nicollet Health System added principles and methodology from the Lean Toyota Production System to speed progress toward safe, effective, patient-centered, efficient, timely and equitable health care. The change initiative launched a new systems approach to work called Lean Production. The overall goal of Lean Production is to remove waste, wait time, and errors from care and support processes. Lean principles are remarkably similar to the IOM rules; each focuses on customer value and quality in pursuit of perfection.

The initiatives will continue to be an integral part of Park Nicollet’s goal to create great experiences and innovative approaches to care and service for patients through passionate attention to their personal values and preferences. Lean Rapid Process Improvement Workshops (RPIWs) will be combined with personalized care work so standard work can effectively be addressed. Information technology capabilities will be developed to capture personal preferences, instructions, e-mail addresses and more. And clinicians will be provided with training, tools, and materials to improve interpersonal skills, engage family members, and enhance the level of personalized care delivered.

Goal

Quality patient care and the Lean Toyota Production System—at first glance, these two concepts appear to be contradictory or at best, unrelated. How can a production system used by a leading automotive manufacturer be applied to improve the quality of health care? Adding a production and performance method of managing work to quality improvement tools and a fully integrated electronic medical record answered Park Nicollet’s need for accelerated systemwide change.

Intervention

The following chart summarizes Park Nicollet’s major goals and objectives related to each of the IOM Aims.

IOM Aim	Goals and Objectives
<p>Safe</p>	<p>Create an environment where all staff welcome the opportunity to report an error and feel responsible for preventing errors in their work.</p> <ul style="list-style-type: none"> • Implement computerized physician order entry (CPOE) and electronic medication administration record (eMAR) to eliminate medication errors. • Use anonymous Web-based incident reporting linked to process for root cause analysis. • Incorporate safe prescribing practices to eliminate medication errors. • Participate in statewide safety collaborative to eliminate post-operative infections.
<p>Effective</p>	<p>Make at least eight system-wide care improvements.</p> <ul style="list-style-type: none"> • Embed evidence-based order sets and alerts into electronic medical record. • Create documentation templates that prompt quality care recommendations. • Participate in Rapid Process Improvement Workshops (RPIWs) that support

	care processes.
Patient Centered	<p>Meet or exceed patient service expectations.</p> <ul style="list-style-type: none"> • Identify and remove barriers that get in the way of providing excellent service. • Engage clinical staff and patients to define service excellence. - Develop standard explanations offered to patients at each step of their experience. • Use Lean techniques to increase the value-added vs. non-value-added time patients experience while using our services. • Include patients in designing our service improvements.
Timely	<p>Implement demand forecasting and new planning processes to create advanced access.</p> <ul style="list-style-type: none"> • Create enterprise scheduling and centralize the maintenance of schedules. • Design and test Patients Online (a service that will offer patients a view of their medical record, interactive opportunities to submit key data and participate in e-visits, and access to decision support and tailored educational materials).
Efficient	<p>Provide decision support for patients, clinicians and leaders through an integrated medical record. Make all clinical documentation available across the continuum of care in a single integrated electronic medical record.</p>
Equitable	<p>Engage the community in identifying needs and raise support to address them.</p> <ul style="list-style-type: none"> • Convene and facilitate eight community groups. • Fund innovation grants to build healthy communities by identifying and responding to community needs and supporting programs and services that enable the organization to meet those needs. • Develop solutions for disparities.

Highlights

IOM Recommended Rule	Parallel Lean Principles
Care based on continuous healing relationships	Increased capacity for healing relationships is created by eliminating waste and by creating standard work. Standard work adds predictability and allows for more time to be spent developing professional competencies, including healing relationships with patients.
Customization based on patient needs and values	“Single-piece flow” and rapid changeover of “set-ups” promote customization. “Value stream mapping” looks at activities that are of value to the customer-all else is waste.
The patient as the	Based on value stream mapping, the organization articulated that the

source of control	patient is our only customer. For example, hand hygiene improvement included signs in every patient room stating that patients should expect staff to use alcohol rub before and after interacting with them, and requesting patients to ask staff if they do not see hand hygiene.
Shared knowledge and the free flow of information	Visual controls make the process readily visible to everyone. “Just in time” requires free flow of information. The organization spent \$60 million to implement a clinical information system spanning the continuum of care. This allows clinical information to flow freely across hospital, clinic and home-care, including patient access to their medical record via the secured Web.
Evidence-based decision making	Lean Production is metric-driven, with decisions based on data. RPIW targets use an evidence-based approach. As an example, the wound infection RPIW focused on defects related to best practices for preventing post-operative wound infections, including shaving technique, normal blood sugars, adequate tissue oxygenation and normal body temperature during surgery. The hand hygiene RPIW focused on implementing new CDC guidelines for using alcohol rub.
Safety as a system priority	Error-proof processes are used. “Jidoka” is one-by-one confirmation to detect abnormalities. This process does not allow for passing on defects- every abnormality must be responded to immediately. Lean Production includes a “visibility room” containing all significant organizational metrics, including the category of safety. The organization included elimination of post-operative infections and preventable adverse drug events as priorities for 2004.
The need for transparency	Visual controls make the process readily visible to everyone. Kanban and Andon are examples of visual controls. Hand hygiene improvement included signs in every patient room stating that patients should expect staff to use alcohol rub before and after interacting with them, and requesting patients to ask staff if they do not see hand hygiene.
Anticipation of needs	Calculate takt time (production time divided by customer demand) to deliver services or supplies just in time. In other words, anticipate need (as measured by takt time) and build processes to meet need with “single flow” with no queues.
Continuous decrease in waste	Eliminate the seven types of Muda (waste)-time, inventory, motion, defects, transportation, motion, over-processing.
Cooperation among clinicians	Lean Production assumes shared flow of knowledge and free flow of information for all roles involved in a process in order to meet demands-just in time with no defects.

Results

The following chart summarizes results of major projects related to organizational goals.

IOM Aim	Goals and objectives
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<p>Safe</p>	<p>Create an environment where all staff welcome the opportunity to report an error and feel responsible for preventing errors in their work.</p> <ul style="list-style-type: none"> • Implement computerized physician order entry (CPOE) and electronic medication administration report (eMAR) to eliminate medication errors. • Use anonymous Web-based incident reporting linked to process for root cause analysis. • Incorporate safe prescribing practices to eliminate medication errors. • Participate in statewide safety collaborative to eliminate post-operative infections. <p>Results: Two audits to assess the impact of CPOE/eMAR on organizational processes and patient outcomes were conducted in January 2004 and May 2004 in separate locations. While the May audit showed no statistically significant changes, the January audit showed the percent of orders using unsafe prescribing practices was reduced from 37.8 percent to 0 percent. The percent of charts with perfect orders improved from 20 percent to 100 percent.</p>
<p>Effective</p>	<p>Make at least eight system-wide care improvements.</p> <ul style="list-style-type: none"> • Embed evidence-based order sets and alerts into electronic medical record. • Create documentation templates that prompt quality care recommendations. • Participate in RPIWs that support care processes. <p>Results: To date, five system-wide care improvements have been documented in the following areas.</p>
<p>Patient Centered</p>	<p>Meet or exceed patient service expectations.</p> <ul style="list-style-type: none"> • Identify and remove barriers that get in the way of providing excellent service. • Engage clinical staff and patients to define service excellence. • Develop standard explanations offered to patients at each step of their experience. • Use Lean techniques to increase the value-added vs. non-value-added time patients experience while using our services. • Include patients in designing our service improvements. <p>Results: A number of RPIWs have focused on reducing wait times and access to services. The organization's measures of patient satisfaction have shown improvement that has been linked to departments' efforts in redesigning work based on customer values.</p>
<p>Timely</p>	<p>Implement demand forecasting and new planning processes to create advanced access.</p> <ul style="list-style-type: none"> • Create enterprise scheduling and centralize the maintenance of schedules. • Design and test Patients Online (a service that will offer patients a view of their medical record, interactive opportunities to submit key data and participate in e-visits, and access to decision support and tailored educational materials). <p>Results: Implementation of new "waterfall" scheduling, which keeps endoscopy surgical patients arriving throughout the day, allows more patients to be seen daily. With this</p>

	<p>new scheduling, the number of patients seen per day increased from 32 to 62 within six months.</p>
<p>Efficient</p>	<p>Provide decision support for patients, clinicians and leaders through an integrated medical record.</p> <p>Results: An online view of clinical information for 2 million patients spanning hospital, clinic and home care was made available to all clinical staff in February 2003. In January 2004, improvements in medication administration in the hospital were added, with all inpatient units using CPOE linked to pharmacy verification, automated medication dispensing and online medication charting. In April 2004, additions included enterprise scheduling including hospital and clinic, clinic check-in process and enterprise chart tracking.</p>
<p>Equitable</p>	<p>Engage the community in identifying needs and raise support to address them. - Convene and facilitate eight community groups.</p> <ul style="list-style-type: none"> • Fund innovation grants to build healthy communities by identifying and responding to community needs and supporting programs and services that enable the organization to meet those needs. • Develop solutions for disparities. <p>Results: Innovation grants provided funding for a project to conduct focus groups with Somali women and families and OB/GYN staff to understand childbirth education needs. It had previously been identified as a problem that Somali women were not participating in traditional labor and delivery education. As a result of a Somali community partnership, a videotape was produced and distributed to Somali women. The video features Somali women discussing their childbirth experiences and promoting prenatal care and communication with their health care provider along with basic childbirth education. Other projects funded included the development of criteria for healthy snacks and beverages in local schools and an initiative to fully immunize all school-age children. A planning grant was also funded to define outcome measures that matter to patients.</p>