

# Six Sigma: Healthcare under the Microscope

## EXECUTIVE SUMMARY

As the healthcare industry struggles to reinvent itself like Detroit automakers did in the 1980s, it's not surprising that manufacturing and non-healthcare service industries are offering tantalizing models for industrial rebirth. One of the more promising: a methodology called Six Sigma, whose engineering roots and comprehensive, integrated approach are finding a welcoming niche in healthcare.

Six Sigma arose at Motorola in the 1980s and quickly spread to other companies and industries. With its scientific and evidence-based focus, and its successful track record in other industries, Six Sigma lends itself well to a healthcare industry desperate to find a way to reduce medical errors, increase quality, improve operational performance and cut costs.

Six Sigma is a rigorous and disciplined methodology that uses data and statistical analysis to measure and support improvements in an organization's performance by identifying and eliminating

"defects" in manufacturing and service-related processes.<sup>1</sup> For healthcare, defects would be *any* undesirable outcome, such as the wrong medication coming from pharmacy to a patient, the right medication at the wrong time, or error-prone AR processes. To achieve the Six Sigma level, a process must not produce more than 3.4 defects per million opportunities (or tasks).

The overall framework of Six Sigma is commonly described by the acronym DMAIC, which represents the phases of Define, Measure, Analyze, Improve and Control. Organizations apply these phases to very discrete Six Sigma projects, which are implemented by experts called Green Belts and Black Belts and overseen by Master Black Belts.

Only a few hospitals and health systems have implemented Six Sigma and most of the examples we discuss in this report are in the initial stages of implementation. But the results of a few pioneers are impressive and its adherents in healthcare are a growing and enthusiastic group.



<sup>1</sup> As defined on the iSix Sigma Website, [www.isixsigma.com](http://www.isixsigma.com).

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Welcome Bob Zollars, Chairman and CEO, Dan Eckert, Chief Operating Officer, Andrew Guggenhime, Chief Financial Officer and Steve Wigginton, Executive Vice President of Marketing, Sales & Service and the entire Neoforma team.

## We're different

Six Sigma does require some adaptation to healthcare.



**Susan Peach, senior VP, Catholic Health Initiatives, Denver**

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*A spirit of innovation, a legacy of care.*

“Healthcare is very different” from other industries in terms of how Six Sigma can be applied, says Susan Peach, senior VP

at Catholic Health Initiatives (CHI), who arrived at the Denver-based 67-hospital system early this year after helping build a Six Sigma consulting model for the American Society for Quality. While the same principles apply to healthcare as other industries, many Six Sigma tools do not, she says.

“We’re not measuring tangible products, so the statistical measurements remain important but some of the analytical tests do not,” says Peach. “You have to figure out if they’re applicable.”

Much of the work involves entering baseline data about processes into an Excel spreadsheet and selecting the appropriate software tools to analyze that information. It may sound simple, but gathering the right kind of data about hundreds of processes, sub-routines and communications so that it’s meaningful for statistical analysis is an arduous job that requires months. And, while statistics are important, they provide just a tool within a more comprehensive philosophy that includes using standardized visual models like fishbone charts to guide process improvements, which in themselves require months of sustained team management.

In terms of resources, effort and sophistication, Six Sigma represents a quantum leap over previously popular quality improvement mechanisms like TQM and CQI.

Peach says CHI will eventually apply such methodology to all of its hospitals, which are sprinkled over most of the country. She estimates that fewer than 10% of U.S. hospitals are even considering Six Sigma as an improvement strategy.

## Not a household term

“Out of 67 hospitals, we have only three that are knowledgeable of Six Sigma; two are working on it,” notes Peach. But those facilities and two others provide the focus for CHI’s Six Sigma effort. Two hospitals have Six Sigma projects underway, another is ready to launch one and two others have indicated interest.

“You always start with the interested,” she says. “Six Sigma would be impossible to force on anyone. It requires dedicated resources and the learning curve is very steep. You have to love analytics and data. It also requires leadership from the top” and day in and day out support.

Achieving Six Sigma targets is anything but easy. For example, says Peach, the current state of healthcare accepts that errors occur, and most hospitals perform at Two Sigma, or 95% error rate. To make the leap to a 99.9999% error rate—to Six Sigma—is a huge undertaking. “It seems like only 4%, but it’s tremendously hard to get there.”

CHI’s goal is to use Six Sigma to reduce patient care related errors, including those associated with falls, medication, surgery and other process errors. Not every target is clinical: also in the crosshairs are errors

involving patient registration at hospitals, which can create nightmarish billing problems.

Because CHI is just beginning and a typical Six Sigma project requires six to 18 months, it will take another year to document results. CHI's goal is to undertake four projects the first year, two short-term and two long-term, budgeting about \$65,000 toward education and training. The Six Sigma initiative has required no additional FTEs as the two trained internal consultants working under Peach were already dedicated to quality and process improvement.

### Natural evolution at St. John

Another executive taking up the Six Sigma standard after arriving in her position this year is Joann Richards, RN, PhD, VP for performance improvement and care design at Detroit-based St. John Health, part of Ascension. While the VP of medical affairs had already launched the effort as part of an overall process to reinvigorate quality at the organization, Richards is a Six Sigma advocate, having participated in precursor quality-improvement programs.



**Joann Richards, RN, PhD, VP for Performance Improvement, St. John Health, Detroit**



"I see Six Sigma as a very natural evolution from CQI and TQM but more sophisticated. This is second generation. The automakers have gone through the same evolution," she says. Indeed,

Richards' experience in Detroit observing the automakers grapple with quality issues over the years has taught her that mastering the quality process does not happen overnight.

"That's why healthcare has nothing to be ashamed of that it didn't learn everything the first or second time around," she says.

With its statistical underpinnings, focus on customer expectations and leadership, Six Sigma is much more comprehensive and holistic than previous quality efforts in the industry. "Sometimes people separate clinical performance from how we run our business. First-generation quality improvement tended to separate quality and performance reporting from other parts of the organization. With Six Sigma it's how you run your business. It's not separated, but more of a business approach," says Richards. "Six Sigma tends to be problem and process focused."

In the early stages of the initiative, St. John's eight hospitals are each selecting projects to pursue under the general categories of emergency through-put, registration, scheduling and patient safety. The goal: a year from now, the health system will have four black belts trained; three or four major projects completed and will be rolling into a second wave of projects.

### Minnesota stats

John DeVries brings a background in industrial engineering training and quality improvement to his job as manager of improvement systems at North Memorial Health Care in Robbinsdale, Minn., which includes a Level 1 trauma center—most of whose admissions are through the ER.



Donald Kooy was promoted to President & CEO of McLaren Regional Medical Center in Flint, Mich. Previously he was President & CEO of Lapeer Regional Medical Center. Both are a part of Flint-based McLaren Healthcare.

### Upcoming Events

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**September 3, "Skill-Building for Successful Computerized Clinical Documentation,"** Laurie Shiparski, RN, MS, Laurie Levknecht, RN, BSN, and Tracy Christopherson RRT, Clinical Practice Model Resource Center, demonstrate that successful automation requires the presence of certain skills in both those who lead and those who will use the computer to support advancement of practice and/or service. These skills include participating in meaningful conversation, managing the common dilemmas and building strong partnerships.

**September 9, "The Healthcare Resource Challenge: Evolving from ERP to ERO,"** Eric Morgan, Executive Vice President of Healthcare for Lawson Software, describes how today's healthcare environment requires that providers evolve from enterprise resource planning (ERP) to a focus on enterprise resource optimization (ERO) in order to more efficiently and effectively manage their key operational resources: workforce, supplies and financial assets.

*more events on next page*

A unique feature of North Memorial's business is its large medical transportation service, which involves 100 ambulances and five helicopters covering a multi-state region.

The improvement systems office reports to the COO and, along with DeVries, includes an RN with clinical quality background and a newly-minted MBA to round out the unit's Six Sigma practitioners.

De Vries suggested the Six Sigma strategy after being exposed to current practices in professional associations. The first step was taking advantage of courses at the nearby University of Minnesota's Carlson School of Management. The team was able to apply those teachings to a capacity management project still being piloted. De Vries acknowledges one lesson learned already: the scope of their first project, on capacity-management, was probably too large. Ensuing ones will be scaled down. Already, North Memorial has hired a consultant to do in-house training of four teams to tackle imaging-report turnaround, OR turnover times, medication safety and revenue cycle.

"We don't have any results to report yet," says DeVries, "but based on our experience to date, we believe it will be very rewarding."

### Lean and mean in Michigan

Lori Portfleet is president of Spectrum Health Continuing Care in Grand Rapids, Mich., a subsidiary of Spectrum Health that provides post-acute care.

The subsidiary's CFO became aware of Six Sigma through his relationship with a local non-healthcare corporation, and opted for a "Lean Six Sigma" strategy that aimed to reduce cost as well as errors while



**Lori Portfleet,  
President, Spectrum  
Health Continuing  
Care, Grand Rapids,  
Mich.**



**Spectrum Health**  
*Continuing Care*

providing quality patient care. With help from a black belt consultant, Spectrum began to train all executive leadership as well as all middle management within

the facility on the key tenets of Six Sigma. Further, black belt and green belt resources within the facility were identified, committed and trained.

"A key tenet of Six Sigma is that failure to provide human capital results in failure of the project," says Portfleet.

For this year, Spectrum's goals are to:

1. Obtain executive commitment (CEO, CFO, VP of clinical services, VP of administrative services).
2. Identify human capital (two people full time, others part time).
3. Establish relationship with a black belt (independent Six Sigma consultant).
4. Select a project. (They picked subacute care. "Because of changes in the Prospective Payment System for skilled nursing, our costs were exceeding reimbursement," says Portfleet.)

Identifying how to meet the needs of customers is key. "The voice of the customer—in this case, the patient—is a critical component of Six Sigma," she says. "Sometimes we lose focus on the patient as customer, and think of regulators, payers and referring hospitals as the customer." Six Sigma follows the patient from inquiry to discharge, the "value stream" in Six

Sigma terminology, transcending such traditional silos, both functional and departmental, as the admissions process, nursing, physician services and therapy. “We have truly focused on implementing a patient-centered focus throughout the value stream,” says Portfleet.

### Working hard but not smarter

“Six Sigma helped identify the whole flow from the patient’s experience. We were able to identify the current state,” says Portfleet. The team found, for example, that referral coordinators were spending a significant amount of wasted time on unnecessary tasks. “They were working hard but not adding any value to the process,” she says.

Another finding was that Spectrum was allowing patients to linger till late afternoon on the day of discharge, time that wasn’t getting reimbursed because in subacute care there is no reimbursement for the day of discharge. This happened simply because a suggested departure time had never been defined. In a related finding, patients were being admitted in late afternoon, which pushed the physical therapy evaluation into the next day, putting the entire process behind.

Teams were organized to map and define the current state in January and February. In March a “baseline event week” was conducted and all collected data was displayed on the wall and the team turned to determining what the future state should be. In the “solution specs” for the future state, for example, the majority of patient discharges occur before 11:00am.

“It was a very big ‘aha’ experience,” says Portfleet.

An interdisciplinary project team—a team leader plus dietary, pharmacy, nursing, physicians—and an executive team

together drew up a Contract for Change that would significantly overhaul the process. The interdisciplinary team then launched a reorganization of the Subacute Value Stream. A pilot “team” focused on 12 beds was implemented in early June, with rollout of the remainder of the unit scheduled to occur by August.

### Heretical move

“We did something considered heresy—we named a physical therapist as team leader,” says Portfleet. The team leader, effectively the operations leader, is the key contact for families and interdisciplinary staff and takes ownership of the patient’s case. “We picked this person because he ‘got it,’ he understood that functional silos were not meeting the needs of the patient, and processes were fragmented and disjointed. He’s a bright, 28-year-old PhD. We asked him for a year commitment to the project,” she says.

Three more cells have just been launched, driven by employee demand after they witnessed the first one. “The unit has requested we not wait. They want the other cells to start now,” says Portfleet. “That’s the most powerful message in saying this strategy works.”

She adds that the results of the first cell include a significant reduction in FTEs and increased reimbursement from achieving 98% of patients being discharged before noon so that the bed can receive a new patient admission the same day. Housekeeping has been organized to clean a room within a shortened time period to accommodate an afternoon admission.

The result of the effort has been “phenomenal patient satisfaction,” according to Portfleet. Better outcomes and faster at lower cost.

### Upcoming Events continued

**September 10,** “Preparing for an Untethered and Agile Ecosystem,” Jim Jones, Business Development Manager, Hewlett Packard, provides an update on mobile devices and their successful use and impact in the clinical setting. Convergence of information sources as well as tightly integrated technologies in mobile devices create opportunities to rethink information availability for both caregivers and administrators.

**September 11,** “Human Factors and System Usability,” Robert North and Kate Peterson, Principals at Human Centered Strategies, present key factors to consider when evaluating adoption of technology. Usable healthcare systems and processes are safer and more effective, so government and healthcare organizations are focusing more attention on how poor system usability puts patient safety at risk. This session will introduce you to a quick and inexpensive framework that identifies human factors problems, their impact on safety and effectiveness, and a roadmap to solving these problems. This eye-opening workshop offers many opportunities to ask questions, consider alternate solutions and discuss how you can apply human factors and usability engineering.

*more events on next page*

*Upcoming Events continued***September 23, "Health Care Information Sharing & Analysis Centers**

(HCISACs)...what are they & why do we need them?" Rosemary Nelson, AN, BC, CPHIMS, FHIMSS, recently Deputy Director, Strategic Operations & Planning, TRICARE Northeast (DoD), will review the presidential directive to establish a Critical Infrastructure Protection (CIP) program, and why the US needs such a program to protect critical physical and cyber infrastructures to decrease threats and attacks.

Specific attention will be given to the Department of Homeland Defense's mandate to establish a Health Care Information Sharing and Analysis Center (HCISAC), sponsored by the Department of Health and Human Services. She will discuss threats and vulnerabilities to the healthcare industry, mitigation strategies, and describe how ISAC will raise the healthcare industry's cyber and physical standards through the adoption of best practices.

**September 25, "Outcomes from Implementing an Evidence-Based Computerized Clinical Documentation System,"** Bonnie Wesorick, RN, MSN, CEO and Founder, Karen Grigsby, RN, PhD, Clinical Practice Model Resource Center; Shawn O'Connor Tyrrell, RN, MSN, Vice President, Nursing Services, Sharon Schultz, RN, MSN, Director of Nursing, Jan

*more events on next page*

**Heartland of Six Sigma**

About three years ago, management at Heartland Health in St. Joseph, Mo., began introducing Six Sigma to the organization, educating staff without yet undertaking projects. After about 18 months, the effort became focused, finding part-time black belt candidates and outlining projects. Today, Heartland has just approved three full-time black belts, who previously were only half-time. "We had some of the best and most dedicated people, but we knew that the task was wearing them out," says Mike Dittmore, RN, a master black belt and team leader for performance improvement. "We had to become more aggressive and give them more time and resources," he says.



**Mike Dittmore, RN,  
Heartland Health,  
St. Joseph, Mo.**



The timing was good too because Heartland faced sun-setting of much of its existing software systems, a best-of-breed arrangement requiring myriad interfaces, all potential points of failure. When Heartland opted to bring in an IT vendor with a single, integrated system, the conversion effort became a focus of its Six Sigma strategy.

Heartland's mild-mannered Great Plains image belies its assertive quest to stay ahead of the pack, even though it has little competition in its local market. According to Dittmore, the organization conducts regular benchmarking to maintain its performance edge among peers, achieves

98% of its JCAHO requirements on first try and has applied for the Malcolm Baldrige Quality Award.

"We're pretty aggressive in terms of quality. Now we're even taking it a step further," says Dittmore. For Heartland that means adopting a technique called "Design for Six Sigma," which uses Six Sigma to design processes from the ground up, in contrast to its traditional use as a way to analyze and improve existing processes.

**Guess who's coming to dinner**

"Design for Six Sigma" is like bringing a third-party to the table in discussions with the IT vendor, says Dittmore. "It helps both of us throw out our biases. No longer are we tyrannized by the vendor's terminology like 'optimization' or 'gap analysis.'"

Heartland has just begun to utilize Design for Six Sigma on specific components of the new IT platform: RIS (radiology information system), PACS (picture archiving and communication system), laboratory IS and patient registration/scheduling.

While Six Sigma allows for only 3.4 defects per million opportunities, Dittmore realizes that risk for error still exists to the extent an environment allows. Opting for the single, integrated system eliminates the risk associated with all the handoffs that take place as a result of multiple interfaces in the old best-of-breed system. "Even though you have Six Sigma, you still have risk for errors," he says, and that's why simplifying and streamlining is valuable in and of itself.

Some organizations are already using methodologies similar to Six Sigma. To wit, Heartland has used an approach called

PASTE (Problem, Analysis, Solution, Transition, and Evaluation) that involved 15 steps. By beefing it up with Six Sigma tools it has expanded to 48 steps, but management calls it PASTE Plus, not DMAIC.

### By any other name

“That’s our Six Sigma. We’re adapting Six Sigma to our existing model so we don’t confuse the culture,” says Dittmore.

The results have been impressive over the past two years. Heartland’s HMO, for example, wanted to implement auto-adjudication for claims as a way to reduce costs. A Six Sigma team was able to increase auto-adjudication 10-fold to about 70% of total claims from a previous 7%.

Another Six Sigma team focused on the revenue cycle and was able to add \$700,000 of annual net revenue to Heartland’s bottom line. Yet another team found a loophole for outpatient injections that snared \$620,000 in additional annual reimbursements from Medicare.

In terms of patient safety, teams centered on each of the components of medication administration—ordering, administration, distribution and documentation—have reaped benefits in reduced adverse events and cost avoidance, the latter of which does not necessarily appear on the bottom line.

### Stronger links in the Chain

A Six Sigma analysis of Heartland’s supply chain was able to cut supply replenishment to only three days a week from a previous two-a-day/seven days a week, resulting in savings for both FTEs and supplies.

Dittmore is quick to point out that not all Six Sigma initiatives do as well as these.

Success depends on the engagement of leadership, team motivation and other variables.

Both Six Sigma and Design for Six Sigma provide tools for determining what the customer’s or client’s—or patient’s—needs are. They help determine what you can do to not only meet the customer’s requirements but go beyond and delight the customer.

### Growing a culture

Six Sigma also stresses the need to understand the current state of how work is done in a given setting and how work processes intersect. Not understanding such factors when implementing new IT, for example, can easily make an error-prone system worse.

That happened a few years ago when Heartland acquired a new nursing documentation system. No one scrutinized existing processes before installing the new system and unnecessary tasks were carried over because nurses thought they were mandated—simply because they had become habitual. “Those processes had just grown up as part of the culture. That’s what culture does. They assume it’s written in concrete and it’s not,” says Dittmore.

### Conclusion

Like other studies of human factors, Six Sigma tries to identify not how a process—like medication administration—is *suggested* to be done but how it’s *actually* done. In this case, the information is derived from feedback from all shifts and a flow chart is developed. When gaps or problems are identified—when nursing requests medications from the pharmacy and it takes too

### Upcoming Events continued

Smith, RN, BSN, Clinical System Analyst, Rush-Copley Medical Center, Aurora, IL, will share their transition to a professional practice framework that includes an automated evidence-based clinical documentation system.

**October 1, “IT Consolidation ‘How To’ Part I”** Lynne Glickman, North America Consolidation Technical Lead at Hewlett Packard ([www.hp.com](http://www.hp.com)) will take us through the technical aspects of IT consolidation. She has managed the Consolidation Initiative for HP North America since April of 1999, and was involved in other significant Data Center, Server and Storage Consolidation projects and instrumental in the creation of the “IT Centrix Business Value Model for Server Consolidation”: one of several tools used by HP in financial modeling of consolidation. This discussion will be helpful for those managers and technical professionals who are actually implementing consolidation efforts.

**October 2, “SNOMED: How and Why to Adopt”**, Deb Konicek, Nursing Vocabulary Manager, SNOMED, division of the American College of Pathologists, will review the newly established public domain position of the SNOMED vocabulary, how you can adopt it, and what to expect as you work with your vendors in doing so.

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long, for example—then solutions like improving replenishment of “floor stock” is considered.

Typically, various solutions are prioritized according to what is easiest and least costly to implement. However, the scope of the “defect rate” can also determine a much more dramatic, say, 10-fold, change. For example, a defect rate of 30%—or, stated otherwise, a success rate of 70%—might dictate a 10-fold reduction to 3%. That could feasibly require investing in new technology to get to that level.

While Six Sigma is known for its heavy reliance on statistics, Black Belt Dittmore

says it is just as dependent on skillful facilitation and leadership to keep teams on track. “Six Sigma requires a lot more soft skills than most people think. The real trick is to guide and lead teams without being perceived as taking over. People have to come up with their own solutions. Many black belts don’t have a clue about the clinical setting.”

That might be the most important point of all concerning Six Sigma: in an age when vendors vie for the latest brand-differentiating concept, Six Sigma offers a systematic, objective tool for people to determine their own solutions.



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