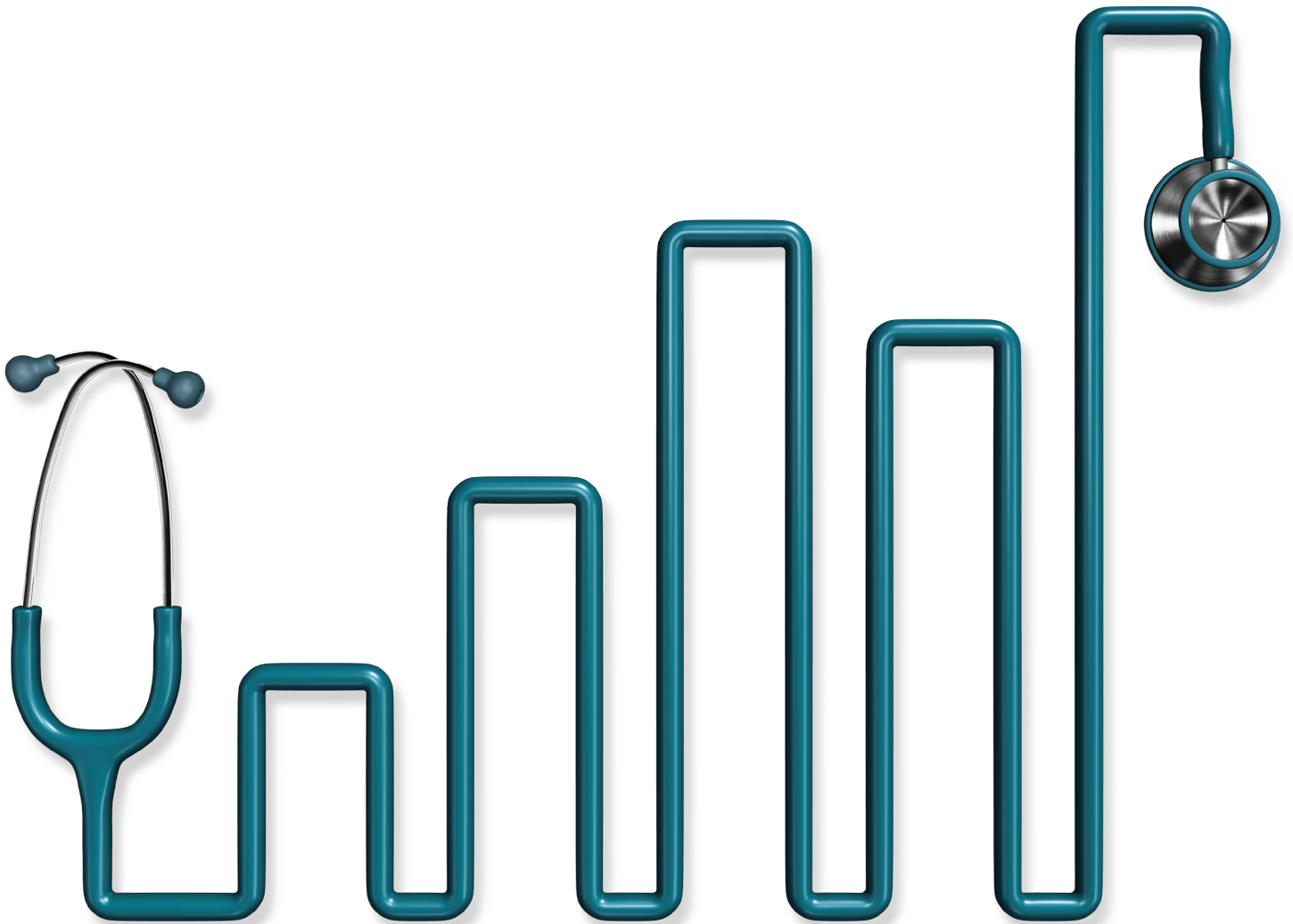


**Greater Rochester  
Health Foundation *and*  
Rochester Business  
Alliance *present:***



**The Process Prescription**  
How the business community is helping local health care providers to improve efficiency

## Introduction

Over the past few years, as the national health care debate raged, health insurance premiums climbed ever higher and spending on health care continued to increase, a quiet transformation has been taking hold in Rochester's hospitals and other health institutions.

Spurred by business leaders to take action, hospitals and other institutions have adopted practices pioneered in industry to streamline operations, eliminate waste and improve care for patients. It began in 2005, when the Rochester Business Alliance (RBA) brought together the CEOs of several companies frustrated by rising premium

improvement practices developed for manufacturing processes (such as Lean Six Sigma) to health care.

Each initiative has made its mark, with 150,000 employees participating in the "Eat Well, Live Well" challenge, the use of generics on the rise and the Rochester Regional Health Information Organization serving as a benchmark for the conversion to electronic health records statewide. But perhaps the most notable impact has come through the Lean Six Sigma initiative, which has not only reduced costs and improved patient care, but quietly sparked culture change in Rochester's health care institutions.

**"They not only voiced the reality that the status quo was unacceptable, they came to the table and lent their dollars and expertise to drive change."**

— Sandra Parker, President and CEO, Rochester Business Alliance

costs: Bausch & Lomb, Eastman Kodak Company, Jasco, Paychex, Wegmans and Xerox Corporation. Rochester Institute of Technology was also at the table, and the Greater Rochester Health Foundation (GRHF) provided expert advice, consultation and staff support to the effort.

"Business leaders really demanded action," said RBA President and CEO Sandra Parker. "They not only voiced the reality that the status quo was unacceptable, they came to the table and lent their dollars and expertise to drive change."

The group identified four priorities aimed at controlling costs and improving care: increasing the use of generic medications, promoting health-conscious practices through employer-based programs, improving the use of technology in health systems, and applying continuous

Businesses not only lent their process improvement experts to the effort, but also contributed dollars, including \$800,000 to start the technology improvements. RBA and GRHF pushed the effort past barriers with combined knowledge, influence and funding.

GRHF became the key funding partner and has provided grants totaling more than \$1 million to the major hospitals and other institutions.

"Those initial grants succeeded beyond what we had hoped for and increasingly moved into the fabric of the hospitals," John Urban, president of GRHF, said. "It moved from special project status into the mainstream."

Total reported savings by three hospitals, a health care center and a long-term care institution involved in the efforts are so far estimated at more than \$15.8 million.

### Lean Six Sigma: What is it?

Lean Six Sigma is a business management strategy originally developed by Motorola Inc. to improve quality by identifying and removing the causes of errors and minimizing variability in various business processes. The term "Six Sigma" came from statistical modeling of manufacturing processes.

Lean manufacturing is a management philosophy derived mostly from the Toyota Production System that focuses on reduction of waste in the production process. In recent years, some businesses have combined Six Sigma ideas with lean manufacturing to yield a methodology named Lean Six Sigma.

***Six Sigma projects often follow a methodology with five steps known as "DMAIC" for short:***

- Define the problem.
- Measure key aspects of the current process and collect data.
- Analyze the data to investigate cause-and-effect relationships and to seek out the root cause(s) of the problem.
- Improve or optimize the current process based upon data analysis.
- Control the future process to ensure that any deviations from target are corrected.

## St. Ann's Community



Medications now are easier to track at St. Ann's Community, because Lean Six Sigma improvements have replaced pill bottles with bar-coded blister packs. The change has increased medication accuracy by 64 percent.

It's not unusual for a resident of St. Ann's Community, a long-term-care facility for older adults, to be taking as many as 17 different medications. These medicines—not only pills, but also drops, injections and tablets crushed in food, like applesauce—are delivered by a nurse pushing a medication cart serving 22 or 23 patients over a two-hour period.

A recent project to increase automation has reduced errors and waste, cut costs by an estimated \$120,000 a year and reduced the time it takes nurses to dispense medicine.

St. Ann's converted the majority of its prescriptions to an electronic system that replaced pill bottles with blister packs labeled with bar codes. With blister packs, nurses can more easily pop out the required number of pills, rather than trying to shake one or two out of a 30-pill bottle. This has reduced by 38 percent the average time it takes a nurse to dispense one medication—from 16 seconds to 10 seconds. St. Ann's tracks this by timing nurses at random.

Financial savings have come from making the medications easier to track, and in some cases, reuse. Medications are scanned as they leave the pharmacy, and fewer medications are being reordered because a nurse cannot find what's needed on the cart. And when

medications are changed, the unused pills can be redirected because they are in sterile, sealed blister packs. This has produced both internal savings and savings to insurers as St. Ann's adjusts billing for recovered medications. The improvements have also increased medication accuracy (giving the right dose of the right medicine to each patient at the right time) by 64 percent.

An implementation team with members from across the system—pharmacy, information technology, quality, the foundation, nursing, administration, finance and human resources—met biweekly for months to prepare for and manage the change. Key to the project's success were commitment from top leaders and the involvement of front-line workers in decision-making. For example, as part of the change, St. Ann's purchased new medication carts. Nurses were invited to try out different carts and provide feedback.

"We worked through some of the concerns before we rolled out changes," said Bill Wilson, director of quality.

### The improvements have increased medication accuracy by 64 percent.

The focus on better tracking and accountability for medications has produced wider benefits, as doctors are thinking more about how to reduce the overall number of drugs that patients are on when they enter St. Ann's care system, weighing which ones are truly needed to improve their quality of life.

### Looking to the Future

St. Ann's staff members acknowledge that Greater Rochester Health Foundation pushed them to be more aggressive in setting goals for the grant.

"A lot of times in this process, we were really sweating," said Carolyn Slack, donor relationship manager for St. Ann's Foundation. But St. Ann's achieved the more ambitious goals.

The example points to the power of Lean Six Sigma efforts to continue stripping out unnecessary costs and streamlining operations with Rochester's local health care community.

"When people do this in industrial settings, they look for 40 percent, 50 percent improvements," Urban said.

With the business community and all who pay for health care—whether through premium cost-sharing with their employer, privately purchased insurance or tax payments to fund Medicaid and Medicare programs—searching for ways to make health care more affordable, Lean Six Sigma-style strategies will only become more important.

## University of Rochester Medical Center

Improvement projects at the University of Rochester Medical Center have focused on everything from reducing the incidence of ventilator-associated pneumonia to improving patient flow into doctors' offices and operating rooms. The medical center estimates annual savings of about \$10 million through the Lean and rapid cycle improvement teams' efforts.

Strong Memorial Hospital operates at an average occupancy of 98 percent on its adult services, so efficiently using beds and operating rooms is critical. One project aimed to speed

quarter of surgeries are not scheduled, so the hospital is also looking for ways to adjust how operating rooms are booked to maximize usage.

Improving the flow of patients has also been a focus in the medical center's orthopedics clinic, which handles 180,000 patients a year. Simple steps, such as mailing patients paperwork to fill out in advance of their appointments and advising them to wear loose-fitting clothing so they do not have to undress for X-rays, have helped in reducing wait times.

The rate of ventilator-associated pneumonia dropped from 5.75 per thousand ventilator days in 2009 to 0 in the fourth quarter of 2010.

admissions to the hospital from the emergency department. It began with mapping the admissions process in detail, laying out all the steps and information that must be communicated among different parts of the hospital.

The team worked to improve the flow of information and increase the speed and efficiency of actions—everything from faster communication to the admission office at patient discharge to better coordination with Environmental Services for room cleaning. As a result, the average admission time fell from 11 to 10 hours in 2009, to an average of eight hours now.

To improve efficiency in the use of operating rooms, the hospital is working to standardize its preoperative assessment and to ensure that all information and equipment are gathered in advance and ready when the operation is to begin. About a

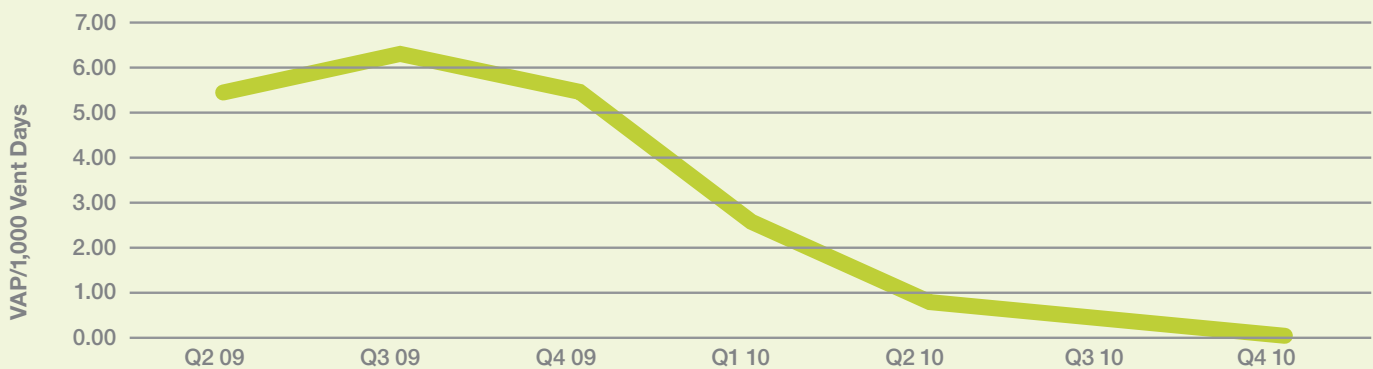
To target ventilator-associated pneumonia, staff members follow an evidence-based set of steps, including elevating the head of a patient's bed and following a regimen for oral care to reduce germs.

The rate of ventilator-associated pneumonia dropped from 5.75 per thousand ventilator days in 2009 to 0 in the fourth quarter of 2010.

A similar set of steps is followed to reduce the incidence of central line arterial bloodstream infection. Rates dropped from 3.98 per thousand line days in the first quarter of 2009 to 1.96 in the fourth quarter of 2010.

These infection-reduction efforts began to improve patient care and have reduced costs by about \$4 million.

**Strong Memorial Hospital Ventilator-Associated Pneumonia**



Through Lean Six Sigma improvements applied over 18 months, URMC reduced its rate of ventilator-associated pneumonia from more than five per 1,000 ventilator days to zero.

## Rochester General Hospital

At Rochester General Hospital, Lean Six Sigma efforts began in 2006 and have become critical to departments across the institution. Recent initiatives to improve the flow of patients through the hospital have targeted the sickest patients first: those entering the emergency room and needing to be transferred to the intensive care unit.

Research has shown that the longer patients remain in the ER before being transferred, the more likely they are to stay longer in the hospital and need ventilator support. And there's the potential for higher mortality rates.

When the team created a chart depicting the transfer process, it looked like spaghetti strewn across the page. It was taking an average of six hours from the time the decision was made to admit the patient to the ICU.

"There was a broken process. It was extremely complicated and convoluted, involving multiple individuals and multiple processes," said Dr. Robbin Dick, the emergency medicine physician leading the effort, along with CEO Mark Clement, the Lean Sigma office and its leader, Roopnarine Hazarie.

The process has been cut to two lines, and is based on having one nurse act as the single point of contact for an emergency patient transferring to the ICU. That means the nurse goes to the ER to see the patient and is accountable for physically bringing the patient to the ICU. The hospital has reduced the time to 90 minutes and hopes to cut it further.

To make that improvement, the team needed not only to streamline the transfer process but also to make more beds available more quickly in the ICU.

Lean Sigma leaders at the hospital estimated their projects in 2009 yielded bottom-line savings of \$800,000.

The hospital now works proactively to try to keep at least one ICU bed available, rather than waiting for a need to arise. This means having a plan to move the least-sick patient out if necessary, which necessitates having free beds in other units, such as the pulmonary and stroke units.

Dr. Dick said the success of this project has hinged on changing the culture at the hospital. Part of that has been holding people accountable to goals, and if they can't meet them, figuring out what changes need to be made and who has the authority to make them.

Along with the development of internal Lean Six Sigma experts, the engagement of medical champions for the initiatives has been critical to their success.

"If you don't have a physician champion, then you're going to have a difficult time sustaining the gains made through Lean Six Sigma initiatives. A physician champion brings support and credibility to the work of the Lean Six Sigma team, which is usually made up of non-clinical personnel," Hazarie said.



Since 2006, members of the Rochester General Lean Sigma team have presided over dozens of process-improvement projects, from cutting the time patients spend in post-anesthesia care to reducing errors in the labeling of pathology samples.

The hospital has completed dozens of other Lean Six Sigma projects, improving a range of processes from post-anesthesia care to the labeling of pathology samples. While much of the work is complex, some examples are simple: female patients had been delayed going into surgery while waiting for lab pregnancy tests, which are a standard pre-surgical requirement. The hospital switched to home-style pregnancy tests, which give results in minutes.

The hospital has also developed its own Lean Sigma Practitioner Academy, providing employees with homegrown training tailored to the health care setting. Two classes of 23 employees have so far graduated and received the internal certification.

Lean Sigma leaders at the hospital estimated their projects in 2009 yielded bottom-line savings of \$800,000 and cost-avoidance savings of \$900,000. And the work has the potential for transformation above and beyond financial impact—including the work-process benefits that will come through implementation of an electronic medical record system.

## Unity Health System

A project to reduce hospital stays for pneumonia patients cut the time by 40 percent and was one of more than 40 projects at Unity Health System that have resulted in about \$4 million in savings and cost avoidance.

A typical pneumonia patient is admitted to acute care from the emergency department. The average patient age is 74, and nearly half have hypertension. Before the project, led by Dr. Nayef El-Daher of the infectious disease unit, more than half of patients were in the hospital longer than the target of three and a half days, and the average stay was nearly four days.

A pilot study in fall 2008 in two acute care units aimed to reduce the average length of stay and increase the percentage of patients going home earlier than that from 50 to 60 percent, without increasing the number being readmitted to the hospital.

During the study, 82 percent of pneumonia patients in pilot units were at or below the target, while only 50 percent of patients in control units met the target.

Staff members optimized use of the guidelines for switching from intravenous to oral antibiotics, and improved communications on when patients should be switched.

The changes were implemented in all units in April 2009, and lengths of stay declined from the 3.8-day average to 2.3 days. The hospital not only managed to send patients home sooner, it increased revenues by \$119,000 in 2009 by treating additional patients using the freed-up beds.

Lean Six Sigma efforts at Unity began in 2007 when a loaned executive from Eastman Kodak Company led several projects. Unity's executive management team attended Lean Six Sigma training at Xerox Corp., and in 2008 Xerox provided training to more than 60 employees. Unity created a Department of Operational Process Improvement by hiring Catherine Lee, a Lean Six Sigma leader from Johnson & Johnson.

Unity also has used Lean Six Sigma principles in billing. One project focused on the process for handling patient refunds. The project team used value-stream mapping to streamline



Among its successes, the Unity Operational Process Improvement team reduced the time required to process a patient refund from 40 to six minutes, and lowered the backlog of refunds by 85 percent.

*From left, Luz Flores Lee, John Rocco, UOPI Director Catherine Lee, and Darlene Ryan.*

the process, eliminating some requirements to double-check that a patient was entitled to a refund. The average time to process a refund decreased from 40 to six minutes, and the backlog fell by 85 percent.

Unity recognizes that Lean Six Sigma can be a huge culture change. The system's objective is "to move process improvement from a push to a pull," said Joyce Zimowski, senior vice president. This means staff members will want to implement process improvement on their own and will have the tools and management buy-in to do so.

The changes were implemented in all units in April 2009, and length of stay declined from the 3.8-day average to 2.3 days.

## Anthony Jordan Health Center

Anthony Jordan Health Center serves a population that is 68 percent African-American and 27 percent Hispanic, with a median household income of just \$12,000. Only 2 percent of patients have private health insurance, while 78 percent receive government-funded insurance such as Medicaid, and about 20 percent are uninsured.

What's more, the center must manage a no-show rate averaging 30 percent, which reduces productivity and revenue, and limits the access of other patients who could be treated.

Using Lean Six Sigma principles, Jordan managers are trying to increase their capacity to see patients through a series of projects large and small—everything from reminding patients of appointments, to better organizing exam rooms to redesigning the typical doctor's visit.

"The methodologies used in industry apply directly, since the core problem is managing supply and demand," said Lou Schneider, a managing consultant for the projects, formerly with Xerox Corp.

The team is working to maximize the use of doctors' and other staff members' time during appointments. A first step is pre-visit planning to ensure that all necessary records are part of the patient's electronic medical record. Medical assistants, rather than licensed practical nurses, bring patients into the room, checking vitals and discussing the problem that brought the patient in.

The doctor focuses time on diagnosis and treatment of the one or two most pressing problems the patient has, rather than trying to help with all the problems a patient might have. After the doctor finishes, a licensed practical nurse reviews with the patient what the doctor said, discusses steps to take and answers questions.

Daniel Rodriguez, an LPN who was part of a three-day trial of the new-style visit, said he thought it was a huge success. Rodriguez saw one woman in her 50s who initially was resistant to undergoing recommended screening, including a mammogram and colonoscopy. Under the new visit design, he had the time to help her see the importance not only to herself, but to her family, of agreeing to the tests.

Now the team is working to refine the model and implement it across the center. Several problems must be solved, including making it work in the available space.

The team also is working to reduce the no-show rate through additional reminder calls to patients. In one trial, the call center made three calls leading up to the appointment and found that they reduced no-shows significantly. The center is considering texting patients, which could be automated and would work even if patients had run out of minutes on pre-paid cell phones.

"My goal is that Jordan becomes a showpiece. I think it can be," Schneider said. "While we need to increase provider capacity, there is no reason we can't improve patient care, patient satisfaction and staff satisfaction at the same time."



Lean Six Sigma efforts at the Anthony Jordan Health Center have improved efficiency for physicians and other providers, who now benefit from standardized exam rooms where it's easy to find supplies, and identify plugs or batteries for laptop computers.



**John Urban**  
President

Greater Rochester  
Health Foundation

“Process improvements can help to make the system work better and improve community health, which is why GRHF is pleased to fund this initiative. The kinds of improvements our health systems are making can help return Rochester to its status as a national model community for cost, quality and access to health care.”



**Sandra Parker**  
President and CEO

Rochester Business  
Alliance

“While Lean Six Sigma started as an improvement method for manufacturing, its extension into health care is positive for everyone in the community. The RBA applauds the local businesses that are lending their expertise, the health organizations that are streamlining processes, and the Greater Rochester Health Foundation for funding this important work.”



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