Healing Healthcare

BY ELAINE SCHMIDT

"Do no harm." While that familiar dictum was never part of the Hippocratic oath, it has long been considered one of the precepts of medicine.

Yet in 1998 the Institute of Medicine in the United States concluded: "The burden of harm conveyed by the collective impact of all of our health care quality problems is staggering." According to a benchmark institute report on patient safety issued in 1999, "A substantial body of evidence points to medical errors as a leading cause of death and injury." Diagnosis: Healthcare was ailing.

In 2001, the Institute of Medicine further addressed quality issues and set six aims for healthcare – care should be safe, effective, patient-centered, timely, efficient and equitable. Today more than ever, hospitals struggle with those challenges, along with the pressure of keeping up with advancing technologies, rising costs for drugs and equipment, increased competition and the Medicare dilemma.

As healthcare attempts to heal itself, many institutions, including three of the top 10 on the *U.S. News & World Report* list of America's Best Hospitals, are applying the science of Six Sigma as part of the treatment.

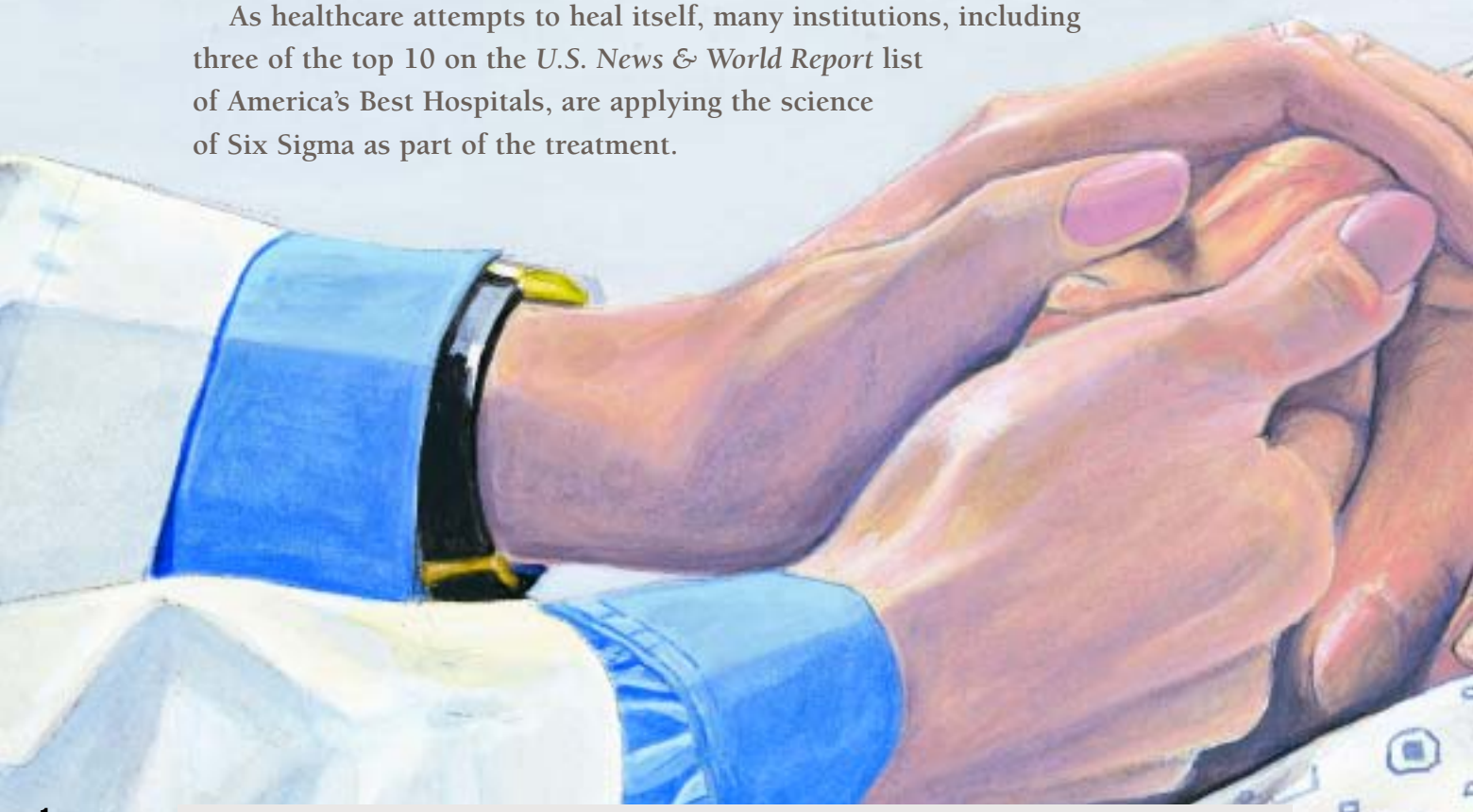

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ILLUSTRATION BY BETTE LEQUE

The Johns Hopkins Hospital

Patient safety was one of the catalysts for deploying Six Sigma at The Johns Hopkins Hospital.

"We had one of our pivotal safety moments because of the death of pediatric patient Josie King," said Deployment Leader Laura Winner. King died as a result of a medical error in 2001. "We've aligned the priorities of how projects are determined with the Institute of Medicine's aims of safety and efficiency," Winner said.

A nurse who has been with Johns Hopkins for 15 years, Winner received Green Belt training in 2000, when the radiology department began "dabbling" in Six Sigma. A hospital-wide deployment, blending Six Sigma and Lean Six Sigma into a program called Lean Sigma, followed four years later.

Now a certified Black Belt, Winner understands the delicate balance of providing exceptional patient care – and paying for it. "Johns Hopkins has financial constraints like everyone else in healthcare," she said. "But this couldn't be about the money; it had to be about improving quality and safety."

Winner said the Six Sigma program started out as a test of concept to provide tools for clinical staff to improve patient care processes. Anyone from the various clinical departments who was interested in the training was invited; about 20 people participated.

The deployment at Johns Hopkins has not been top down. "We are just making it available to the staff," Winner said. More than 75 Green Belts have been trained to-date.

One of the lessons Winner learned from the early training classes was that the examples needed to be healthcare specific. She recalled a training example that involved measuring the thickness of the sugar on a glazed donut. "We were constantly asked how this applied to healthcare," she said. Today, the trainees are given examples and exercises that are tied to issues in operating rooms, emergency departments and other healthcare scenarios.

The Lean Sigma program provides Green Belt training to nurses, physicians, administrators, radiology technologists, pharmacists, and others – all of whom remain in their regular positions. "We wanted to make sure that the front-line staff would be able to apply these tools," Winner said.

While the hospital has trained more than 75 Belts internally, it also has brought in expertise from outside healthcare. Richard Hill, hired in 2004, came from the aerospace industry to infuse the institution's Lean Sigma program with a fresh, non-medical perspective. More recent additions to the Lean Sigma team include two GE-trained Master Black Belts, Robert Hody and Anselmo Chung.

Bringing Lean Sigma tools from other industries to healthcare involved a medical learning curve, Hill said

Inside Three of 'America's Best Hospitals'

Institution	The Johns Hopkins Hospital hopkinshospital.org	Mayo Clinic mayoclinic.org	NewYork-Presbyterian Hospital nyp.org
			
Headquarters	Baltimore, Md.	Rochester, Minn.	New York City
Founded	1889	Late 1890s	1998 (New York Hospital – 1771; Presbyterian Hospital – 1868)
Employees	9,034	53,208	15,078
2006 Revenue	Not available	$6.29 billion	$2.6 billion

– but not a Six Sigma learning curve. "I was really a little hesitant at first," he recalled. "But after the first meeting I realized that a process is a process. There's no difference. Whether you're giving someone an X-ray or X-raying a part of a plane, both are totally fallible."

Both are also improvable. Hill described a blood waste project he led in 2005.

"We buy all of our blood from the American Red Cross," he said. "Prior to the project, we had blood waste of 4.2 percent." Some of the causes of waste identified in the project were defects in the blood-packaging process. Units of blood must be packed in contact with ice in insulated containers and are rendered unusable if they separate from the ice, he explained. If blood reaches temperatures above 10 C, it has to be discarded.

The project showed a lot of variation in the interpretation of the existing temperature indicator used to measure blood temperature and led the hospital to switch to a more accurate and reliable measurement device. Simple changes in the way blood units were packaged and chilled solved the other major issue.

"From project inception, we have reduced blood waste to less than 2 percent of units issued, resulting in a savings of more than 2,500 units and over $500,000 dollars," Hill said.

Such projects have the potential to benefit the entire healthcare industry.

Mayo Clinic

One of the recent improvement projects at the Mayo Clinic also has huge implications across healthcare. "We shared our information with [the United Network for Organ Sharing]," said Todd Bille, a planning analyst and co-designer of the clinic's process improvement program. "They considered it as one of the top enhancements for transplant patients in the nation [in 2006]."

The Mayo Clinic has the largest transplant program in the United States, performing more than 1,200 transplants a year. Historically, an average of 45 days elapsed from a new patient's initial contact with the Rochester Transplant Center to setting up an appointment. The goal of the project was to develop a one-call process, granting patients an appointment upon initial contact.

"We were able to reduce the cycle time from 45 days to 3 days by taking out lots of steps on the basis of what's value added and what's not," Bille said.

Since 2006 the Mayo Clinic has been using a blend of Six Sigma, Lean Six Sigma and other methodologies, incorporated in a program it calls the Mayo Quality Academy. But the concept of quality is nothing new at the institution; it's part of the Mayo DNA, Bille said.

Will and Charlie Mayo, the doctors who joined their father in a group practice in the 1880s, were known in the early 1900s for their benchmarking studies. It was at the Mayo Clinic in 1907 that a Dr. Henry Plummer devised a codified medical record system that is essentially the patient chart system in use today. His idea was that a standardized medical record should follow a patient throughout their life, regardless of how many doctors they might see. In a 1910 speech, Dr. Will Mayo verbalized the Mayo Clinic's commitment to patients: "The best interest of the patient is the only interest to be considered" – which has evolved into today's credo, "The needs of the patient come first."

"Healthcare isn't just a transaction," Bille said. "In healthcare we aren't talking about warranties and costs. We're talking about human lives. How can you decide not to go to a 6-sigma level of performance when there's human life at stake?"

About 34,000 employees are engaged in patient care, research and education at Mayo Clinic locations in Minnesota, Florida and Arizona. The institution teaches Six Sigma and the other methodologies through a curriculum called TEAMs – Together Everyone Achieves More. "We do not do training of Belts; rather, we focus on teams," Bille said.

A department or area experiencing a specific problem signs up as a team to participate in the Quality Academy, Bille explained. Once the problem is determined, the team of three to eight members selects an

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>
> *–Todd Bille, Mayo Clinic*

improvement project that focuses on the particular problem, using the DMAIC model as a project roadmap. Participants, about 70 to 80 per class, go through 70 hours of classroom training taught over a series of nine days during a three-month period. The training is tailored to the problem, making use of tools from the different methodologies as needed. The team is expected to complete the project within 100 days. About 400 people have participated in the program.

One of the Mayo's success stories lies in the reduction of cycle time in treating patients who come in with a potential heart attack. "The industry standard for cycle time of heart attack patients is 120 to 150, even 180, minutes from the time they come in the door to catheterization," Bille said. "Now, Mayo's cycle time is 100 minutes."

One of the factors in reducing the time was to have the appropriate on-call staff accessible to the hospital, even during bad weather. "We occasionally have bad weather here in the middle of winter," Bille wryly observed. "During a snow emergency, we have our staff stay at a nearby hotel so they can get here more quickly."

Among the current issues being looked at is the physically structured working environment in the radiology department. "We have employees walking the equivalent of a football field to provide service to a patient," Bille said. Complicating the solution is the

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–Mary Cramer, NewYork-Presbyterian Hospital

Applying Six Sigma in Healthcare

Diagnose your environment. From her experience at Johns Hopkins, Deployment Leader Laura Winner advised that anyone contemplating a Six Sigma deployment in a healthcare environment "really think about the culture you live in. There's not one approach that's going to work for everybody. If you are in a community hospital, for instance, you might be able to do a top-down deployment," she said. "If you're in an academic hospital that's big and decentralized, you may need to figure out where you're going to get resistance and what would work best for you."

Consult the process owners. Mary Cramer said that part of NewYork-Presbyterian's success has come from involving the experts of any given area in the project. "Six Sigma is data driven and evidence based," she said. "Clinicians are scientists. When we demonstrate that the data are valid and that we have gone through rigorous methods to collect and analyze the data, then we've got them."

Don't beat the money drum. "Don't get into it just to save money," Johns Hopkins' Richard Hill said. Healthcare professionals are motivated more by issues of patient safety and providing quality care.

Operate with the right tools. "You can use a stethoscope for a tourniquet," Mayo Clinic's Todd Bille said, "but it's probably better for listening to the heart. You have to have a certain amount of flexibility to use the right [improvement] tool at the right time."

Practice your bedside manner. Winner said it's important to make clear to hospital staff members that freeing up some of their time through the improvements created by a Lean Sigma project is not going to mean a head reduction. "You need to reassure employees that you will find value-added activities to fill the time you're freeing up."

need to work around structural walls and the lead shielding that protects healthcare workers and others from the radiation.

"We have some huge issues in physically moving things around," he said. "But gaining 5 to 6 minutes per patient would allow us to scan one more patient per day and avoid the need to buy another scanner at a cost of millions of dollars."

NewYork-Presbyterian Hospital

The hospital of Columbia University and Cornell University, NewYork-Presbyterian is a 2,300-bed, five-campus institution created by the 1998 merger of Columbia Presbyterian and New York Hospital. "This is an enormous place with bureaucracy that can be difficult," said Master Black Belt Mary Cramer.

The hospital deployed Six Sigma in 2004, tying it to the hospital's strategic initiatives. "We wanted to enhance teamwork and increase efficiency," Cramer said. "We needed something dramatic." She was one of the first wave of 10 hospital staff members selected for training during the second half of 2003, and now co-leads the Performance Excellence department.

"Our emphasis is tilted toward looking at the systems and processes of care," Cramer said. "Our projects do not get into whether we should use this or that antibiotic or surgical technique. But if we're going to use medication, we want to make sure to get it to the patient quickly and accurately."

Explaining the sort of issues on which the Black

Six Sigma Snapshot

Institution	The Johns Hopkins Hospital hopkinshospital.org	Mayo Clinic mayoclinic.org	NewYork-Presbyterian Hospital nyp.org
			
Deployed	2004	2006	2004
No. of Belts	GB: > 75 MBB: 4	> 400 people have participated in program	GB: > 200 BB: > 26 MBB: 4
No. of Projects	> 20 active > 17 completed	Not applicable	> 50 active > 300 completed
Financial Benefit/Savings	Unknown	Unknown	$75 million to $100 million
Six Sigma Goals	Improve the safety, quality and efficiency of the hospital's care delivery system; create a culture of continuous improvement; broadly share results and lessons learned; offer a healthcare-specific curriculum to other healthcare organizations	Improve and demonstrate quality, safety, service and value	Enhance revenue; improve inpatient and emergency department throughput/efficiency

Belts might focus, Cramer said that in addition to the purely medical services it provides, a hospital does everything a hotel does, from making and delivering food, to changing bed linens and towels, to checking people in and out. These areas and processes are ripe for the application of Six Sigma, she said.

Identifying opportunities for improvement has its own process, which starts with looking at existing data. "If we look at throughput or revenue data, we know where the opportunities are. We will then go back and talk to the people that are close to the process and ask if our recommendations for projects make sense to them," Cramer explained.

"What we are suggesting may not actually be an issue. We get the VOC [voice of the customer] from those close to the processes." She added that Black Belts always work closely with the people in the areas they are analyzing, because those people are the content experts.

The hospital breaks down bureaucracy by vetting with leadership before launching projects and making changes to processes. "If it is deemed that we want to reduce wait times in the emergency department, we will do a very detailed process flow analysis of the department," Cramer said. "We will look at where the bottlenecks are and which of them will provide us with the greatest opportunities for increasing flow. Then we go back to the leaders and say: This is what our analysis has revealed."

Black Belts, who are recruited from every layer – from physicians and nurses to finance and administration – are there to "improve the infrastructure," she said. Once trained, they move into two areas in which the hospital has determined they can be most effective. One-third of them go to work on revenue projects, looking at such things as reducing denials from insurers and increasing efficiency of registration processes. Two-thirds concentrate on projects designed to improve patient access or throughput.

Much of the time a patient spends in a hospital is waiting for treatments, tests or results. Cramer explained that a project might focus on one small facet of a patient's stay, such as getting from the front door through registration more quickly or shortening the length of time for results to come back from the lab or radiology. "If we are discharging a patient to a nursing home, we can make sure it doesn't take days to make those arrangements," Cramer said.

"We have reduced what we call our variance on length of stay by 13 percent at our Cornell campus and 26 percent at the Columbia campus," she said. Those reductions have enabled the hospital to serve more people. Inpatient discharges grew from 105,000 in 2004 to a projected 111,700 in 2007. "We also know what the cost savings is for every day we reduce length of stay," Cramer said.

> *"Money doesn't resonate with clinicians; [a process improvement program] has to be about patient safety and quality of care."*
>
> *–Laura Winner, The Johns Hopkins Hospital*

A Quality Treatment Plan

Cost savings is often a result of improving healthcare processes – even if it is not the driving force.

Of the blood waste project at Johns Hopkins, Hill said: "We went into it for the right reasons, saving this precious resource and stopping staff dissatisfaction with the waste of that resource, and ended up saving a lot of money."

While healthcare professionals must be sensitive to the reasons for launching a quality program – as Winner said, "Money doesn't resonate with clinicians; it has to be about patient safety and quality of care." – saving money can mean even better patient care when those funds are re-invested into the hospital.

Hill and Winner point to Jack Welch's mantra: "Do the quality and the money will follow." Those are compelling words for a profession that cannot afford to not put the patient first. ◆

Editors' Note: Since her interview with iSixSigma Magazine, *Mary Cramer has moved to a new Six Sigma role with Massachusetts General Hospital.*

More on Six Sigma in Healthcare: "Why Wait?" on page 67 details how Valley Baptist Medical Center-Harlingen cut wait time in labor and delivery triage.

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