The First Healthcare Quality and Efficiency Revolution

Excerpt from *Skin in the Game: How Putting Yourself First Today Will Revolutionize Healthcare Tomorrow* by John H. Hammergren and Phil Harkins

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Ernest Codman, who lived from 1869 until 1940, was one of the Boston elite. He graduated from Harvard Medical School in 1895 and interned at Massachusetts General. A top surgeon at MGH, and a professor at Harvard Medical School, he also co-founded the American College of Surgeons, an organization that included such noted figures as George Crile, founder of the Cleveland Clinic, and Charles Mayo, founder of the Mayo Clinic. But despite his pedigree and station, Codman threw away his professional reputation and affiliations in a zealous crusade for a simple idea. Codman believed that the quality of care a hospital provides should be measured objectively in terms of end results, and that such data should be made publicly available to provide physicians with standards for improvement and "consumers" with the information to make informed decisions. To many in the establishment of the time, his idea was far too radical and threatening to be adopted.

For centuries, surgery had been held in contempt by patients and doctors alike, and surgeons were considered little more than butchers. By the early 1900s, however, with the rise of the great hospitals and their affiliations with the great medical schools, surgery had finally become a respected practice. Yet, in Codman's view, surgery was still not a science because it had done little to adopt standardized best practices, and hospitals were not doing enough to ensure that patients receive the best scientifically validated treatment known.

Codman described the end results idea as, "the common-sense notion that every hospital should follow *every* patient it treats, long enough to determine whether or not

the treatment has been successful, and then to inquire 'if not, why not?' with a view to preventing a similar failure in the future."[1] The technology for the system was a simple "end results card" assigned to each patient, that included data cells for descriptions of the patient's condition, the initial diagnosis, the course of treatment prescribed, the benefits and complications of the treatment, the diagnosis once the patient was discharged, and follow-up analysis for a number of years after. In his own practice, Codman's end results cards included 141 deaths that occurred during his fifteen years at Massachusetts General and another 337 cases after he left to practice surgery on his own. Codman did not limit his data to pro forma observations, he made qualitative judgments about the outcomes, particularly when the result was failure. He ruthlessly determined whether the fault was due to the skill of the surgeon, a lack of equipment, preventable errors, some behavior or attribute of the patient, or the disease itself.

As in our own time, many who worked in health care during Codman's day believed that health care results could not be measured because there was too much variation between patients and conditions, and medical treatment involved more art than science. Codman disputed these notions in industrial terms by claiming that the only significant "product" of a hospital should be the results of the treatment provided there. He believed that high quality results should be standardized so they can be reproduced in other settings, the way an industrialist would copy best practices in one factory and apply them to all others to achieve consistent low price production. In this way, Codman was pushing the link between science and management in order to measurably improve the overall quality of care.

Codman knew that in practice surgery led to constant experimentation based on particular conditions. But if those "experiments" were never recorded or collected, any innovations or process improvements only benefited the individual physician and no one

[1] Chicago Tribune, "Staph Infections Rampant" June 25, 2007

else. By focusing on results – and the means by which those results were achieved – a chief surgeon could assess the performance of his staff physicians and reward them or coach them accordingly. Reaching further, Codman hoped to build an entire system for improving the efficiency and quality of care. Physicians would submit their end results cards to the American College of Surgeons or some other review body. Innovations would be surfaced quickly, evaluated effectively, and circulated to other hospitals. Those hospitals would then be responsible for monitoring and adopting the latest in best practices to the benefit of patients.

This notion had tremendous implications not only for the science of surgery but for the business of running and "marketing" hospitals. For instance, as a hospital administrator, Codman was acutely aware of hospital costs. Efficiency for Codman meant eliminating unnecessary hospital visits, prolonged stays and avoidable errors because these cost money. In addition, Codman declared that assessing end results allowed a hospital administrator to eliminate useless or less effective procedures to further reduce costs. As Codman put it: "The prevention of waste and the judgment of the proportion which each item should take, in order to be sure of a product – the satisfied and relieved patient – is the essence of good hospital management. This idea… has never penetrated hospital managements. Their minds have been satisfied with treatment, not with the good results of treatment." (246)

Codman imagined that hospitals run efficiently – meaning those that obtained the best results with the least waste – would stand out in the marketplace and be rewarded accordingly. At the time, according to Codman, hospitals obscured performance results deliberately and patients were in the dark about where to go for the best care. As Codman observed, "No one, be he rich or poor, knows whether he really has the services of a good surgeon… because [hospitals] do not find out which surgeons get the best results, and let the public know." (248) Codman urged hospitals to make their

results public so that general practitioner physicians recommending treatment would know the best place to send their patients. Despite personal misgivings that rankings would become a form of crass advertising, he advocated for hospital and surgeon performance measures to be published in order to inform the marketplace.

In this way, Codman was the prophet of a more rational health care marketplace. He imagined a day when surgeons who were good at one particular procedure would concentrate on that and make it their specialty, thus earning top dollar for their repeatedly demonstrated skill. He also envisioned that hospitals would go the same route, and forcefully criticized the common practice of every hospital accepting every patient regardless of the aptitude or capability of the institution to treat that patient. Instead, if patients and prescribing physicians had sufficient information to make informed decisions, they would be rational actors and naturally choose the best hospital at the best price for a particular condition and avoid hospitals that performed poorly or charged more than the value of the procedure. Such free-market competition would force hospitals to develop niche services, thus increasing the volume and quality of their work while lowering the price. Codman derided the fact that a doctor's or hospital's reputation and network of relationships were the primary means by which it was able to charge fees; and instead, envisioned a system in which the market rate for a surgeon's service would depend on his public record of performance. In a statement that still rings loudly today, he argued that the only thing that mattered to a patient was a surgeon's or a hospital's results, but such information was never made available. "Secrecy is the peculiar disease of efficiency," Codman stated, and publicity was the cure. (250)

Codman's belief that hospitals and physicians offer a product for sale in an imperfect marketplace is still a radical notion today. It is not surprising, therefore, that Codman experienced great difficulties in his lifetime. Like a bull in a china shop, his obsession with the end results idea wrecked many of his relationships.

To prove his theories, he resigned from Massachusetts General and opened a hospital of his own, moving his surgical practice from the vaunted halls of Mass General to a little house in a shabby part of the city where he had twelve beds for patients. It was a rash choice, but Codman believed he needed to be able to work outside the establishment to be free of the restrictions of stodgy trustees and less reform-minded colleagues. Why pay a high price for substandard work, he asked, when you can be guaranteed quality at a reasonable price? His hospital's motto was, "A Hundred Dollar Hospital with a Hundred Dollar Surgeon," and he advertised a clear fixed fee for care. This put the onus on his surgeons to be as efficient and results-oriented as possible. No one was accustomed to thinking about health care and medical practice as a business. Nevertheless, Codman practiced what he preached. His hospital used the end results system faithfully, and he published and distributed the data to the public and the heads of major hospitals in the hope of winning converts.

But for all his brilliance, Codman's ideas never gained institutional support. His arrogance did not help matters. At a meeting of top surgeons and administrators to discuss the theme of hospital efficiency, Codman unveiled a cartoon he'd drawn which depicted the citizens of Boston as an ostrich with its head stuck in the sand, surrounded by greedy Harvard doctors and hospital administrators collecting a slew of golden eggs which represented money paid for unnecessary surgical procedures. The point wasn't subtle and wasn't well-received. No one liked being told they were taking advantage of an unwitting public.

Great events also got in the way. Codman blamed his failure to advance his ideas on the outbreak of World War I. The chaos of the war and the devastating flu epidemic that killed millions around the world made the implementation of any rational system difficult. Even so, Codman was able to organize an emergency hospital with an end results system in Halifax, Canada, after the Great Halifax Explosion left thousands

dead and injured. Still, by the time the war had ended, Codman was broke and his hospital had been closed. For the rest of his career, he concentrated his considerable brilliance on an “end results” study of bone cancer. At the end of his life, Codman viewed that study as his one lasting legacy to the world.

It is my view, however, that the final chapter of Codman’s legacy has not yet been written.

The Low Cost, High Quality Shift

Codman’s approach to standardizing best practices can have an incredible impact on the quality of health care. A particularly strong example comes from the world of obstetrics.

Human birth, that most miraculous and yet natural of events, generally takes place in a hospital in this country. Although the procedure is so common it can seem routine, every parent knows that it is not. Much can happen during labor to create moments of uncertainty, anxiety and real risk. If a crisis occurs, we soon appreciate the advances of medical science and may gain renewed awareness that for thousands of years, giving birth has been the most traumatic and life-threatening moment in a woman’s life. Today, in the 4 million births that take place in the United States every year, the chances are excellent that everything will turn out right for both newborn and mother.

In fact, it didn’t always look as though we’d manage such progress. One of the greatest technological developments in obstetrics occurred in the 1600s with the invention of the forceps. Although considered primitive today, forceps saved many lives by allowing the doctor to pull a stuck baby out of the birth canal. Amazingly, their inventor and the early practitioners, kept the technology secret for almost one hundred

years because it gave them a competitive advantage. When knowledge about forceps finally spread in the mid-eighteenth century, they were soon a common tool for doctors.

By the 1930s, as antiseptics, blood transfusions, and labor-inducing drugs became available, more women began having their babies in hospital. A 1933 study of maternal deaths, however, threw cold water on the idea of medical progress. The maternal death rate had not improved with the shift to hospital deliveries, and newborn deaths had actually increased. Moreover, two thirds of all those deaths had been preventable. Despite access to the best medical technology, doctors did a worse job delivering women in hospital than midwifes did in the home.

The problem was that doctors did not always know what they were doing, and the reason was a lack of standardization. Over the following decades strict regulations were instituted, training regimens mandated, and precise steps in procedure established. Every time there was a maternal death, it was analyzed to see where things had gone wrong and how standards could be improved. By the 1950s, maternal deaths had fallen 90 percent. The newborn death rate had improved little, however, and was still a major concern until a simple metric changed everything.

The Apgar Score was created by Virginia Apgar, a brilliant doctor and anesthesiologist. Dr. Apgar was dismayed over the frequency with which unresponsive or blue infants were allowed to die untended. Her simple ten point score assessed a newborn's condition on five aspects – Appearance (skin color), Pulse (heart rate), Grimace (responsiveness), Activity, and Respiration – and assigned points for how well the infant was doing in each category. Using the score, nurses and doctors could easily make an objective and clear assessment. What's more, they tended to work harder to raise the score to an acceptable level when it was low, and to try to generate better scores overall. During the fifty years that followed, tracking simple objectives and measures, the field of obstetrics managed the balance between constantly upgrading

standards to improve reliability and continuing to innovate to improve care. Today, giving birth is extremely safe for mother and newborn.[2] In fact, recent studies show that newborn deaths in the U.S. are down to 6.3 per thousand births, while maternal deaths during childbirth are down to just one in every ten thousand live births!

I believe that quality should be measured in outcomes – lives saved or improved, procedures implemented successfully, errors reduced, customer satisfaction raised. This spirit needs to be implemented in all aspects of health care and at all stages of the care cycle. In my view, the problems hospitals face are so persistent because hospitals have not adopted the operational quality and service standards common in a competitive business market. For many people – including physicians, patients, and policy makers – the idea of running a hospital, and health care in general, like a business is anathema. For some reason, we believe that the practice of medicine is more art and craft than it is business and science. But if we industrialize health care, as if it were any other business, we can make it lower cost and higher quality at the same time. Today, some pioneering health systems are making that exact shift with dramatic results.

Geisinger Health System in central Pennsylvania, for example, decided to overhaul its elective heart bypass surgery as a way of reducing its costs and providing higher quality care. To do so, Geisinger's cardiac surgeons first came up with a checklist of 40 best practice action items. Although Geisinger did not force surgeons to follow every item, the very existence of the list became a strong reminder of all the steps that needed to be taken before cardiac surgery. Now, the culture of the hospital is to cancel an operation if any step has been forgotten.

In a move that would make Codman proud, Geisinger combined this thoroughness of approach with a fee structure for service that incentivizes quality outcomes. Geisinger charges insurers a flat fee for the surgery plus half the amount that

[2] The Score: How childbirth went industrial by Atul Gawande, New Yorker, October 9, 2006

would normally be charged for related care over a 90 day period following the surgery. In effect, this 90 day half price charge functions as a guarantee of quality – you don't pay more if they make a mistake and they are incented to do it right the first time. In most hospitals, by way of contrast, an error or a poor outcome arising because of surgery requires extensive post-operative hospital care, which the hospital is able to charge to you or your health insurer for. In other words, mistakes and low quality treatment are, perversely, to the hospital's benefit since it generates more revenue. This is one major reason why the overall cost of health care continues to rise as quality lowers – high cost oftentimes does equal low quality. In Geisinger's case, the hospital absorbs the costs if post-operative hospital care is necessary, and does better financially if surgery has a high quality outcome and further care is not needed. Geisinger is trying to replicate this approach in other surgical areas such as hip replacement surgery and thereby expand its offerings to encourage health insurance systems to include its system in their offerings. Geisinger has even branded its service as ProvenCare. For a small health care system in the middle of central Pennsylvania, this is a remarkably effective market-based approach to competing with the larger and more famous hospitals.[3]

Today, Codman's efforts at driving efficiency and improving quality and service have a great deal in common with the Six Sigma movement in business. Six Sigma technology was developed over twenty-five years ago by Motorola to improve product reliability. Engineers studying manufacturing production had determined that there were typically 66,000 errors for every million "opportunities" during the course of the production of a product or service. In other words, typical manufacturing processes were operating at a 6.6 percent error rate. Although this may seem like a small number, the ramifications in terms of product quality and customer satisfaction are enormous. What if 6 percent of the tires you manufacture are faulty and lead to highway deaths? Few

[3] In Bid for Better Care, Surgery With a Warranty, New York Times, May 17, 2007

businesses can stand such a high level of errors. By studying every stage of the production process, measuring outcomes, identifying and correcting errors, and installing innovations to improve performance, engineers hoped to halve error rates (to 34,000 per million opportunities) with the goal of ultimately eliminating defects altogether.

Other companies, particularly in the manufacturing sector, adopted Six Sigma technology with great impact. When Jack Welch made Six Sigma practices a cultural fixture at GE, those who studied and followed his every move helped spread the approach to other industries and businesses. McKesson itself has adopted Six Sigma as the corporate standard, and with outstanding success.

Can Six Sigma be used in hospitals? I believe it must. We don't think about hospitals as manufacturing operations, but they are. Everything that happens to you in a hospital from your trip through an emergency ward to your elective surgery involves an established process with many steps. An error rate of 68,000 per 1 million patient procedures seems like a reasonable number in theory until you consider the possibility that you or your child will have a 6 percent chance of receiving the wrong drug or being prepped improperly for surgery. As a consumer and a father, I want that defect rate to be as close to zero as possible.

It amazes me that we tolerate anything less than perfection in our hospitals when we don't tolerate it in other industries like toy or car manufacturing. Many practitioners and observers declare that health care has too many complex variables to be quantified, but as a patient, I would feel more confident knowing that the hospital has a thorough system in place for ensuring that all the steps involved in my treatment are taken. In fact, there are many areas in which a number of hospitals are implementing six sigma standards. These include: reducing medication errors; reducing patient falls; reducing administration errors; reducing lost MRI films; improving turnaround time for pharmacy orders; increasing operating room throughput; reducing emergency room errors;

decreasing length of stay for stroke patients; and improving patient satisfaction. More commonly today, however, protocols and procedures vary drastically not only between hospital systems but between physicians within hospital systems. We are very far from Codman's notion that performance innovations should be surfaced and spread across all hospitals to bring new standards of best practice to health care.

As is obvious from the above list, Six-Sigma targeted measures can be simple or complex, but they should be chosen for maximum impact. In that spirit, the Pittsburgh Regional Healthcare Initiative (PRHI) is trying to eliminate the most deadly and antibiotic resistant form of staph infection – MRSA – which can be found in every hospital in America. As I mentioned, staph infections kill approximately 90,000 patients every year. So how do we stop this rampant killer? The basic tool is handsoap. While 70 percent of nurses wash their hands before treating a patient, 70 percent of doctors don't. And yet we know that if hands aren't washed 100 percent of the time, staph infections cannot be eliminated. So how do we bring the defect rate to zero?

In order to understand how to do so, PRHI used the process engineering techniques common to companies like Toyota, the most successful organizations in the world at eliminating errors and improving quality. You might think that radical structural changes would be necessary to transform a hospital's ability to fight such an intractable problem, but this was not the case. Together with the doctors, nurses and other staff, those studying the problem determined a number of extremely simple processes that could be taken to make hand washing an unmissable step in any patient interaction.

These included, making sanitizer dispensers available; using disposable gowns, masks, gloves, and equipment; cleaning the patient areas thoroughly; identifying infected patients, isolating them, and flagging their records for future admittance; and controlling antibiotic use.

None of this was groundbreaking or original on its own, but the trick was to make the process improvements stick so they analyzed where the breakdowns were occurring. Workers weren't using gloves 100 percent of the time because glove dispensers were often empty. The solution was to ensure glove dispensers were always stocked. Hand sanitizers were not always conveniently located; so sanitizers were placed everywhere they could possibly be needed. Nurses did not always wash their hands because their time was being wasted doing such menial tasks as looking for wheelchairs; so a new system was developed for the use of wheelchairs. In addition, rooms with infected patients were clearly marked as hot zones with tape on the floor, and all workers who entered those zones needed to be gowned, and all equipment such as stethoscopes used in the rooms needed to stay there.

By implementing strict procedures surrounding all of these areas, PRHI has brought its staph infection rate to zero. The secret ingredients to their success was having the leadership to focus on a targeted problem, involving all the key stakeholders in coming up with workable solutions, and creating a system that supported the goal.

In Codman's universe, such a successful approach would be immediately adopted by every hospital in the country. In fact, PRHI uses Codman's end results model to share learning by linking patient outcomes data with care processes and distributing that information throughout its system. This has led to measurable improvements in quality and patient safety. Of course, the key word in all this is "measure." PRHI's willingness to measure its performance forces it to analyze mistakes and spread improvement innovations. What gets measured and targeted gets improved.

Another story comes from the Dana Farber Cancer Institute in Boston, Massachusetts. In 1994, two cancer patients were administered extremely high doses of chemotherapy drugs. Both women became seriously ill, one suffering permanent heart damage. The bad publicity from the event was very detrimental to Dana Farber's

reputation for safety, and strong measures were taken to institute a mistake-free culture. Today, Dana Farber has installed a vigilant error-reporting system in place. Pharmacists are not allowed to fill hand-written or verbal prescriptions. Doctors must show the latest scientific results to pharmacists if they wish to prescribe dosages that are not standard. Nurses get the same instructions in the same way every time they administer a prescription. This required a tremendous organizational commitment, cost approximately $11 million to implement, and involved extensive staff training and the hiring of doctor assistants to help mitigate the extra time and attention needed. Furthermore, Dana Farber has been relentless about reporting and assessing all medical errors since 1994, no matter how trivial or non-injurious, in order to maintain its culture of error reduction. For the staff of Dana Farber, the business case for such measures has been self-evident. Unfortunately, most hospitals in this country do not even track errors let alone make attempts to learn from them. That is the kind of mindset a six sigma culture can instill.