

A Six Sigma Primer for Physicians

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Six-Sigma is more than simply allocating resources to correct a problem - it's a proven methodology designed to uncover, isolate, understand, and remedy the root causes of problems.

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The key to winning in sports is to gain a competitive edge. Athletes must train harder and seek out new training methods; new ideas of physical or mental conditioning just to stay ahead. Likewise, in healthcare, gaining and maintaining a competitive edge or, even surviving, in today's healthcare environment will demand strong managerial skills and an organizational culture devoted to cutting edge thinking.

All stakeholders in healthcare, from physicians to hospital board members, are searching for ways to deliver quality and service for greater patient satisfaction at affordable costs. They want to improve reimbursements, operational efficiencies, retention of labor, medical and pharmaceutical error reduction and above all, minimize expenditures. Achieving these lofty goals requires looking beyond the borders of one's own industry for management initiatives that drive both quality and low cost while serving the customer in his or her own best interest. The healthcare industry's holy-grail of providing quality while minimizing cost is often thought of as extremely difficult to attain, until now.

What is happening in the manufacturing and outside service industries is a valuable lesson for healthcare managers and providers to learn and stay competitive. The hottest management improvement initiative sweeping many industries is the one approach with the most visible success above all improvement methods so far. It is not a hot new fad or passing fancy but rather, a flexible system built on the best of past management ideas and proven practices of the business world's most successful companies. It is a philosophy designed to markedly improve an organization's performance and its management leadership.

Six Sigma methodologies, made famous by Jack Welch, the former CEO of General Electric Corporation (GE), have attained widespread appeal in all business industries because of its wholesome concept of data-driven process improvement to drive quality and minimize costs. When problems and solutions are quantified, the numbers don't lie. Decisions are made from a more concrete and tangible viewpoint. Welch even calls Six Sigma the "code that changes corporate DNA." The Six Sigma approach to a process improvement problem reveals the underlying "physics" of the process. There are no assumptions or innuendos about whether things get better or not, it is about how much and in which direction.

Healthcare providers are beginning to incorporate this culture changing philosophy of Six Sigma to improve upon or even replace current quality initiatives they already have in place.

The goal of this chapter is to help the healthcare executive to better understand what Six Sigma is, how it can help to improve performance, and why the provider needs to take a closer look at its potential benefits to an organization, particularly in comparison to previous process improvement programs.

The Story of Six Sigma

The concepts of process improvement and total quality management emerged after WWII, when the Japanese auto and electronics industries, in a quest to capture the U.S. marketplace, virtually re-coined the term “Made in Japan” from a trademark of inferiority to a worldwide stigmata of quality and endurance. Toyota Motor Company soon became the ideal model to emulate by U.S. companies such as Ford, Motorola and later, General Electric. The Deming model and subsequent Total Quality Improvement/Continuous Improvement management initiatives, copied from Japan, evolved with a passion when brought to America. The search for best practices led to the popularity of accolades such as The Malcolm Baldrige Quality Award; an award that became Olympic gold to a company’s marketing campaign.

The quality envelope was pushed further in the 80’s when Motorola Corporation augmented traditional improvement tools with a systematic problem solving method based on rigorous statistical analysis. This evolution of a process-oriented problem solving approach soon became the genesis of what is now known as the Six Sigma Methodology. The ultimate goal of the Six Sigma model is to find the root causes of variation in a processes of a business, find the problems that created the variations, determine ways to measure them, and control (or eliminate) the process variations; with the intent of process improvement that has long-term sustainability. The achievement of quality to its greatest extent would be a measured in a quantifiable metric of “sigma”. The greater the sigma level reached, the more efficient the process.

In reaching the six-sigma level, there is almost no variation from the most desired efficient way of doing things. Is this ultimate goal of perfection too ambitious a goal for healthcare? Perhaps. For service industries and the healthcare industry, the goal of virtual perfection may be impossible by virtue of the significant number of variables involved. But, one must consider the implications of a less than almost perfect system, as illustrated below.

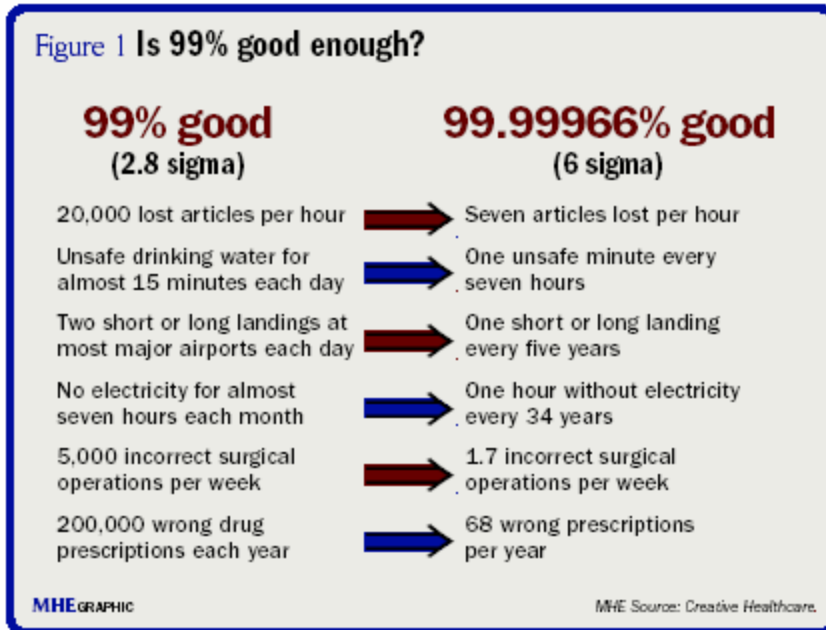


Figure 1: Keith Butler, MD, Ian Lazarus FACHE, The Promise of Six Sigma, Managed Healthcare Executives, October, 2001, p2.

The term “sigma” is from the 18th letter of the Greek alphabet and represents the statistical symbol for standard deviation. In statistics, a standard bell shaped normal population distribution, one sigma represents a percentage variation from the mean, and two- sigma represents an even greater variance, and so on.

In Six Sigma vernacular, the bell shaped curve becomes a representation of variation itself; in other words, achieving a “six sigma” process means virtual perfection in the upper standard limits of being 99.99966% good, as shown below.

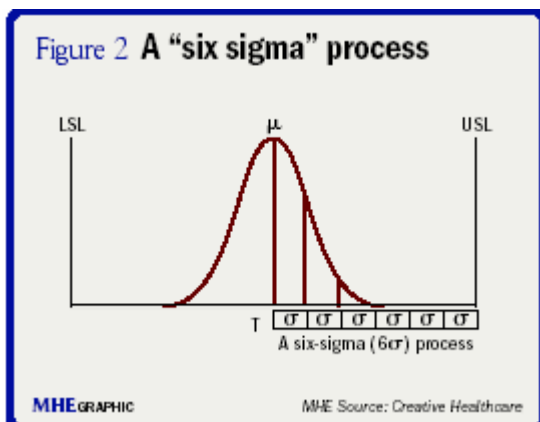


Figure 2: Keith Butler, MD, Ian Lazarus FACHE, The Promise of Six Sigma, Managed Healthcare Executives, October, 2001, p2

Cost of Quality

The cost of quality actually goes up when the variation and error rate of a process goes up. For example, the costs of pharmaceutical errors alone, in terms of lives and money, are huge. Consider the legal implications of incorrect procedures to an institution. Coding errors that lead to variability in reimbursements costs physicians and other providers, lost revenue. Think also of the cost of additional safeguards, such as inspectors, that must be put into place to oversee defective processes. When a process is improved, the cost of quality goes down. There are fewer costs due to redundancy, lost time and lost labor.

The concept of looking at variations in a process is analogous to the process of teaching a child to ride a bicycle for the first time. The child will be wobbly when he or she gets on the bicycle, at first and, may even fall, several times. As long as you are watching closely, to help the child back on the bicycle, help steer a little and provide encouragement, the child soon learns to ride smoothly and it appears all so natural. The child soon learns to balance from the feedback gained from you and the internal feedback from the brain. After studying the learning process closer, you may find the child to be more successful learning on a set of training wheels or on a bicycle a little smaller in size. Regardless, the closed loop feedback, analysis, and monitoring by a teacher or process “champion,” keeps the child from wobbling too much and to stay on a straight and narrow course.

Businesses wobble too in their processes and, in Six Sigma terminology, this wobbling is the variation that needs continual feedback to help correct and stabilize. Unlike riding a bike, where when once learned it becomes natural and smooth, businesses continue to wobble in their processes and may fall without ever being able to get back up. The institution of Six Sigma methodology is a closed feedback loop to prevent instability in processes.

Virtual perfection may not be as easily attainable in a service industry as computer chips coming off an assembly line and the healthcare industry certainly has its share of “wobbliness;” It is, nonetheless, this desire to constantly improve operations, perfect the way business is done and to tune in to what the customer needs are what separate this improvement method from those that have come before. Moreover, the benefits of setting high performance goals, is a strategic decision to accelerate improvement, promote continual learning and sustaining efforts to succeed. It is a cultural change in mind-set to attain quality at its highest level.

Example of the Variation in Process Concept in a Healthcare Institution

The radiology department at University of Texas MD Anderson Cancer Center in Houston, Texas had goals of increasing its capacity, reduce patient waiting time, eliminate wasted errors and improve morale in the department.

At first glance, and where most expansion efforts have previously failed, is in addressing the needs by hiring more staff, minimizing hardware limitations by adding more CT scanners, and adding more physical space. In essence, they would be duplicating the current process to meet demands.

Six Sigma consultants, hired by MDACC, looked at the entire process of patient CT throughput, or CT cycle time, and using Six Sigma tools, identified where the greatest variations occurred. They found the greatest variation and the greatest opportunities in improvement were in the handling of patients and maximization of the radiologist's time not the scanning speed, or number of CT scanners. In fact, the rate limiting factors for CT cycle time results were found to be in the interpretation, transcription, and interpretation of CT films. Innovations in time saving opportunities meant hiring facilitators in handling clinician phone calls and people to match and hang up current radiology studies with previous studies so the radiologist can complete interpretations faster while maximizing time. Future MDACC changes will involve voice recognition technology to improve transcription cycle time.

The cultural lexicon of Six Sigma defines quality as measures in the reduction in variations or "defects" in the process per million opportunities of occurrence. Each incremental increase in sigma level achieved is significant reduction in defects, as given below.

Fig 3

Sigma	Defects per million opportunities
1.5	500,000
2	308,537
3	66,807
4	6,210
5	233
6	3.4

Figure 3: Jean Cherry and Sridhar Seshadri: "Six Sigma: Using Statistics to Reduce Process Variability and Costs in Radiology," Radiology Management, Nov/Dec 2000, p1.)

Many companies, including those in healthcare, are said to operate at a sigma level of 3, or about 5,000 nationwide incorrect surgical procedures each week, hardly an acceptable number.

The Six Sigma movement gained its greatest notoriety and acceptance by major industry in the 90's, when Welch of GE wanted to empower his employees and challenge them to participate in the decision-making process. The company had reached a plateau of growth and Welch knew that staying there meant death by stagnation.

He wanted GE to constantly change and improve, becoming an even more dynamic organization. Welch elicited the advice of Honeywell's CEO Larry Bossidy, and soon the largest, most ambitious management initiative ever undertaken at GE began. The results have been nothing short of impressive over the course of five years: over \$3 billion in savings and annual productivity increases consistently in the double digits. The impact of Six Sigma improvement on bottom-line costs, return on investment (ROI), and profitability caught the attention of every industry from merchandising to hospitality services. This interest also prompted a company, like GE, to begin taking the Six Sigma methodology to its customers, including those in healthcare. The impact on early adapters in the medical industry has been impressive and continued to grow with greater awareness.

Six Sigma Healthcare Pioneers

Example #1: One of these early healthcare adapters is the Mount Carmel Health System of Columbus, Ohio. The organization was barely breaking even in the summer of 2000 when competition from surrounding providers made things worse. Employee layoffs added fuel to an already all-time low employee morale.

Chief Executive Officer Joe Calvaruso was determined to stem the bleeding, break the cycle of poor financial performance and return the hospital system to profitability. He sought the potential of Six Sigma and began a full initiation of its methodology. The plan was an audacious one, as the organization ensured that no one would be terminated as a result of a Six Sigma project eliminating his or her previous duties. These employees would be offered an alternative position in a different department. Moreover, top personnel were asked to leave their current positions to be trained and work full time as Six Sigma expert practitioners that would oversee project deployment while their positions were backfilled.

The Six Sigma deployment was the right decision. More than 50 projects were initiated with appreciable success. An example of one of these early Mount Carmel success stories was the dramatic improvement of their Medicare+Choice product reimbursements, previously written off as uncollectible accounts. These accounts were often denied by HCFA due to coding specifically around those patients classified as "working aged." Since the treatment process status often changed in these patients, HCFA often rejected claims or lessened reimbursement amounts, effectively making coding a difficult and elusive problem. The employment of Six Sigma process improvement tools fixed the problem, resulting in a realized gain of \$857,000 in previously uncollected funds. The spillover to other coding parameters also has dramatically boosted revenue collection.

Example #2: With the help of GE, Commonwealth Health Corp. of Bowling Green, KY, within 18 months of its Six Sigma launch, realized nearly \$1 million in annualized billing improvement savings and reduced radiology expenses. The cost savings came from recognizing specific opportunity areas in which productivity could be improved so that patient throughput could be increased by 25%. The changes resulted in a reduction in cost per procedure by 21.5% although fewer resources were expended.

Its CEO, John Desmarais became a passionate believer of the impact Six Sigma has had on his company and says, “It’s the single most important thing we have done in the history of our organization.”

Example #3: Scottsdale Healthcare in Arizona used consultants from Creative Healthcare USA on a project, rather than doing a full deployment of Six Sigma in its organization, to analyze its problem of emergency department (ED) “diversions.” Diversions happen when emergency departments are too full in capacity to handle acute emergencies and a decision is made to close its doors to patients and ambulances are diverted elsewhere. The issue of closed and diverted emergency rooms is a growing nationwide phenomenon because of fewer EDs and a growing aged and uninsured population. The consultants, using Six Sigma principles, mapped the ED process and found multiple bottlenecks that have a direct effect on the probability of evoking a “diversionary” status in the emergency room.

One bottleneck process deemed “out of control,” in Six Sigma jargon, was the issue of bed control. A process is considered “in control” when operating within acceptable specification limits. It was found that the average transfer time for a patient admitted to a hospital bed from the emergency department was 80 minutes, of which half of this time, a bed is available and waiting. The process was a significant “waste of time” and, moreover, complicated by an Administrative Nurse “inspector” locating beds on different floors. Two tenements of Six Sigma level of quality were violated: one is that having an inspection is a correction for an inefficient process and two, the more steps involved the less is the potential yield of a process. Through this revelation, the hospital eliminated the Administrative Nurse, reduced cycle time by 10% in bed control, and improvement ED throughput with greater turnover thereby, improving revenue by nearly \$600,000.

The addition of a nurse inspector and waiting patients in a busy ED is an example of “Little’s Law” or sometimes referred to as the first fundamental law of system behavior. When more and more inputs are put into a system, such as more ED patients and an additional nurse employee, and when there is variation in their arrival time (no control over patient arrivals) or process variation (different people doing the same things differently), there becomes an exponential rise in “cycle time.” Productivity of the system begins to fall and inefficiency and variation creeps in, as seen below.

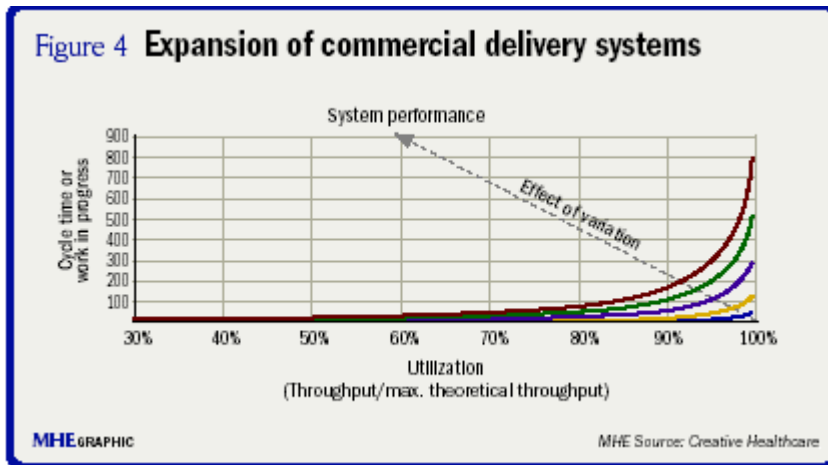


Figure 4: Keith Butler, MD, Ian Lazarus FACHE, *The Promise of Six Sigma*, Managed Healthcare Executives, October, 2001, P.4)

And, an examination of the project types to which healthcare provider organizations have utilized Six Sigma methodology reveals almost any hospital process is a candidate.

Example #4: The Charleston Area Medical Center (CAMC) in Charleston, W.Va. chose to start implementing Six Sigma techniques in its supply chain management. The initial savings from a just-in-time inventory management system may have been mere \$163,410 but projected long term savings is expected to be over \$800,000. The Six Sigma staff of CAMC moved on to other projects and produced remarkable results, as exemplified below.

Figure 5 Six Sigma project potential
One hospital's experience

Project	Validated savings (\$)	Long term savings (\$)
Supply chain management	163,410	841,540
"Captain of the ship"	519,000	790,000
Denials	232,637	425,000
Results reporting	367,621	341,000
Medication safety	31,774	242,777
ED wait time	100,000	202,428
HR recruitment	32,000	124,430
Physician satisfaction	39,780	66,000

MHEGRAPHIC MHE Source: Creative Healthcare USA

Figure 5: Bea Stamps, MD, MBA, Ian Lazarus FACHE, *The Promise of Six Sigma*. Part II, Managed Healthcare Executives, January 2002, P.6.

Medical Error Reduction

- Reducing patient falls

- Reducing medication errors
- Improving pharmacy turnaround times

Business Operations

- Improving the revenue cycle
- Improving human resource recruiting and retention
- Improving OR scheduling and throughput

Patient Case Management

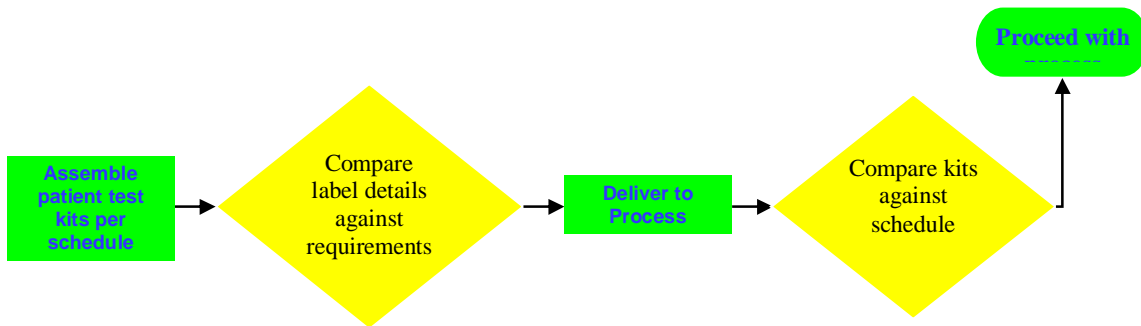
- Decreasing length of stay in long term patients
- Decreasing length of stay for cardiac patient types
- Reducing emergency department diversions
- Improving radiology scheduling, operational flow, and resource maximization patient satisfaction

The Roadmap to Success

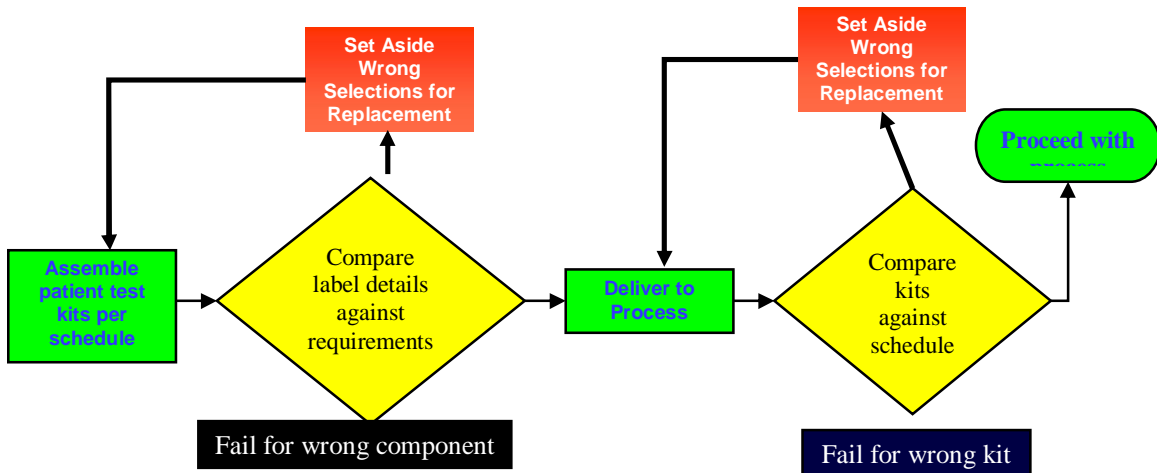
Six Sigma is a rigorous systematic discipline that demands the use of various problem solving tools and a particular methodology to drive process improvement. While the approach is best known for its basis on quantitative metrics of quality, it is the approach to improving quality and reducing variation that separates Six Sigma from other quality campaign methods. In fact, many organizations use the measurable feedback data provided by Six Sigma, to augment other ongoing quality initiatives, like TQM or the Balanced Scorecard. By validating the impact of defects and improvements, as well as the use of small scale experiments, reaching the optimal solution to a problem makes implementing a change more believable to the organization. One Chief of Staff of a major metropolitan hospital has stated that the medical staff respects the statistical rigor of the methodology. Data and evidence gathered by stakeholders gets their attention. Root causes to variation suddenly emerge as a result of the problem solving discipline. Many times, according to practitioners, the real problem is not what you thought after you look at the data. It becomes a real education to project stakeholders on an “out of the box thinking” approach to not only finding solutions to improving a process but also, finding a solution that sustains itself in the long-term.

At the heart of the Six Sigma management philosophy is the scientific approach known by the acronym **DMAIC**.

(D) Define. This is the first phase of the Six Sigma practitioner’s process. The team in charge of the project must clearly define the problem and the factors critical to quality (CTQ) that are important to the customer. An examination of the business process through mapping techniques correlates those CTQ factors with gaps where the process falls short. An example of the delivery of patient test kits to a hospital by a laboratory highlights a basic definition problem.



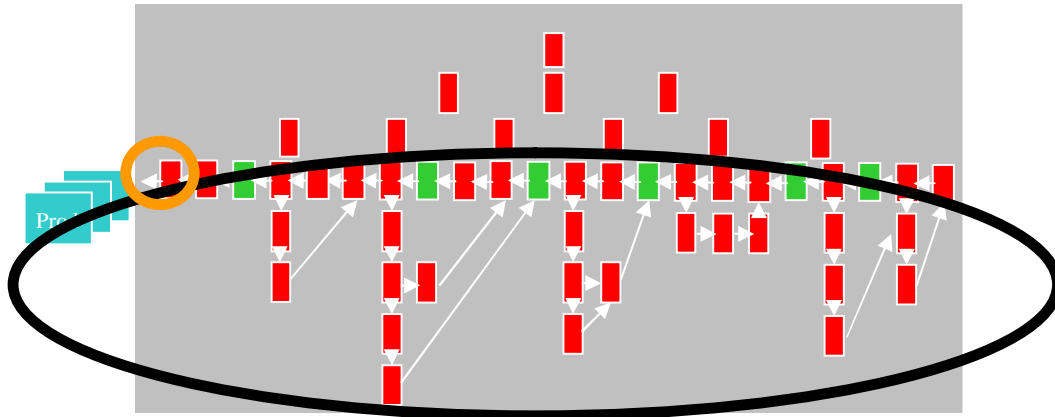
On the surface, CTQ factors are found in the steps in the kit preparation process. One step, the assembly of patient test kits may involve a multitude of component activities, all of which may introduce variables of error into the process, leading to a cycle of error management. In further defining the process, these hidden factors add to the cost of quality such as mistakes or defects in kit components, handling or delivery.



Once a process is mapped out, the Six Sigma practitioner then begins isolating all the variables that enter into the fulfillment and delivery of patient care kits. Sometimes, the “low hanging” fruit of simple error correction is revealed by the basic process map.

The “hidden hospital,” therefore, becomes all the redundant factors that do not add true value to the patient care delivery system.

“The Hidden Hospital”



The diagram shows all the “hidden” or non-value added side steps a process may incur along its main path. Examples are redundant paperwork, a technician having to go find supplies not readily available, or a physician having to re-dictate a lost case history.

It is said that Six Sigma turns a physical problem into a mathematical one to solve. The statistical nature of Six Sigma customer focus, for example, can best be expressed as a mathematical equation of $Y=f(X)$ where Y is the variables of output in a process. This output can mean patient satisfaction, accuracy of lab results, cycle time or quality of a process. The X variables are the inputs that go into delivering or producing Y (Y is a function of X) such as essential strategy or critical processes. The exercise of defining the variables can often be quite revealing in what the customer really wants and, in turn, actually gets.

$Y=f(X)$, where Y =Outputs, X =Inputs or variables that determine output

(M) Measure. After a defined problem is established, the next step is to determine what are the metrics for this process? How do you determine if you are successful? One way is an establishment of base-level benchmarks of what the ideal process should be so that it can be compared to measures of defects. What is the process capability? What is the process “entitled” to be and what are the measurements? Are these measurements reliable and valid? These are the critical questions asked of “out of control” conditions. It is the measurement phase where basic probability training and statistical analysis comes into play as part of the Six Sigma practitioner’s armamentarium.

(A) Analyze. This is the phase in which underlying root causes for a problem are explored. Statistical analysis is used to examine potential variables that may contribute to the underlying defect. The multiple tools used in this phase include multivariate analysis, ANOVA, regression analysis, normality tests, and correlation. The questions to be asked, at this point, are whether the process can be improved, what can be done to improve it, what resources are needed to accomplish it, and what will undermine improvement efforts?

(I) Improve. The definitive answer to $Y=f(x)$ is answered. What is the effect of implementing this particular solution and is it the optimal one. A plan of action is measuring the outcome of several potential solutions to find the answer. Training in experimental design and multiple linear regression refines the decision making process and helps leave nothing to assumption or intuition.

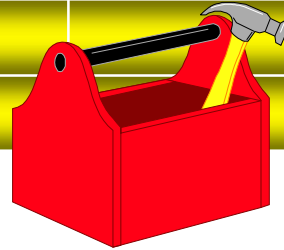
(C) Control. Once a possible solution is found, critical ongoing measures are put in place to ensure consistency and quality in the changes made. The use of control charting techniques ensure costs, schedules, etc., are maintained and strategic goals aligned with the organization.

The control phase concept is what separates the use of Six Sigma from other quality initiatives that may unravel over time or have no discipline for long term payoffs in quality and revenue.

The Six Sigma Tool Box

A list of the tools in the Six Sigma box that practitioner's can call upon to arrive at a solution. Each phase has multiple tools in which the practitioner can use to approach the problem.

Define	Measure	Analyze	Improve	Control
Adult Learning Model	Process Mapping	Multi Vari	Variable DOE	EVOP
Project Management	Cause & Effect Matrix	Correlation	Fractional DOE	Response Surface DOE
Computer Tools	Fishbone Diagram	Regression	Full and 2 ^k Factorial DOE	Multiple Regression
Descriptive Statistics	Statistical Analysis	Hypothesis Testing	Advanced DOE	Transition Plans
	Lean Tools	ANOVA	Logistic Regression	Control Plans
	MSA	FMEA		SPC
	Capability			Control Methods



How is Six Sigma Employed?

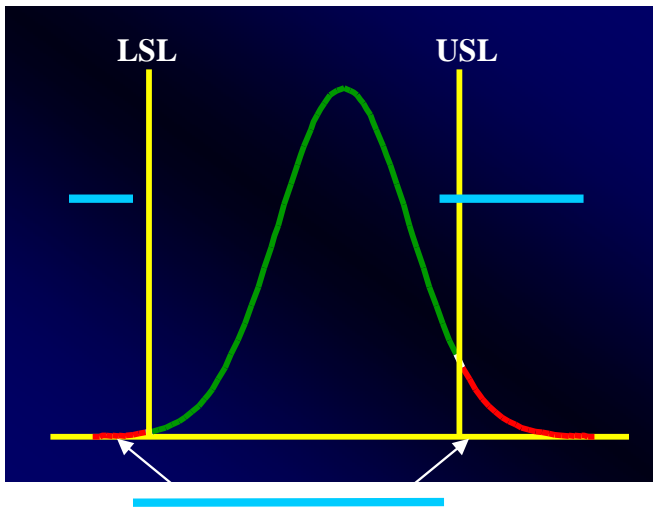
When an organization chooses to employ Six Sigma techniques in solving a problem, it has the choice of hiring a consultant practitioner to either help find a solution or by jumping in and having the consultant incorporate the capability in-house through training and deployment of its own employees. Outside consultants work with staff to introduce them to the concepts and help them realize the potential effect on operations. Either way, the projects are supported by Green Belt, practitioners, who are supervised by Black Belts or even more experienced, Master Black Belts. Black Belts have had the most intensive training in the tools and problem solving techniques employed through Six Sigma methods. Green Belts are often the process owner or “champion” of the process change.

The first step for an organization, before it decides to employ Six Sigma, is to define its strategic objectives and set forth its goals. The organization must have a clear vision of where it wants to go, what kind of organization it wants to be (preferably world class), and whether satisfying the customer as well as the stakeholders involved in the process, is the key to long term success. The continuous pursuit of excellence is the ever-present hallmark of Six Sigma companies.

The incorporation of Six Sigma, into an organization, is not about a one-time effort to right the ship; it is about a strategic decision to be always customer focused, constantly vigilant and developing the agility to stay on top of the marketplace. In essence, Six Sigma becomes a cultural change in philosophy and mind-set. It is a vigilant focus on what the customer wants. The traditional philosophy of ensuring that operations stay

within lower and upper specification limits or “goalpost mentality” is replaced with customer-driven measures to achieve specific target goals. Any deviation from the target becomes a loss to the organization and, ultimately, a loss to society.

Traditional Philosophy

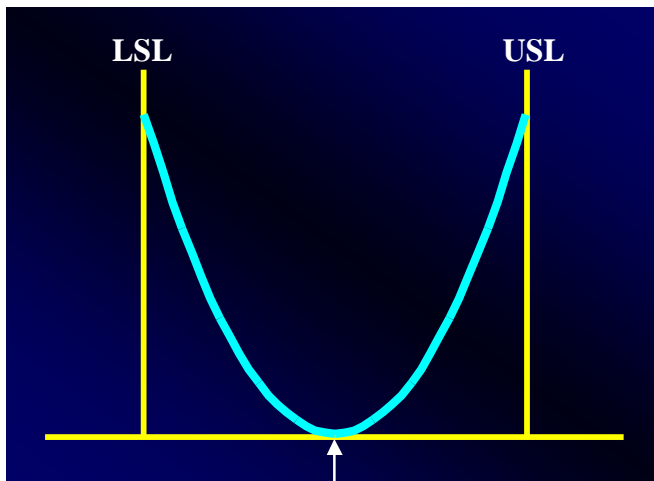


Anything outside
the specification limits
represents losses

Goalpost Mentality

The Japanese engineer, Genichi Taguchi, suggested a paradigm shift function to describe the loss to society of not having reached a more exact specification target.

Taguchi Philosophy



Any deviation from
the target causes
losses to society

***Variation: “the
enemy of best
practices”***

Consider the financial and social implications in pharmaceutical errors incurred by institutions alone. This is one issue of quality in which vigilant focus on minimal variation is truly warranted.

In order to accomplish this cultural change, the business must give Six Sigma projects the momentum and support it needs through the proper alignment of its organization. Without the proper environment for cultivating change, initiatives never develop the momentum needed to reach critical mass.

A supportive critical mass, or a guiding powerful coalition, is necessary for organization to gain wide acceptance and belief. Leadership must be the biggest supporter of Six Sigma projects through a top down quality agenda. They must create the vision, communicate it and encourage a sense of urgency to “get it done.” Management must reward those employees who are diverted from their usual duties to become Six Sigma trained. These employees will bring a skill set needed to reinforce Six Sigma at the process level; and to drive and sustain quality improvement.

Six Sigma projects must support also the strategic goals of the organization and quantitative metrics must reflect the achievement of those goals. In healthcare, Six Sigma aligns patient goals with strategic goals, as illustrated below.



Figure 6: Bea Stamps, M.D, MBA and Ian Lazarus FACHE, The Promise of Six Sigma: Part II, Managed Healthcare Executives, January 2003, p4.

A project such as emergency room (ED) throughput makes sense because patient satisfaction, and the perception of quality as well, is known to be directly related to patient waiting time as seen in many patient surveys. Improving ED throughput, not decreases patient waiting time, but increases satisfaction, improves ED revenue generation and minimizes diversion time.

Keys to Making Six Sigma Work

To summarize the key elements necessary for successful implementation of Six Sigma performance improvement methodologies, Jerome Blakeslee Jr. in Quality Progress, names several key principles for organizations to reap the most benefits:

- 1) Six Sigma must be driven by committed leaders. To paraphrase the points made by Blakeslee, leaders must be willing to go against the grain in recommending unpopular or non-conventional management ideas. Their hands-on leadership and personal responsibility for driving Six Sigma efforts would leave little room for delegation to others.
- 2) Six Sigma efforts must be integrated with current quality, management and strategic initiatives. This is good news to those who thought Six Sigma would have to replace the investment in existing management techniques. On the contrary, the quantitative metrics of Six Sigma enhances TQM, CQ or more recently, Balanced Scorecard measures with feedback data that extend beyond assumptions.
- 3) Process thinking is the supporting framework for success with Six Sigma efforts. The organization must be rigorous in mapping existing business processes to see where it falls short of meeting customer expectations and market demand.
- 4) The organization must be vigorous in intelligence gathering on what the market and the customer wants. This means figuring out what hard data measurements reflect customer satisfaction or loyalty on a continual consistent basis. A good closed feedback loop ensures the maximization of company output to match customer requirements.
- 5) The Six Sigma projects must be designed to produce real savings and return on investment. Short-term payoff projects are designed to engage Six Sigma principles quickly, engender belief in the system and establish a foundation for long term Six Sigma success. Projects initially are designed to have short (less than six months) completion deadlines with significant payback. Long term pay-offs are often the result of incremental short-term benefits, as well as long-term design.

Six Sigma and Previous Initiatives Such As TQM

Many organizations have quality initiatives in place and are possibly seeking to improve or replace current organizational improvement methods. To better understand where Six Sigma might fit in, a summary comparison of several key differences in the quality initiatives of TQM versus Six Sigma, helps us to improve our understanding of where TQM measures have fallen short and where Six Sigma initiatives may succeed in picking up where it left off.

I. Customer Focus

TQM:

- The early mantra of TQM policies and mission statements was to “meet or exceed customer requirements.”
- If customers were happy before let’s keep it that way.
- Unfortunately, customers have dynamic and ever-changing requirements which often were measured on a one-time, or sporadic, if not ongoing, basis.
- No one took the time to truly understand the customer needs and to adjust the process to constantly fit that need.
- Lack of control mechanisms to sustain change

- Quality also meant as long as the customer was happy, the process was fine with less regard to the possibility of making it more efficient and less costly.

Six Sigma:

- The customer focus is top priority.
- The goal is to truly understand the customer
- Before defining the problem, the customers of the process and their requirements must be fully understood. This is important, particularly in designing a controllable and sustained improvement with the appropriate metrics that allow the organization to stay on top of customer developments and unmet needs.
- The solutions are dynamic and ever-changing in order to achieve six sigma level qualities.
- Control mechanisms of a process are designed to be sustaining but constant monitoring signals need for adaptation.

II Goals

TQM:

- The achievement of quality was a fuzzy concept with a specific quality department focused on “quality control” or “quality assurance.”
- The emphasis was on stabilization rather than improvement of existing processes.
- The answers to improvement were, at times, based on assumptions and hypotheses. No real hard data.
- Not having the tools to understand customer needs meant the possibility of an “open-loop system.”
- The quality initiatives were often separated from management objectives and strategic goals.

Six Sigma:

- Solutions are data driven and fact driven with evidence based improvement. For the first time, questions are being asked as to what measurements are needed to gauge the performance of business processes.
- The difference is now managers are asking what is essential information is needed and how can this information be used to optimize results?
- The integration of Six Sigma, employing its tools and practices, require a proactive management philosophy.
- In order to cultivate support for improvement changes, process owners must build buy-in at all levels, from top down and across departments.
- Management is constantly aware of improvements and therefore, process ownership and accountability.
- In a culture of continual adaptation to a changing environment, management must stay on top of its business practices in order to achieve its ambitious goals.
- The “closed-loop” of a Six Sigma system allows organizations to track customer needs and adjust accordingly.

III Organization

TQM

- Inconsistent integration of quality policies, reforms, and decisions across the organization.
- Managers were sometimes left out of the circle while “quality councils” made changes.
- Leadership apathy, possibly as a result of above
- Little attention paid to process ownership, acceptance, and accountability
- Incremental changes
- Ineffective training

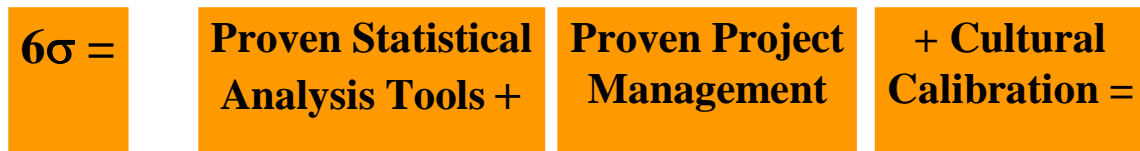
Six Sigma

- Clear, consistent, and focused emphasis on customer requirements, process improvement, and management
- Implementation of Six Sigma methodology begins at the top leadership where the vision to drive cultural change is derived. The passion for constant reinvention of the business is essential for survival.
- Training is in-depth and on-going. Mentoring and coaching nurtures the infrastructure for sustainable change.
- Incremental exponential change

Conclusion

Critics of Six Sigma have called it “TQM on steroids” or just a passing fancy as if it were the flavor of the month management program. The reason for this misunderstanding is that the differences of the methodologies are not well understood. Moreover, while success stories of TQM/CQI abound and these initiatives provided the fertile impetus for Six Sigma genesis, previous failures of half hearted TQM implementation have left some with a bad taste for quality programs. These opinions have left many to be skeptical of Six Sigma’s quality focus and methods. The misconceptions of TQM/CQI, and possibly failings, have had more to do with the introduction and management of these ideals than an actual failure of the system itself. These errors in implementation could also be repeated by organizations wanting to try Six Sigma as well. That is why an organization must take the time and make the commitment to truly educate itself on the successful ways of implementing Six Sigma into its culture. It is not for everyone and there have been success stories for those who decide to take a quantum leap forward in competitive edge thinking.

Whichever initiative is chosen, be it TQM/CQI or any other improvement style, Six Sigma, or a combination of both, a successful implementation requires a hands on leadership approach that should be intimately involved in making sure there is a supportive environment for cultural change. In the spirit of Six Sigma’s mathematical emphasis, the formula for putting it altogether is seen in the figure below:



**Getting, Better Faster:
Better Financial Performance,
Better Teamwork,
Better Place to Work!**

The key to driving any initiative is the urgency on the part of leadership to find a solution to today’s market place forces. As stated before, the vision must be carried forth from the top down and encouragement from management starts from the bottom up.

There is strong support for healthcare professionals to use Six Sigma methods for improvement of quality and reduce costs. Healthcare is a complex process with a lot of variability, diversity in specialty arenas, different patient needs, and professional skills. Managing this variability and improving efficiency while reducing costs is the greatest challenge for providers today.

The ever-changing environmental challenges of lowered reimbursements, increased competition, and increased demands to improve and maintain safe patient care delivery make walking the tightrope of quality vs. fiscal solvency a critical choice of management decisions. Physicians and healthcare executives are in a better position to make decisions when presented with credible, measurable, and controllable results. Buy-in for improvement changes within Six Sigma organizations is higher because of the collaboration required from multiple stakeholders in different departments. The process improvements become more robust and decisive rather than intuitive and second-guessing. Six Sigma improvement methodologies are the competitive edge an organization needs to sustain long-term results.

Additional References:

Arnold, Jennifer: “Six Sigma Reveals Astounding Results.” Pg. 4 of reprint from www.GEMedicalSystems.com/education.

Blakeslee, James, Jr. “Implementing the Six Sigma Solution,” Quality Progress, July 1999.

Cherry, Jan and Sridhar, Sashadri: “Six Sigma: Using Statistics to Reduce Variability and Costs in Radiology,” Radiology Management, Nov/Dec 2000.

Ettinger, Walter. “Six Sigma. Adopting GE’s Lesson to Healthcare,” Trustee, September 2001, Pg.4.

Pande, Peter, Neuman, Robert, and Cavanagh, Roland. 2000. The Six Sigma Way: HowGE, Motorola and Other Top Companies Are Honing Their Performance. New York, NY. McGraw-Hill Publishing. Pgs.11-13.

Scalese, Dagmara. "Six Sigma: The Quest for Quality." Hospital and Health Networks. December 2001.

Stamps, Bea and Lazarus, Ian: "Primer on Six Sigma for Healthcare Providers." Managed Healthcare Executive. January 2002.

Venable, Steve and Paul Silverman, "Six Sigma Methodology. Applying a corporate model to Radiology Enabled MDACC to Boost CT Capacity." Journal of Imaging and Technology Management. Nov/Dec 2000, Volume 13, Number 7.

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