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# Pro: Lean Six Sigma Revolutionizing Health Care of Tomorrow

**“The significant problems we face cannot be solved at the same level of thinking we were at when we created them.” Albert Einstein**

It is nearly impossible these days to pick up a professional health-care journal or even a local newspaper and not find an article on quality — or lack thereof — as it relates to patient care. Due to rising costs and personnel shortages, health care as an industry needs to apply a different level of thinking to improve its current state of affairs. Fortunately, no one needs to reinvent the wheel to come up with a groundbreaking problem-solving methodology. Lean Six Sigma has consistently proven to be successful at companies like Motorola, Toyota, and General Electric.

Based on numerous personal conversations with health-care professionals, it seems there is a perception that a production-based process improvement method devised outside of the health-care walls could never be applied to their world. As a result, Lean Six Sigma has been slow to be adapted by most health-care institutions. However, as a Lean Six Sigma Practitioner, I find it difficult to understand why organizations are so hesitant to embrace a proven methodology such as Lean Six Sigma.

*What has been your experience with Lean Six Sigma? Has your laboratory embraced its introduction or do you believe it's all hype and no substance? Feel free to share your thoughts with Managing Editor Scott Kober at [skober@clma.org](mailto:skober@clma.org) for inclusion in a future Letters to the Editor section.*

This article will lay out some of the most common misconceptions regarding Lean Six Sigma and point out their flaws in the thinking that Lean Six Sigma is not right for us.

## **Misconception No. 1: Lean Six Sigma does not easily translate to health-care scenarios.**

In a July 2006 article entitled “*Make Healthcare Lean*,” authors Anthony Manos, Mark Sattler, and George Alukal state that “Lean processes could contribute as much to the health-care sector as they have to the auto industry.”<sup>1</sup>

Combining Lean and Six Sigma process improvement methodologies creates synergies that increase process speed and capacity, improve quality while reducing variation, and increase customer value and satisfaction while reducing overall costs.<sup>2</sup>

Lean Six Sigma principles (Tables 1 and 2) apply to everyone, not just huge facilities with multi-million dollar budgets. Every organization, regardless of size, can evaluate their quality management capabilities and shortcomings, and then look to Lean Six Sigma to see if that can help them fill in some gaps.

Implementation of Lean Six Sigma tools could be as easy as reading a book or attending a seminar on a few common tools, such as a “5-S program,” a training seminar focused on workplace organization and cleanliness. While some of the most basic Lean Six Sigma principles may sometimes be scoffed at as being “common sense,” it is important to remember that common sense is not always common practice.

As an example, consider the area in a laboratory where blood specimens are centrifuged. What does that workstation look like in your facility? In most laboratories, that area is one perfectly set up for the application of 5-S concepts.

One laboratory I worked with applied 5-S principles to the specimen centrifugation work area’s balance test tube racks by doing the following:

- **Sort:** They removed any unneeded or rarely-used items from the area
- **Simplify:** Each hole in the test tube rack was clearly marked to determine what tube size and liquid volume level was to be placed there. If a position was not needed, it was covered up with waterproof tape.
- **Scrub:** Each time the centrifuge was used, it became the responsibility of the individual using it to keep it clean, organized, and ready for the next person to use.
- **Standardize:** Tape was used to mark the required placement of the rack on the counter. Each centrifuge in the department had the same standardized rack configuration.
- **Sustain:** Friendly peer reminders helped to maintain motivation and self-discipline.

The result of this simple project not only improved process efficiency, but it created staff buy-in of Lean Six Sigma principles and stimulated them to tackle more complex projects.

Many early adopters of Lean Six Sigma were introduced to the process improvement methodology through a simple experience as seen above; it only takes a few people who value its potential to energize an entire organization. Some laboratories have implemented “Lean Teams” whose focus it is to map or flowchart core processes and identify opportunities to eliminate unnecessary steps or wait times. It is common for these teams to reduce turnaround times by 30-to-60 percent. Just think of the impact this could have on morning blood draws!

**TABLE 1**

**WHAT IS LEAN?**

Lean is a set of principles and tools intended to reduce non-value added activities within a process, ultimately increasing the speed of process flow. The principles are all based removing unnecessary complexity that adds cost, time, and enormous waste.<sup>2</sup>

**TABLE 2**

**WHAT IS SIX SIGMA?**

Sigma is a Greek statistical word used to represent the amount of variation within a process. The higher the sigma value, the smaller the variation. Six Sigma is used to describe “virtual perfection,” — it equates to an accuracy rate of 99.9997 percent or, for every million opportunities, defects that occur 3.4 times.<sup>3</sup>

Sigma Level	% Accuracy	Defects/Million
1	30.85	690,000
2	69.15	308,537
3	93.32	66,807
4	99.38	6,210
5	99.977	233
6	99.9997	3.4

One laboratory I worked with struggled to report 80 percent of morning results by 7:30 a.m. prior to Lean implementation; at the end of the project, they were reporting 99 percent. This transformation occurred after implementing just three key solutions: increasing the frequency of LIS label printing, standardizing phlebotomy carts, and requiring phlebotomists to send specimens via the pneumatic tube system to the laboratory after every three patient draws.

Proper implementation of Six Sigma requires more time and investment than Lean; however, the resulting reduction of process variation makes Six Sigma worthwhile. Typically, individuals selected to lead or facilitate a Six Sigma initiative receive specialized training on the Define, Measure, Analyze, Improve, Control (DMAIC) methodology and apply those skills to a complex project with significant variation.

As laboratories eliminate unnecessary activities and reduce variation in the services they provide, not only will it make employees' jobs easier and more enjoyable, but it will also have a positive impact on the entire patient care delivery experience.

**Misunderstanding No. 2: Lean Six Sigma costs more to implement than it saves**

An inside look at specific case studies debunks this myth. Take, for instance, Barbara Waters, MT(ASCP), Blood Bank and Support Operations Manager at PA Labs in Muncie, IN. In 2005, Waters hired consultants to facilitate a phlebotomy productivity project. The project team reviewed data, suggested solutions, and implemented those changes expected to have the most significant impact. Three months later, productivity at the facility increased 35 percent. Full-Time Equivalents were also significantly reduced as the separate phlebotomy and accessioning departments were integrated. Due to those changes, PA Labs saved approximately \$300,000, nearly six times their initial investment into Lean Six Sigma.

Jean Hammelev, BSCT (ASCP), MBA/HCM, Executive Director of Quality for Laboratory Sciences of Arizona/Sonora Quest Laboratories, has been utilizing Lean Six Sigma principles as part of her facility's general improvement processes for the past six years. In 2000, Sonora Quest began training Six Sigma Black Belts and Green Belts. Today, they have one Master Black Belt, three Black Belts, and more than 50 part-time Green Belts on staff. In the first two years following Six Sigma implementation, Sonora Quest achieved a 2:1 Return on Investment (ROI), then a 3:1, followed by 5:1, and 5.5:1. In 2006, the ROI is forecasted at 6:1. Hammelev said she credits the Six Sigma success to the commitment and active support of CEO David Dexter and the Senior Leadership Team, claiming that "this top-down driven process has enabled us to continuously improve our overall Six Sigma efforts year after year."

**Misunderstanding No. 3: We already have an established quality system; there is no need to change to the latest "flavor of the month"**

As health care struggles to streamline processes and reduce process variation, many "flavor-of-the-month" programs

**TABLE 3**

**LEAN SIX SIGMA BELTS**

- **Master Black Belt** – Proven track record, sophisticated problem solver, trains and coaches Black Belts, Lean Six Sigma Program Leader
- **Black Belt** – Full-time project leader, advanced problem solver, trains and coaches Green Belts, received 3 to 5 weeks of training
- **Green Belt** – Part-time project leader, received 1 to 2 weeks of training
- **Yellow / White Belt** – Project team member, received some level of training

have been utilized to expand quality programs. As a Medical Technology student in the mid-'70s, we were taught about Quality Control. In the '80s, Quality Assurance and Total Quality Management became the buzzwords. In the '90s, our thinking shifted toward Quality Systems Management. Each of those approaches include many of the concepts and tools used in Lean Six Sigma — the difference lies in the structured, database-oriented, problem-solving approach of the DMAIC methodology (Table 3).

These days, laboratorians are often being called upon to focus on the entire customer/patient experience and the many interconnecting processes that link them. This is an area where Lean Six Sigma is often particularly effective in identifying areas of improvement and enacting successful change. Master Black Belt Carolyn Thaman, who worked outside of the health-care industry for many years before joining CompuNet Clinical Laboratories, shared three areas where she feels Lean Six Sigma shines:

1. Defining the project scope and assigning accountability for obtaining improvement outcomes by identifying a project Champion. The project Champion is normally a member of the facility's Senior Leadership Team and a project Process Owner. The Champion is responsible for day-to-day operations ("**Define**" phase).
2. Measuring those things that are critical to the customer's perception of quality and using this information to drive process improvement decisions ("**Measurement**" phase).

3. Through the “Control” Phase, continuously monitoring the impact of implemented changes. Lean Six Sigma assigns long-term accountability to the Process Owner and proactively determines what actions must be taken if the process falls out of control.

While somewhat dependant upon the inherent strengths and weaknesses of a facility’s quality program, Lean Six Sigma consultants often are able to identify similar areas for possible improvement. Mark Serricchio, a Master Black Belt for Healthcare Solutions from Roche Diagnostics, finds that most of his clients discover the leave-behind dashboard metrics, which monitor critical operational processes, and the ability to sustain the achieved outcomes to be of most value.

According to Caroline Ambrose, MT(ASCP), CQM(ASQ), a recognized laboratory benchmarking expert, “Laboratories are data rich and information poor.” Lean Six Sigma is one way to help laboratories convert data into useable information that stimulates action.

Paul Labbe, Vice President of Operations at CompuNet Clinical Laboratories and a Six Sigma Black Belt, offered this pearl of wisdom — “You can call Lean Six Sigma the flavor of the month, but don’t disregard it!”

**Misunderstanding No. 4: Lean Six Sigma projects are too complex and take too long.**

This mindset is not unique to Lean Six Sigma projects — it has plagued process improvement initiatives in health care and the clinical laboratory for as long as I can remember. Proper project selection is the most critical and challenging activity in launching Lean Six Sigma initiatives.<sup>4</sup> The “Define” and “Measurement” phases of Lean Six Sigma Initiatives, *if performed properly*, result in a narrowly-scoped project with a clearly-defined and measurable improvement goal.

Project timelines are often driven by the availability of project resources — primarily, the availability of the project leader, or “Belt,” and team members (Table 3). Most organizations are beginning to speed up their project timelines by adopting what many call “DMAIC on steroids.” This approach involves scheduling concentrated team meetings in a short period of time. Team discussions may involve a series of four-hour meetings scheduled within a few weeks of each other or up to five days consecutively depending on the type and urgency of the given project. Personally, I have had great success with this approach, and the average project has been completed within three months.

**TABLE 4**

**QUEST DIAGNOSTICS’ SIX SIGMA JOURNEY**

**1999:** CEO Ken Freeman announced Six Sigma company-wide roll-out

**2000:** Wave 1 Six Sigma Training for Black Belts

**2001:** Wave 1 Six Sigma Training for Green Belts

**2003:** Lean Booster added to Six Sigma training offerings

**2006:** More than 2,000 Black Belts and Green Belts trained

**ROI approaching 6:1 of dollars saved compared to dollars invested**

While some organizations, such as Quest Diagnostics, began by incorporating Six Sigma alone into their quality programs, they have since discovered the need to utilize Lean as well (Table 4). Carol Kristnan, MT(ASCP), CQM(ASQ), Technical Director of Laboratory Operations for North State Regional Laboratories, part of Centura Laboratory Services, received her Six Sigma Black Belt from Quest and stated that, “Lean Six Sigma provides logical tools that guide the team into collecting and analyzing the correct information to make the important and often controversial changes to produce the needed outcome.”

Combining these approaches has helped to speed up project timelines and reduce complexity. The term “Lean Six Sigma” evolved from the recognized value of combining the two methodologies; it refers to first streamlining a process and then focusing on reducing its variation. After all, why would anyone want to reduce variation in unnecessary steps of a process?

**Why Lean Six Sigma in Health Care?**

According to their landmark publication, *To Err Is Human: Building a Safer Health System*, the Institute of Medicine estimated that as many as 98,000 people die each year from medical errors within a hospital setting, more than die due to motor vehicle accidents, breast cancer, or AIDS.<sup>5</sup>

To reduce this number, Lean Six Sigma principles and methodologies can play a significant role (Table 5). Its appropriate use will not only improve our patients' quality of care and increase employee, clinician, and patient satisfaction, but it will also help reduce daily operating costs.

A list of critical success factors necessary for a successful Lean Six Sigma initiative may serve as a good reminder of the gaps in our current quality systems. They include:

- Leadership Driven – Champion Involvement
- Project selection is tied to key business strategies
- Best resources are chosen to lead the initiatives (Green Belts, Black Belts)
- Focus remains on the customer experience
- Focus on process, not people
- Process accountability established with the Process Owner
- Data becomes the basis for all decision making
- Communication is consistent for all stakeholders
- Changes are incorporated into operational and performance objectives

Whether in the automotive industry or a nonprofit health-care setting, the reality remains the same — organizations must work hard to engender trust and loyalty from informed consumers who utilize their products and services. Jeanette Riedle, a Roche Diagnostics Six Sigma Deployment Champion, summed up the challenge well when she said, "Customers buy your products, but they experience your processes." Incorporating Lean Six Sigma into a quality program will give any health-care organization the competitive edge they need to thrive.

**References**

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2. George M, Rowlands D, Kastle B. *What is Lean Six*

**TABLE 5**

**HOW IS LEAN SIX SIGMA DIFFERENT?**

- Senior Leadership Involvement and Commitment
- Focus on Customers / Value
- Focus on Process / Flow
- Dedicated Resources
- Stretch Goals
- Financial Accountability
- More Sophisticated Statistical Tools / Soft Skills Training
- Dashboard Monitoring of Improvement

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