Saint Francis Medical Center

2620 West Faidley Avenue
P. O. Box 9804
Grand Island, Nebraska 68802-9804

Contact: Marie de Martinez, FACHE
Vice President for Business Development
308.398.5585
308.398.5589 (fax)

Submitted August 28, 2009

Topic

"Uncompromising Dedication to Quality – Lean Lab Becomes an Essential in Excellent Patient Care"

Category of Criteria

Non-critical access hospital located in the State of Nebraska

Overview

Uncompromising dedication to the quality and timing of laboratory information is essential to excellent patient care. Patients, physicians and a variety of businesses depend upon rapid, accurate information. The course of medical treatment for an illness will usually depend upon information delivered from the laboratory to the physician. Results of laboratory testing may determine whether an individual is hired to a certain job. Saint Francis Medical Center, driven by its mission and values and led by the Laboratory, discovered an important tool in delivering quality care.

Today's health care system is advancing in every respect, and must manage increased complexity and regulation. The advent of prospective payment systems and managed care has forced hospitals and other health care providers to become cost conscious about the actual price tag of service delivery. Moreover, healthcare organizations recognize that patients have more choices as to where they receive services. In order to remain competitive and progressive, healthcare institutions must discover and implement ways to remain patient friendly while decreasing costs, becoming more efficient, adding value to services, and above all, decreasing the amount of errors.

Searching for competitive advantage and challenged by new financial constraints due to a difficult economy and rising costs, Saint Francis Medical Center leadership charged its laboratory with increasing the quality of its product while decreasing the costs of providing results.

Methods

Core values and strategic initiatives at Saint Francis Medical Center lead to innovative and cost-conscious efforts toward continual improvement. As a result, we initiated interventional approaches that address quality at its core. As an example, the laboratory instituted *Lean* and created as its goal a system that would provide safe, timely, and effective patient care at the lowest cost possible. The *Lean* philosophy offers the laboratory a way to proactively drive out waste, decrease costs, turn around times, and errors, while increasing efficiency and productivity through streamlined work activities, connections, and flow.

Lean is an improvement strategy derived from the automobile industry, namely Toyota Production Systems. These concepts have migrated to multiple industries. In recent years *Lean* projects have captured the attention of healthcare. Hospital laboratories have become the natural starting points for most *Lean* projects as many laboratory processes are similar to those in manufacturing. Laboratory results influence 70-80% of all bedside decisions made in patient care. The laboratory influences every other hospital system.

To introduce the concept, some definitions are in order. "*Lean*" is a set of tools that identify and remove waste in every single action performed in a process, allowing production time and costs to be reduced while ultimately increasing overall quality of the product(s) and service(s). "Waste" is any unnecessary non-value added service to an end product that the customer is not willing to pay for. It can be identified in several forms: wait time, motion (transportation or effort), money, inventory, overproduction, over processing, and errors or redos. *Lean* pinpoints the waste and targets it for improvement opportunities. In this case the *Lean* process allowed us to identify areas in which the laboratory could improve upon the quality of care for its patients.

LEADERSHIP/PLANNING/HUMAN RESOURCES

Due to the costs, commitment, and the overall changes involved in such a project, the decision to initiate *Lean* received careful study. It was at times difficult to promote the program to some of the stakeholders. Mary Lou Emanuel, the laboratory director at the time, was the driving force behind the initiation of the *Lean* process at Saint Francis Medical Center (SFMC). She understood that healthcare reimbursement was transitioning to a performance-based system. It was apparent that better processes and new ideas had to be adopted in order for the laboratory to perform optimally. *Lean* became an option to facilitate improvement. With two laboratory employees basing their Master's degree work studies on *Lean*, and with multiple laboratory employees going to seminars and workshops, and benchmarking trips to other laboratories who had implemented *Lean*, the knowledge and the excitement of what it could do for the lab intensified.

With research came reality. *Lean* would require a large financial commitment from the organization, as well as being intellectually and emotionally challenging. *Lean* was not only going to be changing laboratory processes, but really, the culture of the entire organization. To address this challenge, the laboratory team had to be creative and frugal in its use of resources. The laboratory was not able to afford the $175,000 - $250,000 to have a renowned consulting service on site for months at a time to direct the project. It was also understood that the lab could not be appropriately modified using these tools by implementing steps learned in a week-long seminar. The laboratory director proposed a modified approach to an on-site consultant--an online version of a consulting firm, enabled by company-provided software, with training and support delivered over the Internet. The system included all aspects of direction and training that an onsite consultant would provide, but at one-fourth of the price. The online version cost $108,522 *less* than any comparable consulting service.

PATIENT/COMMUNITY FOCUS

Results produced from laboratory testing influence most patient care decisions. With inpatients requiring lab tests several times daily, and over 70,000 tests for physician clinics, critical access hospitals, nursing homes and other businesses depending on the laboratory, supplying the best and most accurate information has become a basic expectation of our patients, customers and community. The tremendous number of tests, as well as the impact they may have on each human life dictates that processes leading to results must be as smooth and accurate as possible. Interruptions and interference with smooth process flow can lead to mistakes and delays. With an accuracy goal of 100% and complexity of testing constantly becoming more technologically challenging, the decision to embrace a new strategy was more intuitive than it might have been in years past. Our VP of Ancillary Services sponsored the project, and was the Administrative lead who delivered the support from the top down. Another member of the SFMC management team formally trained in *Lean* became the project leader. Other hospital departments, (Quality Management and Nursing) provided employees to participate as full-time team members. This offered valuable insight from outside sources into lab processes. Nurses and physicians had to adapt to *Lean* changes during the project. Some modifications directly affected when patients had their blood drawn or how results would be obtained. Other departments such as Maintenance and Materials Management played a key role in new processes. People most affected, however, were laboratory employees. These were the people who, for the duration of the project, picked up the work and shifts for those that participated on the team and performed jobs outside their normal scope. They endured multiple process changes at a rapid pace. They changed work practices and thought processes entrenched in 20+ year-old routines.

Process Management/Organizational Performance and Results

The initial timeline set for *Lean* was twelve weeks. It soon became apparent that this target was unrealistic. Combined with the magnitude of such a project, multiple other factors contributed to an extended timeline. The project leader's hours with the team were significantly reduced after the first five weeks. The team lost a member to illness, narrowing the participants down to five for the majority of the project. The scope of the job expanded to include the lab's Microbiology department. The consultant manager changed mid-project. The laboratory's physical location was moved from the 9th floor of the hospital to the main floor. In order to compensate, the total length of the project to completion became 22 weeks.

The first two weeks were composed strictly of online training provided by the consultant via live meetings over the Internet. Then the real work began. A prioritization matrix, or listing of every single test or task that the laboratory performed, was created. If a test or process was in the top 80% in frequency on the list, it was identified to be *Leaned*. Next, the team took video footage of all of the tests and/or processes identified. The footage was broken down *second by second*, and every single movement, supply, piece of equipment or workstation, and task was analyzed and determined to be value-added or non-value-added. Anything deemed non-value-added was scrutinized to the point of possibly being eliminated entirely. Video analysis allowed team members to identify and include only the supplies at a work station that were *required* to perform a specific function. This ensured a constant flow of operation was always maintained. All unnecessary items were removed. Needed supplies for various tasks were then arranged for point of use (POU), in sequence of use (SOU), and for frequency of use (FOU). From this information, improved layouts of workstations were created (See Appendix A).

After performing the above functions, 'standard of work' had to be created and written to ensure that new processes were followed and that all laboratory personnel performed tasks identically. 'Standard of work' definition takes the variability out of the workplace and is used as a means of "mistake proofing". Once created, the 'standard of work' had to be communicated to everyone, and in a way that was both positive and educational. It then had to be unveiled at a workstation in which people could actually work at the improved system. For each new process, a 3-day pilot was initiated, feedback collected, and adjustments made. A 30-day trial period immediately followed, during which time feedback was again collected. No changes were made during this time in order to allow employees an opportunity to experience the new method without daily alterations. If there were striking discrepancies identified during the trial, adjustments were made at the end. Upon trial completion, each new process was formally implemented. The final product was a workstation or a process that was neat, labeled, and constantly supplied (See Appendix B). At any one point during the project, there may have been ten different pilots or trials occurring simultaneously.

Results *Lean* research in general demonstrated that the potential for savings was unmistakable and remarkable. The project yielded significant savings to the laboratory's bottom line. In a three year period, the return on investment for total savings less costs was estimated to be 474%, or a total dollar savings of $555,077. The project not only decreased costs, but met goals for improved turn-around times for laboratory tests, increased productivity, reduced inventory, diminished number of errors, and improved reliability. Furthermore, the project provided opportunities to integrate new services into the laboratory for future growth.

In all, the *Lean* project incorporated 388 improvement ideas within the laboratory's remodel and processes. As a result of instrumentation layout analysis, a Core lab was established where the proximity of technology allowed 83% of all testing to be overseen by one technologist. Light, color, and sound signals were installed to indicate to appropriate staff that further work was needed on a specimen(s) (See Appendix C). Designated positions, including a manual tech, runner/receiver, and lead tech were all created to ensure a continuous flow of specimen processing. With these modifications, staff productivity instantly improved by 20%. Wait time in which specimens just *sat* waiting to be acted upon decreased in some areas 60-90%.

Turn around times for many laboratory tests led to improvements of 30-50%. Hematology test (CBCs) times decreased from 17 minutes to 8 minutes. Coagulation study (PT and PTT) times were reduced from 14 minutes to 12 minutes. Urinalysis testing times dropped from 10 minutes to 6 minutes. To better serve patients and physicians, a goal to have all morning labs drawn and communicated before 7 am was initiated. Standard of work now dictates that specimens are submitted directly to the laboratory after 1-2 patient blood draws. Since January 1, 2009, that goal has been met 97 – 100% of the time. Prior to this practice, most laboratory specimens were held on the phlebotomists' carts until completion of all morning patient blood draws and waits sometimes exceeded an hour before even arriving in the lab for processing.

Inventory was another area in which reductions occurred. A year's worth of data for *every* type of supply was analyzed. A two-week amount of each was calculated. The two week supply allowed the laboratory to have enough of each item to last through an ordering period. This "just in time" inventory system reduced the need for storage space and ensured that items never had to be thrown away due to expiration. Inventory was replenished by a system that included kanban cards for each item. The cards contained pertinent information about each item including: order number (as a barcode), amount of order, picture of the item, and address to where it was stored. The system works much the same way as a grocery store restocking practice does. As soon as a certain amount of supply is used, the kanban card serves as a signal and triggers an order for an appropriate amount of the item to be placed. In addition to the above improvements, the system produced a one-time inventory savings of $18,000. The project also recouped another $10,853 when all existing inventory was sorted. Excess items were sold or redistributed to others.

Finally, a major part of the project included reducing interruptions and thus the likelihood of errors for those performing patient work. An integral part of the standardized work created for many of the lab workstations centered on performing testing on only one specimen at a time. The creation of a Call Center, staffed and located outside of the primary testing areas, meant that interrupting phone calls were no longer a distraction. Supplies available at the point-of-use through a two-binned supply system meant that personnel never had to leave a work station in the middle of testing to retrieve an item. By removing interruptions, laboratory staff could maintain focus on the work at hand.

Lessons Learned The laboratory has enjoyed much success with the *Lean* project and in reflection, there were obstacles and many valuable lessons learned throughout the process. First, 'buy-in' for such an elaborate project is a basic requirement, and should start with the Executive Office. The organization as a whole should be aware of and educated on *Lean before* the process begins. As the whole hospital became more aware of *Lean*, the cooperation level needed for the project increased substantially.

Secondly, our laboratory was the beta project for the online consulting service. The team had to perform many of the activities that the consultants would have done themselves had they been on-site. The team also reworked some parts of the project, as the consultants were not at the facility for redirection. Misinterpretation of instructions from the online training at times led to prolonged trial periods and pilots. Having the consultant come out periodically would have been tremendously beneficial.

Other barriers or challenges included physical difficulties. Blueprints for our remodeled lab were not always accurate. Communication between what the team was doing and what the laboratory needed to know was not always clear. Finally, overcoming a culture of wanting to "stay the way we were" was massively challenging. The project's longevity took its toll on the emotions of all involved.

Despite the barriers, there were many rewards and victories. In a tough economy which led to layoffs in our laboratory, the department was able to survive and continue to provide outstanding patient care with minimal disruptions. Had *Lean* not been implemented, the atmosphere would have been chaotic. Because the team had to perform all functions of the project, members fully understood each and every process implemented. There was no adjustment period from the departure of a consultant. Team members learned the importance of data and how facts, instead of perceptions, are more reliable.

As discussed previously, the involvement from non-laboratory employees on the team contributed to the project's success. They were the objective eyes and guides to opportunities for improvement unrecognized by lab employees.

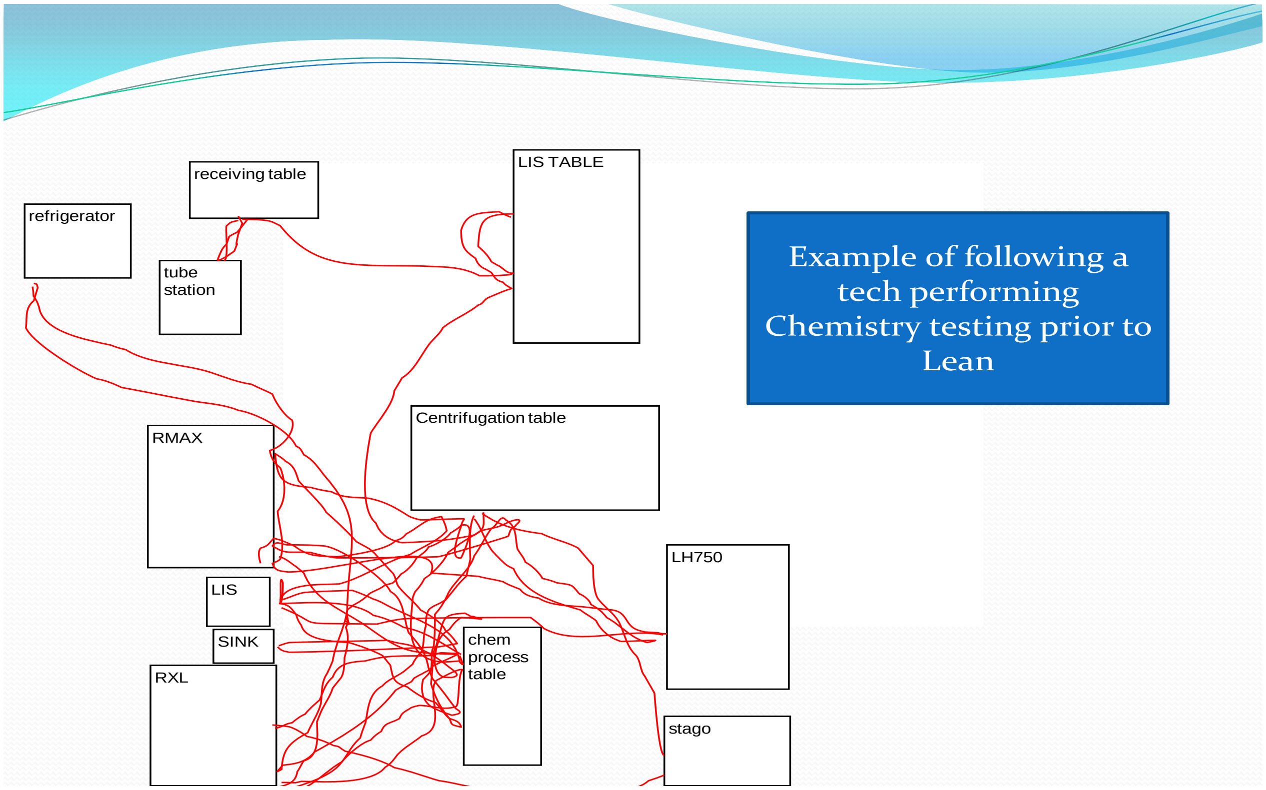
The most difficult part of *Lean,* as in most process changes, is sustainability. Tools and reports have been formulated to provide accountability for new standards including; logs of quality checks; check out logs for phlebotomy carts to ensure that they are properly stocked and ready for the next shift; standard work audits performed and posted weekly, work stations, processes, and inventory (See Appendix D).

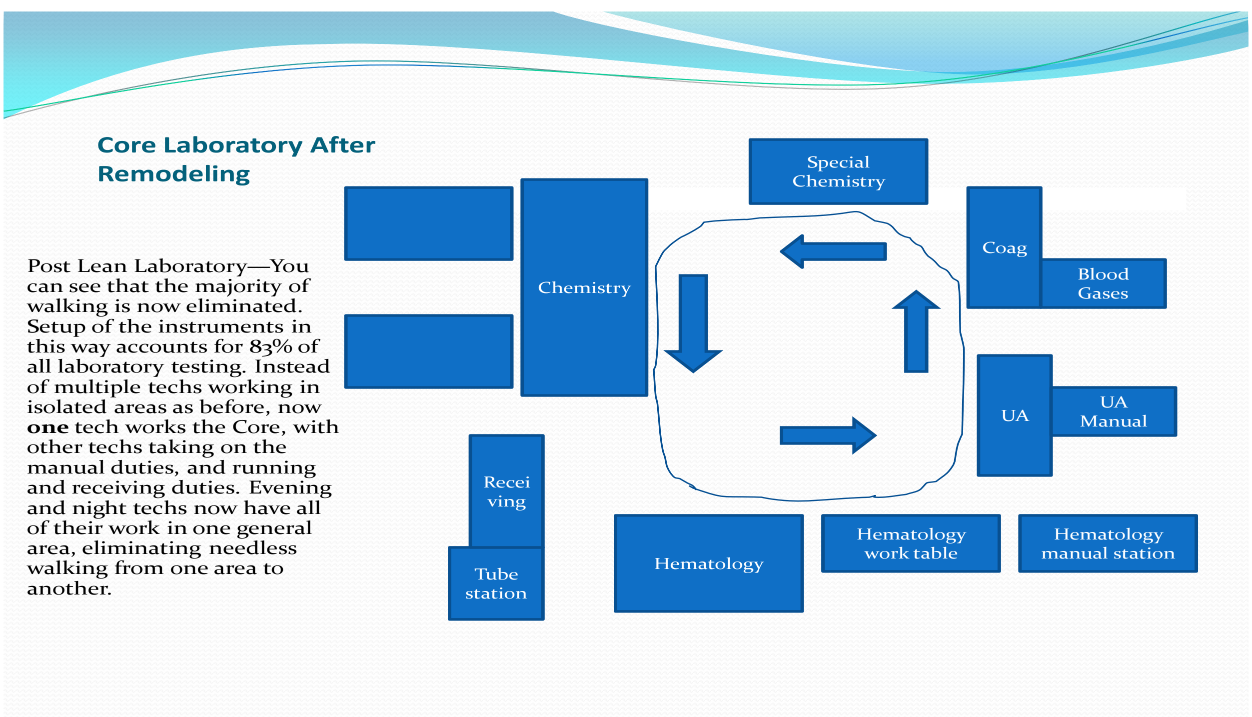
Handheld devices are now being introduced into our inventory system to guarantee that ’just enough’ supplies are ordered. All of these tools and reports are overseen by management, who holds everyone in the lab to the new high standards.

The project is exciting because of its portability. Its principles can be applied in every other department of the hospital. Departmental process can be reduced to basic components and improvements identified. The laboratory team now serves as in-house *Lean* experts, sharing their knowledge of *Lean* throughout the entire organization.

In conclusion, *Lean* was a successful venture for the laboratory because it placed the ultimate focus on the patient. SFMC lab employees were challenged to remove needless steps in all work to better serve their customers. *Lean* is a continual process. New standards developed through this project become ground zero for the future improvement ideas. The SFMC laboratory will be more effective and efficient for years to come due to the success of this project.

Appendix A


refrigerator
receiving table
tube station
LIS TABLE
Example of following a tech performing Chemistry testing prior to Lean
RMAX
Centrifugation table
LIS
SINK
RXL
chem process table
LH750
stago


Core Laboratory After Remodeling
Post Lean Laboratory—You can see that the majority of walking is now eliminated. Setup of the instruments in this way accounts for 83% of all laboratory testing. Instead of multiple techs working in isolated areas as before, now **one** tech works the Core, with other techs taking on the manual duties, and running and receiving duties. Evening and night techs now have all of their work in one general area, eliminating needless walking from one area to another.
Special Chemistry
Chemistry
Coag
Blood Gases
UA
UA Manual
Recei ving
Tube station
Hematology
Hematology work table
Hematology manual station

Appendix B


SANI-CLOTH PLUS
SNAP TUBES
DILUTING FLUIDS
HEMOCYTOMETER
MINIPIPETTES
FROSTED SLIDES
CYTOSPIN CARRIERS
MANUAL STOOL SUPPLIES
BF VIALS
ACETEST
ICTOTEST
ORANGE SQUARES
CLINITEST
LG GLASS TUBES
PIPETTES
CHEMSTRIP
10 UA

Appendix C

Appendix D

Standard Work Audit

Performed by: Stephanie Mulligan
Week of: 7/2/2009
Employee: Shana Jensen
Time: 1550
Area assigned: Drug screen area
Lead Tech: JR

	5	4	3	2	1	SCORE
TASK FULFILLMENT	Performs all tasks as designated by standard work including helping as needed in other areas.	Consistently performs all tasks as assigned in standard work for their designated area.	Performs most of the tasks assigned to their position.	Performs few of the tasks assigned by standard work.	Performs tasks only when asked.	4
PRIORITIZING WORK	Gives attention as required to specimens and tests indicated as priority specimens in all areas.	Works to ensure all priority specimens and tests in their designated area meet priority TAT goals.	Processes priority specimens and tests in an efficient manner ahead of routine specimens.	Processes all specimens and testing as routine.	Batches priority test and specimens to process at their convenience.	4
MAINTAINING WORK FLOW	Continuously works with coworkers to maintain a workflow throughout the lab that produces accurate results in the most timely manner.	Works to ensure all specimens in their designated area are processed in a timely manner asking for help as needed.	Works independently to efficiently process specimens in their designated area resulting in some extension in TAT.	Works independently to process specimens in their designated area without regard for timely results	Workers performance of duties in this area results in many interruptions to work flow and extended TAT.	4

ELIMINATING WASTED STEPS	Performs work in accordance with *Lean* procedures to eliminate the waste of energy and time. Makes suggestions for further elimination of waste.	Performs work in accordance with *Lean* procedures to eliminate the waste of energy and time	Performs work in a way that keeps wasted steps and time to a minimum but is not consistent with standard work.	Does not strive to eliminate waste in their work practices.	Adds waste to certain tasks while performing duties.	4
PRACTICES 5S PRINCIPLES	At all times works to maintain area in accordance with 5S principles and prevent degradation.	Consistently keeps work area in accordance with 5S principles.	Maintains inventory and visual control of work area.	A recognizable effort has been made to maintain the condition of the work area.	No effort has been made to comply with 5S principles.	2
					Total	18 /25