

RADIOLOGY MANAGEMENT

May/June 2011
volume 33 number 3

The Journal of AHRA: The Association for Medical Imaging Management

Revisit, Revamp, and Revitalize Your Business Plan: Part 2

By David Waldron



A Lean Six Sigma Journey in Radiology

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EXECUTIVE SUMMARY

- The department of radiology at Akron Children's Hospital embarked on a Lean Six Sigma mission as part of a hospital wide initiative to show increased customer satisfaction, reduce employee dissatisfaction and frustration, and decrease costs.
- Three processes that were addressed were reducing the MRI scheduling backlog, reconciling discrepancies in billing radiology procedures, and implementing a daily management system.
- Keys to success is that managers provide opportunities to openly communicate between department sections to break down barriers. Executive leaders must be engaged in Lean Six Sigma for the company to be successful.

Akron Children's Hospital is a 300 bed hospital with approximately 100,000 radiology procedures and 600,000 outpatient visits per year. It has over 4000 employees and is located in northeast Ohio. The organization embarked on the Lean Six Sigma mission approximately two and a half years ago. Each department at Akron Children's Hospital has utilized these methodologies in different ways and has been able to show increased customer satisfaction, reduced employee dissatisfaction and frustration, and decreased costs along the way.

Akron Children's Hospital has always been committed to continuous quality improvement in the services that it provides. Commitment starts with the president and CEO of the hospital, as well as executive staff and the board of directors. The president and CEO gave Lean Six Sigma credibility by reflecting on proven techniques used in other businesses outside hospitals to improve processes. Akron Children's formed a Center for Operation Excellence department that is staffed by eight people who work on projects for Lean Six Sigma across the hospital. Lean Six Sigma has increasingly become a part of the culture at Akron Children's. More than 500 of the 4000 plus employees have participated in some type of Lean

Six Sigma project. The executive suite believes in empowering employees to create an environment where the employees make a better and more efficient work environment for themselves. The belief is in open communication, motivation, and celebrating victories. The president and CEO has stated, "We all know that culture eats strategy every day. You can have the best strategy in the world, but if you don't have a good culture, you're going to have a hard time implementing that strategy. Lean Six Sigma is a real investment in culture. It communicates to your people that you really value them and what they do."¹

The department of radiology at Akron Children's Hospital has undergone different Lean Six Sigma processes over the last two and a half years. The MRI scheduling backlog was reduced from 25 days down to one or two days, there were discrepancies in billing radiology procedures that were reduced from 10% to approximately 1%, and a daily management system was implemented—as a result, huddles and department whiteboards are a common site in the department today.

Overview of Lean Six Sigma

Six Sigma improves the quality of process outputs by identifying and removing

the causes of defects (errors) and minimizing variability in manufacturing and business processes. A set of quality management methods is utilized including statistical methods. Normally, an organization creates an infrastructure of people ("Black Belts," "Green Belts," etc) who are experts in these methods. Each Six Sigma project carried out within an organization follows a defined sequence of steps and often has quantified financial targets (cost reduction or profit increase). The DMAIC methodology steps, which are used, stand for: Define a problem or improvement opportunity, Measure process performance, Analyze the process to determine the root causes of poor performance; Improve the process by fixing root causes, Control the improved process to hold the gains.

Lean methodology has its origins in the Toyota production system. The Lean system looks at processes broken down and then categorizes these parts in terms of value and waste. The five principles of Lean are:

1. Identify value in the eyes of the customer
2. Map a value stream
3. Create flow in the value stream
4. Create pull in the value stream
5. Always improve

These processes are reviewed from the perspective of the customer and are analyzed based on providing value to the customer. "Waste" is then removed from these processes to be more efficient and effective. In Lean, types of waste identified called DOWNTIME: Defects, Overproduction, Waiting, Not utilizing the police skills, Transportation/movement, Inventory, Motion, and Excessive processing. Ideally, improved quality should lead to lower costs and improved productivity should lead to better quality outcomes.

Lean Six Sigma is a process improvement methodology that combines the benefits of both Lean and Six Sigma techniques to enable companies to streamline operations, increase value for the customer, and reduce waste. Lean Six Sigma heavily involves front line employee involvement

and manager engagement, reduces costs, increases customer satisfaction, and generates revenue. It is an aggressive methodology for breakthrough improvement in speed, quality, and cost. When implemented properly, the focus of Lean Six Sigma equally balances focus on processes, outcomes, and improving employee problem solving skill sets.

MRI

In January 2009, it took approximately 25 days to have an uncomplicated outpatient MRI scan scheduled. This backlog caused frustration among the patients, physicians, and staff. In addition, this was not representative of the high quality brand of care that Akron Children's subscribed to. Additionally, in January 2009, the MRI team typically performed about 86 exams per week between the two main MRI machines. The journey through MRI started with a Green Belt project in which an interdisciplinary team was created and worked to stabilize the schedule. Through five months of hard work of a Green Belt team (including a radiology scheduler, clerical supervisor, MRI technologists, IT PACS administrator, special imaging supervisor, and nurse), the team was able to stabilize the schedule and slightly increase daily schedule capacity for patients. The team used a value stream map and cause and effect matrix rating system to determine what to address first and tried to figure out the most likely causes based upon frequency of occurrence, such as a patient not being authorized by the insurance company. The improvement group also looked at every block in the schedule at how well each time spot and patient type was working. For example, if an early spot couldn't be filled because inpatients couldn't be brought down to radiology due to nursing changeover

time, could we use that time for outpatient school aged children? Careful data analysis showed what percentage of spots were being used in the prior eight weeks. Too many inpatient spots (that may or may not be filled) embedded in the schedule would potentially contribute to longer outpatient wait times to get an appointment.

The team members went to the various referring physicians to ask for ways to improve the MRI system, and came back with only one major complaint: patients did not want to wait one month to get their outpatient appointments and were therefore being referred elsewhere. The team looked at spoken and unspoken rules around times of day for scheduling certain exams and for radiologist preference of MRI machine. They created ordering guides for the inpatient units to allow for better computerized MRI order entry, since they did not have the same computer order entry system for any radiology exams. The team also created scheduling guides for the radiology schedulers concerning exam length in relationship to complexity of the exam so that enough time was allotted for a simple brain scan versus brain and total spine exam. To stabilize the schedule, the team utilized a simple fishbone diagram, standard work instructions, and a Lean tool called Heijunka (allowing for just in case spots) to balance the volume of inpatient, outpatient, and urgent add-on patients. Finally, the stabilized schedule allowed the technologists to complete MRI scans in the new allotted time, which increased from 60 minutes to 75 minutes per exam. Although the project sometimes added an additional one to two exams per day, this project still did not make a significant impact on outpatient MRI access time.

Next, an eight week frontline staff improvement project, called an A3 project,

When implemented properly, the focus of Lean Six Sigma equally balances focus on processes, outcomes, and improving employee problem solving skill sets.

was done by an MRI technologist who worked daily with the radiology scheduling office to load the outpatient schedule. Frequent communication would occur, sometimes hourly, between the technologists who were responsible for inpatients and the scheduling office who handled the outpatients. If either group was aware of a cancellation or a possibility that a time spot was not going to be filled, instant communication of this occurred to try to pull patients in from a wait list, inpatients, or even employees that needed an MRI. This raised the daily total to about 100 exams per week for the month of July 2009. Although the technologist and scheduler did a fantastic job in working through some of the barriers in managing the schedule, it was not a sustainable method for daily management without the involvement of more individuals.

In August 2009, an MRI Kaizen, led by a Lean Six Sigma project leader was held to create a clear, long term plan for reduction of outpatient wait time for MRI appointments. This interdisciplinary and interdepartmental two day event took place to create a sustainable way to load the daily schedule, keeping it balanced with cancellations, no shows, and inpatient add ons. The same Green Belt team was used, along with two radiologists and the manager and staff member from the insurance authorization center who worked diligently to ensure the MRI exams were approved by the insurance companies. During the event, standard work instructions were written regarding "wildcard" slots (empty until that day only) in the daily schedule and how they were to be utilized. Protocols were reviewed by the radiologists and, where appropriate, image sequences were reduced and standardized for the radiologic technologists. Communication between the radiology schedulers and insurance authorization specialists concerning clinical patient information needed for insurance authorizations was solidified. This massive effort was followed by an intense marketing plan to increase business and fill the increased capacity in the

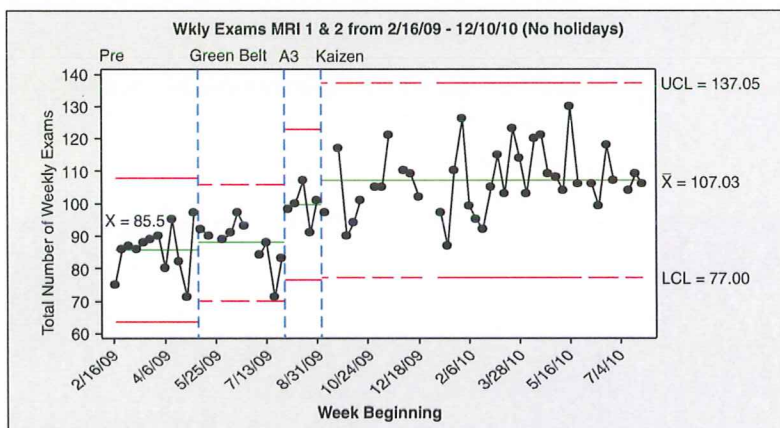


Figure 1 • MRI Volume Trend

MRI suite. At the end of the process, the outpatient wait time to have an MRI scan was reduced from 25 days down to one or two days, even for complicated exams. Since completion of the projects and the implementation of a strategic marketing plan, MRI volume has increased by 23%. Also, over \$1.3 million in additional revenue for the hospital has been recognized. See Figure 1.

In January 2011, Akron Children's Hospital received an honorary mention award at the International Quality and Productivity Center's Lean Six Sigma & Process Improvement Summit in Orlando, FL for a project that improved the efficiency in scheduling MRIs at the hospital, resulting in quicker access for patients and increased revenue. The category for this award was in the "Best Process Improvement Project Under 90 Days."

Billing

Many facilities use two different companies for billing professional and technical charges in their departments. At Akron Children's Hospital, it was noticed that there were some discrepancies between the professional and technical charges being billed. These discrepancies, which occurred approximately 10% of the time, resulted in denials and subsequent rebilling of many charges in the department. In

reviewing the downtime components of the Lean process, there were many wastes in billing radiology charges such as an inaccurate and outdated charge master, insufficient patient information, rebilling, and coordination of the charges from exam scheduling to patient billing. A Green Belt project was undertaken to reduce this waste and improve the efficiency of the billing system. Led by the administrative director of radiology, a team of nine employees was formed including radiology, finance, billing, and IT. The team met biweekly for a period of about three months utilizing the DMAIC process. The entire revenue cycle process was viewed in a value stream map that displayed the entire revenue cycle with storm clouds which denoted problem areas (see Figure 2).

Data were then gathered involving CPT code matching, volumes, and breakdown of error locations. After the team measured and analyzed the data, they came up with the defects. Some of the defects found included charge master descriptions not appropriately matching the correct CPT code, technologists performing different exams than ordered and not adjusting the charge, or insufficient documentation by the technologist or radiologist. Improvements were then implemented, which included a complete review and correction of the charge

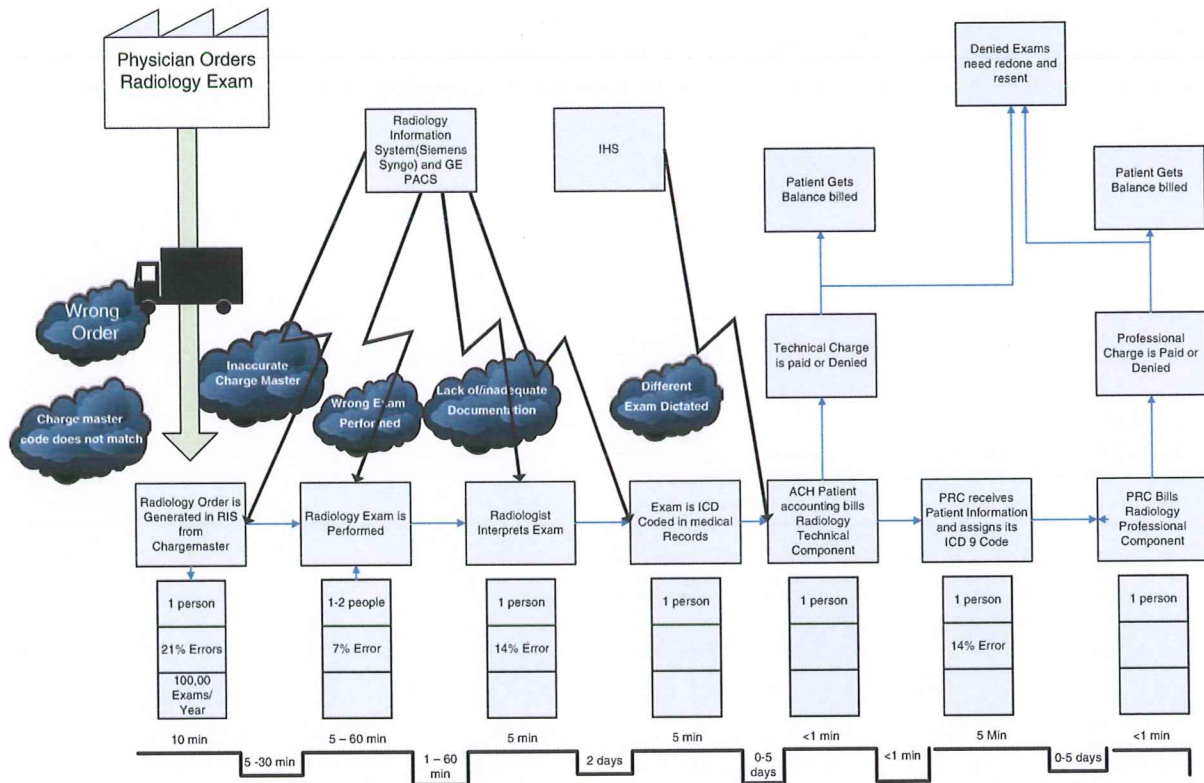


Figure 2 • Value Stream Map of Radiology Revenue Cycle

master, standard work processes for radiologists and technologists, and a reconciliation of professional and technical charges on a weekly basis. Through these processes, defects were reduced from 10% to approximately 1%.

Lean Daily Management System

Since the radiology department had been an early adapter of Lean Six Sigma principles, with involvement in the Green Belt program, A3 program, and Kaizen program, they were chosen as the first site for implementing the Lean daily management system to become Blue Belt certified (see Box 1). In the radiology

BOX 1. Blue Belts

A Lean “Blue Belt” leader certification program, taught by an internal black belt, was created at Akron Children’s to implement the Lean daily management system. The goal of each modality or department is for each manager, supervisor, lead technologist, and physician to be able to understand and apply the basic Lean and Six Sigma tools and principles to their daily management systems. They are taught the concept of “daily management” in an eight session program that brings managers together on the same level for a more cohesive, efficient, and aligned radiology department. All leaders and managers are expected to be able to coach and mentor their staff, lead huddles, track metrics, and lead their respective operations.



Figure 3 • CT Metric Board ("Kids Board")

department at Akron Children's Hospital, management processes are seen across every modality in the form of charts and whiteboards. There are tracking charts for different metrics that the staff actively follow and improve. For example,

the CT department tracks the number of procedures done and number of incorrect orders received on a daily basis (Figure 3). Also, there are white boards, such as one in the diagnostic section of the department, displaying where people



Figure 4 • Department Huddle (All Leads/Supervisors)

are working and where they are assigned during the day, as well as a section for the nurses, radiologist, and a special section for hot topics.

Another useful tool that has helped radiology leaders manage is daily huddles. Each huddle lasts approximately five to fifteen minutes and addresses the metrics from the previous day's activities and the schedule for the current day. There are huddles in each modality (eg, x-ray, MRI, nuclear medicine) to work through patient issues, staffing issues, and relay other relevant information specific to that area. There is also a department wide huddle where all lead technologists, nurses, child life specialists, supervisors and managers, and radiology IT support staff attend and align resources needed for managing the daily patient schedule. The current day's patient schedule is discussed, including staffing, equipment issues, shared patients between modalities, announcements, and other pertinent information. (See Figure 4.) Finally, there is a radiologist huddle every morning where the following information is shared: staffing, daily metrics (including turnaround time of emergency department stat reads for x-ray), any unread exams or QC cases, coverage during meetings or conferences, and any protocol changes and announcements. (See Figure 5.)

Conclusion

Lean Six Sigma has brought many positive changes to the Akron Children's Hospital radiology department including improved employee morale, increased employee involvement, higher imaging quality, and decreased patient wait time for exams. A couple of notables that came out of the MRI project were a dramatic decrease in complaints from physicians and patients in regards to the wait time for the procedures (from five a day to almost zero), as well as a standardized protocol book that was assembled and implemented which greatly increased image quality and consistency. The daily huddles and metric boards brought an overall improvement in



Figure 5 • Radiologist Huddle

employee communication and inter-working cohesiveness that was created has also increased the productivity and satisfaction of the staff. These projects have reduced expenses and increased

revenues. According to the president of Akron Children's Hospital Regional Network: "The process also resulted in increased clinical efficiency, improved outcomes, and improved patient satisfaction

■ BOX 2. Gemba Walk

Gemba is a Japanese term meaning the place where all activities are actually taking place, otherwise thought of as the place where value is added. All management walks the gemba every day and this is a great way for managers to stay in touch with their employees. By walking through the department, talking with people and asking focused questions on process breakdown, and observing the processes in the workplace, one will be aware of everything that is going on at that time. At Akron Children's Hospital, there is a formally designated "Gemba Walk." This is a structured, weekly event that occurs between all of the managers and supervisors and the director of radiology that focuses on one topic such as checking for adherence to standard work for processes and visual management throughout the department. One level up from this is a Gemba Walk that involves the radiology director and the vice president that is also focused on process improvement and engages the managers in task escalation and resolution such as machine maintenance, revising checklists, and insuring that staff have complete and accurate information.

in radiology programs."² The radiology department will continue the Lean Six Sigma journey in an effort to always improve.

The Lean Six Sigma philosophy and methodology have become a way of life in the department of radiology. Although there have been many improvements in the department, there is still a long journey ahead. Keys to success in radiology are for managers to "walk the gemba" (Box 2) and provide opportunities to openly communicate between department sections to break down barriers. There are many new improvement projects on the horizon and a key to the future is continued support by management and benefits for the employees. Executive leaders must be engaged in Lean Six Sigma for the company to be successful. John Toussaint, MD, who served as president and chief executive officer of ThedaCare, Inc., a community-owned, four-hospital health system where he introduced a model of continuous improvement that helped save millions of dollars in healthcare costs by reducing patient errors, improving outcomes, and delivering better quality care at a higher value, has said "Senior managers must be intimately involved in lean through strategy deployment . . . Lean executives are, above all, facilitators and mentors."³

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