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Improving process throughput of Cardiac catheterization using Six Sigma Training

Abstract

Healthcare is changing daily with the introduction of technology. Heart catheterization is one area that has excelled in the new technology that is constantly being introduced. Facilities are being built which provide patients with diagnostics and treatments that save lives daily. Due to the continual improvement of healthcare processes, it is also important to review process and continually improve efficiency. The catheterization lab patient care process must provide quality patient care that exceeds expectations of all involved. A project was completed to train a team that would implement process improvement. The team was made up of the technicians, nurses and administrative personnel who worked daily in the lab. Using six sigma as a basis of process control, training was executed on a weekly basis with deliverable outcomes that were implemented for improvements. A team of professionals worked to optimize current practices regarding patient through put. This was completed by applying six sigma concepts to communications, scheduling, documentation, and resource utilization of the unit. As a team, resources were compared to the needs of patients' and regulatory requirements. Interval steps of discovery occurred as the project proceeded. This paper will outline the process, difficulties and outcomes of the project in general terms which provides a basis of validating the time spent on six sigma training.

Improving process throughput of Cardiac catheterization using Six Sigma Training

Introduction

Six sigma is "a rigorous, focused and highly effective implementation of proven quality principles and techniques" (Pyzdec, 2000). It is based on the statistical concepts of Carl Frederick Gauss (1777-1855) (www.isixsigma.com). It is now a way of doing business for hundreds of companies around the world. One of the tools used is a performance model known as Define-Measure-Analyze-Improve-Control (DMAIC) (Pyzdec, 2000). It has recently been introduced to the process improvement of the healthcare industry. With the growing cost of healthcare and the introduction of new technology, it is important to implements the continually improve process model.

The healthcare industry is challenged by method-type improvement due to the human factors involved. Professionals are trained in specialized areas that are learned through on the job training. Heart Catheterization (Cath) labs are focused on procedures to diagnose heart conditions and treat clogged arteries (Haugh, 2006). Each team member continually attends education workshops on new techniques, new products and new patients. This is a procedure, in basic terms, when a doctor inserts a thin plastic tube (catheter) into an artery or vein in the arm or leg. From there it can be advanced into the chambers of the heart or into the coronary arteries where it can be viewed to show any clogs, measure to show any abnormalities of the heart and repaired or diagnosed as necessary. The following project will outline in general terms the process, difficulties and outcomes of a project within a cath lab. It will provide a basis of validating the time spent on six sigma training.

Process

This project was funded and supported by higher administration at the hospital and supported by the owners of this hospital system. Two teams were formed for this project. Managers and doctors formed the first team, the champion group. Through the other projects it was discovered that allowing the front line staff (i.e. nurses, technicians, etc.) to develop the project and then present information to the higher-level individuals, was more productive. The project team was made up of staff who worked directly in or supported the cath lab. This particular group was made up of approximately 15 hospital employees with approximately 5 of each on the team in the following groups:

1. Registered nurse or medical technician
2. Administrative manager, with cath lab experience
3. Coordinator in registration, scheduling, etc

The project team met once a week for training and spent approximately four hours per week defining, collecting, measuring or analyzing data related to the training. The training was formalized for 12 weeks and the total project duration with the overall project duration expanding over 6 months.

Difficulties

In the manufacturing industry, it is very easy to observe a process, measure the performance of equipment and analyze the data. Machines do not have the extreme variances of the human as a healthcare facility. Although manufacturing has human factors issues, the cath lab has life or death variances in their patients. Applying process improvement to the healthcare industry must be done in a way which is flexible and realistic. This project found many issues which had to be overcome for the project to continue. A few of the major issues will be explained with examples. Major roadblocks of the project included scheduling issues, and technical learning-curve.

When we say scheduling issues, we are referring to that of the process of training. Scheduling issues revealed to improve the process will be shown the outcomes. The higher administration and physicians were in support of the training schedule for this project. The cath lab had a reduced schedule for the day of training and support was given to assist in the data collection throughout the week. Unfortunately, patient acuity in this area was high and could not be controlled. One such example was a day with two emergent patients arrived within minutes of one another and all nurses and technicians were called to assist. As a leader, many can imagine the look on the other team members. How do we continue? Immediately upon receiving the call, the specialized team members began to encourage the other team members to observe the incidents. This emergency became a learning tool to assist non-technical team members to understand the process in the cath lab.

This leads us to another issue on the team, the technical learning-curve. The basis for this training is that the actual procedures and protocols for medical procedures are not being changed. The training is not medical techniques, but rather the tools to improve daily tasks related to healthcare. Actually, the team members were teaching one-another about their responsibilities. As a process map was initially developed to outline the patient through-put in the cath lab, many of the team members only understood their piece of the map. So there were technical terms related to the medical side and terms that were used during the administration of the patient. This communication became a bonding for the team as everyone now felt that they were responsible for a piece of the project. As the training continued, the team members equally elevated to a high level of understanding of the process. It was during this revelation that the improve and controls were validated.

Outcomes

The propose of this paper is not to reveal all of the specific processes for one project, but to reveal the value of the team concept six sigma training in healthcare. Many models exist for process improvement and all can attain positive outcomes. This particular group can demonstrate the value of communication and teams to improve the cath lab process.
The outcomes which were easily revealed included discrepancies in patients scheduled per day and actual patients processed per day, and the patient procedure scheduling not actual patient procedure times.

The data was collected from information, which was already collected by the hospital. Some of the data was electronically transferred to files used by the project team. One team member was also a specialist in the information area of the cath lab. Patient names were not included in the reporting of the data. The number of patients, which were scheduled at 5PM on the day before a procedure, was compared to the actual number of patients on which procedures were performed. Figure 1 shows that on average, a 50% overage of patients were processed through the facility. This was due to the fact that patients needed this procedure are not always able to schedule ahead. Many cases are done on an emergent basis.

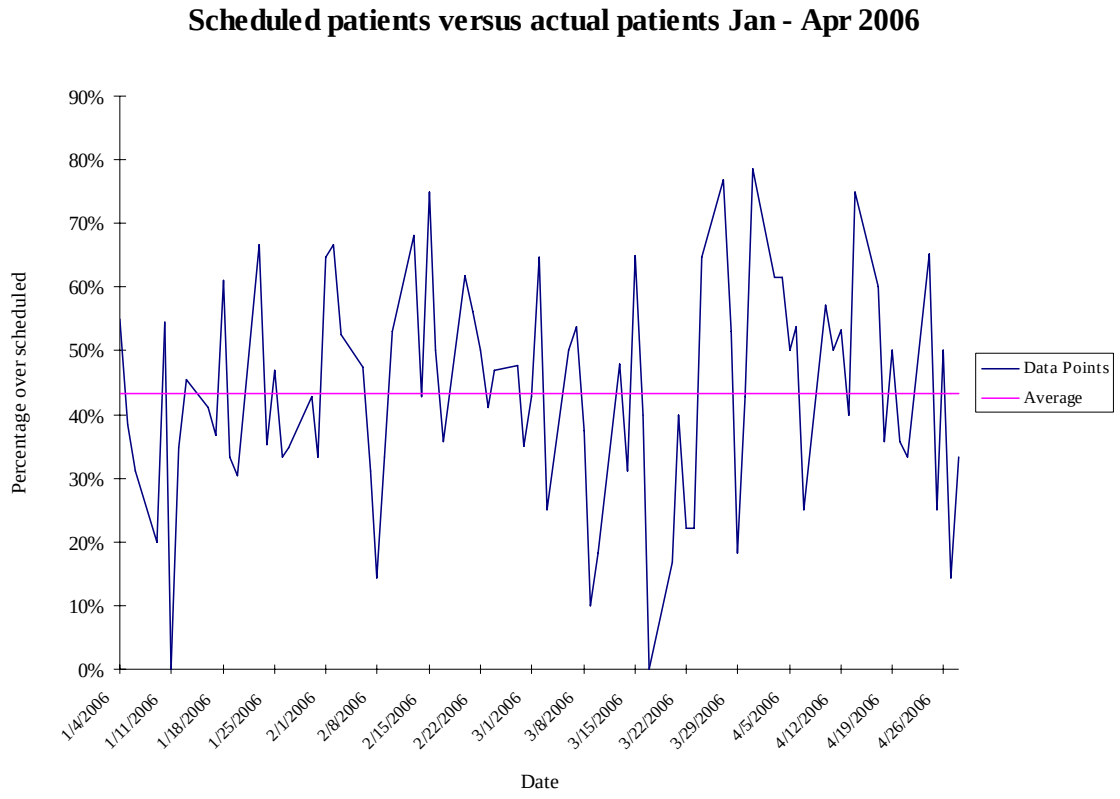

Figure 1. Scheduled patients versus actual patients Jan – Apr 2006

Another outcome, which was easily revealed by the training, was the procedure times scheduled versus the procedure time actual. The team once again had to work together to understand the process through which a patient was scheduled. In this facility, many patients were scheduled through the physicians office, especially when it was a non-emergency case. Without introducing the technical barriers of the scheduling software, it was shown that many procedures were delayed throughout the day. Figure 2 shows that in looking at all procedures that as the day progresses delay time increases.

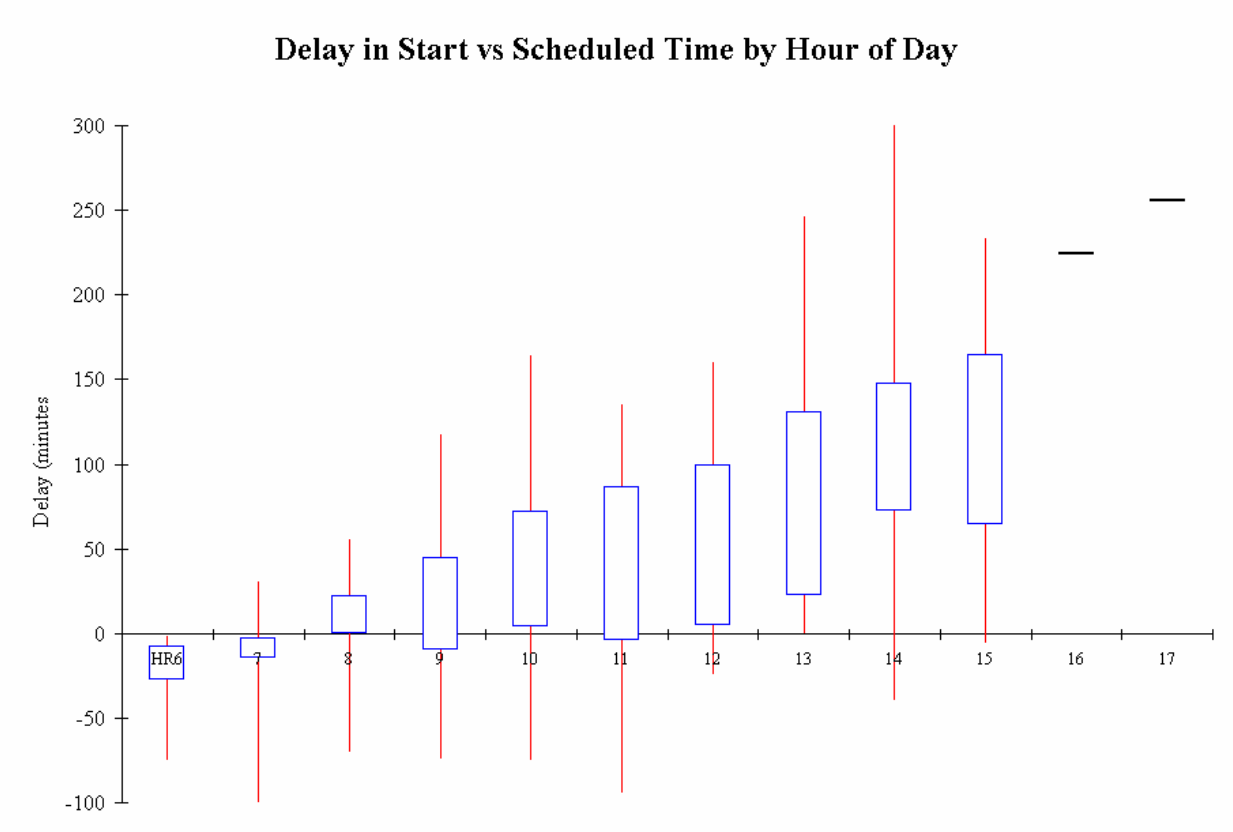

Figure 2. Delay in start vs. scheduled time by hour of day

To further explain this issue, each procedure was analyzed. Figure 3 shows the difference in the time for actual procedure schedule time versus the actual time for completing the procedure. The schedule for this area is done through the registration desk at the hospital or through the physicians' office. The data was input by copying the information from the actual time that was scheduled by the patient versus the actual time that the patient was in the procedure. Patients report to the facility up to 2 hours prior to their appointment to have pre-procedure prep. It was revealed that one area, the EPD, had an average of over 100 minutes delay. This outcome lead to the group effort of coordinators in the cath lab, hospital registration and the physicians office to review the schedule procedures and adjust accordingly. It revealed that most procedures in that area were scheduled for the same duration when the actual procedure times ranged from 4 – 8 hours.

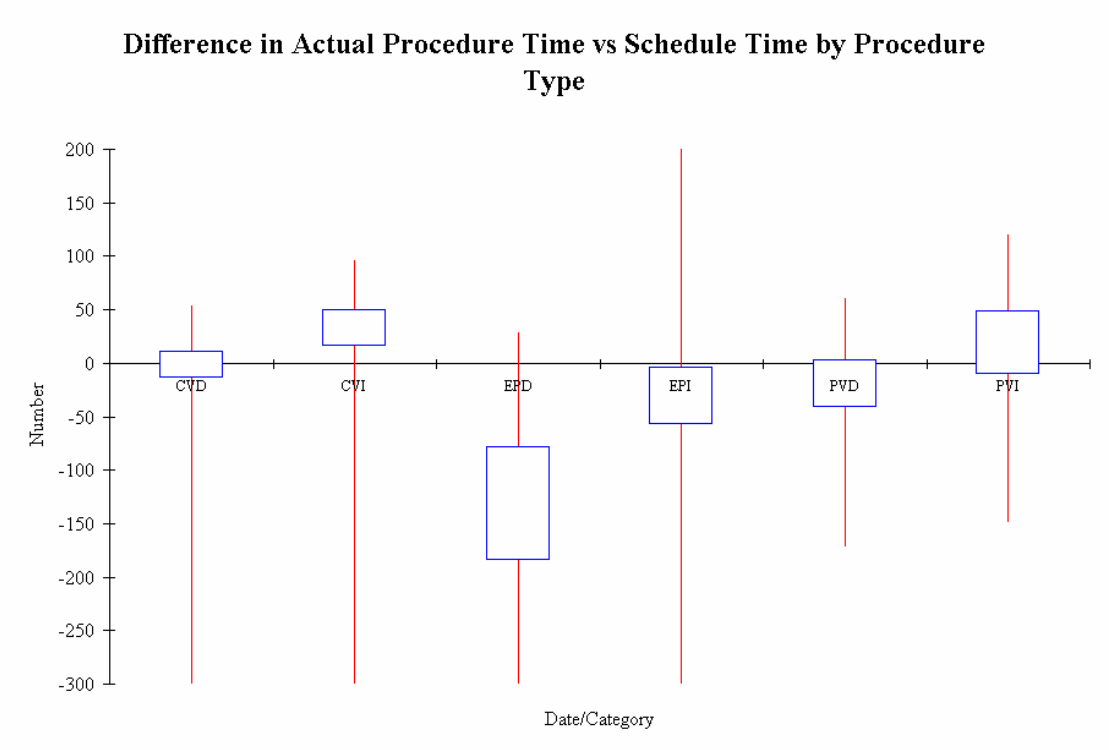

Figure 3. Difference in actual procedure time versus schedule time by procedure type

Conclusions

The cath lab is a great capital investment for a hospital (Konopka, Millar, O'Brien, & Weissman, 2006). But this cath lab project was driven by the need to improve the process and the need to increase staff satisfaction. At the beginning of the project the staff had an overall a very negative view of the higher administration, did not get lunch breaks due the scheduling issues and felt that the advancement was not fair. There had been a high rate of turnover in professionals in the cath lab and the physicians were becoming concerned with patient care issues. The project team developed during the training and became confident in their abilities to communicate issues with higher administration. Currently they have continued their development of other implementations to continually improve the process. A post survey of staff showed an increase of overall satisfaction.

The process, which was implemented for the project, is one which can be very successful in many areas of healthcare. If a cath lab with high acuity patients can overcome the issues of making time for training, it would seem that other areas could be even more successful. The return on investment far exceeded the investment in terms of money. But an even greater feat is to improve the satisfaction of staff and give individuals the ability to be successful.

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