Acceptance of Right from the Start Program Among High Risk Patients in a Residency Training Clinic

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No funding from external sources was used in the completion of this project. The research was conducted as an exempt protocol under quality improvement.
Abstract

Objective

The objective of this study was the application of Six-Sigma methodology, specifically, the Define-Measure-Analyze-Improve-Control (DMAIC) and Lean tool to improve acceptance among expectant mothers into a governmental assistance program, Right from the Start. This program provides care coordinators for pregnant mothers, to help them stay healthy during pregnancy and obtain medical coverage both for themselves and their new babies. The focus was on high risk patients in an outpatient obstetric clinic serviced by a hospital based residency-training program.

Study Design

This was an observational study of changes resulting from the application of Six Sigma principles to the clinic process with particular attention to improving acceptance of the Right from Start program.

Methods

Using cohort analysis and Six Sigma principles, we compared the baseline process from 1 January 2013-30 June 2013 with our implemented intervention from 1 January 2014-30 June 2014.

Results

Using Lean and DMAIC tools (including “voice of the customer”) and team focused approach; involvement in the Right from the Start program increased from 26% to 98%.

Conclusion

We applied Six Sigma principles facilitating an interdisciplinary team approach to improve involvement in the Right from the Start program. Through focused problem assessment, verification of process, and validation of outcomes we improved patient participation in a program that helps pregnant women and their babies.
Purpose

The purpose of this research was to evaluate the impact of applying Six-Sigma methodology, specifically, the Define-Measure-Analyze-Improve-Control (DMAIC) and Lean tools to track acceptance of Right from the Start (RFTS), a governmental assistance program for pregnant women and their children. This program provides a local community nurse or social worker, called a "care coordinator," for each pregnant woman, helping them learn ways to have a healthy pregnancy and obtain medical coverage for both themselves during pregnancy and for their new babies. Our focus was on high risk patients in an outpatient clinic serviced by a hospital based residency-training program.

Introduction and Review of Literature

Charleston Area Medical Center’s Women and Children’s Hospital, performs over 1508 high risk visits per year with an average of 39% of the obstetric patients presenting with a positive urine drug screen at initial visit. This population presents unique challenges including a significant need for enhanced social services and healthcare management. Prior to our quality improvement initiative, the RFTS program had been invaluable as a means to enhance care. RFTS is a West Virginia Department of Health and Human Services (DHHS) program that offers nursing case management to facilitate prenatal care and human health services. Further, RFTS provides voluntary pediatric home health visits by nursing personnel during the first year of life for participants. RFTS assists pregnant women through some of the barriers to accessing healthcare, such as lack of insurance, transportation, childcare, etc. It also promotes healthier lifestyles with tobacco cessation and healthy eating programs. Participation in the program from our clinic has been historically low.

As a result, a thorough evaluation of the processes involved in our management of high risk patients with substance abuse was accomplished. Following the Six Sigma Lean approach, uptake of the RFTS was analyzed. Lean improvement differs from other improvement methods in two key areas. First, lean focuses on improving the entire value stream, while most of the other improvement methods tend to focus on individual processes. In lean language, a "value stream" consists of all of the activities that a company
must perform in order to produce and deliver a product or service to a customer. So, a value stream is really a system that is composed of numerous individual processes. Lean organizations work on improving individual processes, but lean advocates always remember that the real goal is to improve the whole value creation/delivery system and that improving one process may not improve the performance of the value stream. The second important difference is that most process improvement methods tend to focus on improving the productivity or efficiency of major value-adding processes, while Lean emphasizes reducing or eliminating non-value-adding activities (waste) and finding solutions that consume less resources.

More recently Six Sigma tools have been applied to the non-manufacturing realm, particularly service industries including health care. Lean Six Sigma has been useful in the process to improve healthcare outcomes and change institutional behaviors.³⁻⁷ Six Sigma is particularly useful in improving health care processes when iterative tasks and closing loops are necessary, (i.e. pap smear review and follow up).⁴⁻⁶ Integration of statistical analysis by comparison of cohorts of data, analysis of root causes, and point-of-use observation were tools we used to to improve enrollment in RFTS.

**Study Design and Methods**

An interdisciplinary team was formed consisting of a Six Sigma Green Belt from the Women’s Medicine Center at Charleston Area Medical Center, the clinic medical director, the maternal-fetal medicine faculty in charge of the high risk obstetrical clinics and a RFTS staff member trained in Six Sigma. This team jointly deployed Six-Sigma tools including: Define-Measure-Analyze-Improve-Control(DMAIC), Change Acceleration Process(CAP); including obtainment of the Voice of the Customer(VoC), and Point-of-Use observation to improve enrollment in our program.¹² Our current enrollment into the RFTS program consisted of clinic staff (mostly residents and nurses) administering a maternal risk screen, Prenatal Risk Screening Instrument (PRISI) that is sent to the state. The state then provided RFTS staff with a list of eligible patient for them to contact and recruit into the program. Our hospital had RFTS personnel near the clinic but in following this process, they would have to set up an
appointment to meet the patients in her home. This interdisciplinary team calculated the percent of eligible patients from January 1, 2013-June 30, 2013 at 26%.

The interdisciplinary team established a resolution of the following elements as critical to quality (CTQ) for the implementation of a solution to eliminate variance and missed opportunities for enrollment in the RFTS program:

- RFTS staff to enroll patients in clinic setting.
- Intervention must be able to handle high risk patients with multiple medical and psychosocial needs.
- The proposed solution must meet acceptable clinical and operational standards for ease of access, (registration in the clinics), and accuracy (goal for at least 80% of patients eligible to be enrolled in the program).
- There must be a designated project Champion to support the project and navigate organizational barriers

We utilized Six Sigma’s DMAIC tool for project improvement. It consists of the following steps: Define specific goals, Measure the current situation (baseline), Analyze to determine the relationships and factors of causality, Improve the situation continuously, and Control the problems so that it does not reoccur. Figure 1 and the description below demonstrate how our group worked through these steps to improve RFTS enrollment.

Define

Patient Population: high risk pregnant women served in the High Risk clinic at CAMC Women and Children's Hospital. (These clients have a history of drug abuse and are part of the Drug Addicted Mother and Baby Program). The Rationale for Study: RFTS has a history of low acceptance rate with high risk clients especially those clients with a history of substance abuse. Typically these clients would refuse services or the RFTS Designated Care Coordinators will close their case because clients will ignore or not respond to contact attempts.
The four concepts utilized in the Six-Sigma, (Define Stage), consisted of:

1. Utilization of the “Change Acceptance Process (CAP).” Projects that improve patient centered care processes must be the product of a unified team with a common tie that binds; Quality = Acceptance x Effectiveness. The key variable in this equation is Acceptance.

2) Obtaining the “Voice of the Customer (VoC).” This process focused on getting input and feedback from not only persons providing care, i.e. attending physicians, resident physicians, and nursing/clinical staff, but from all persons who are stakeholders in the need to improve upon the current process, including: team members who schedule and register patients, administration, suppliers, and most importantly, the patients. We learned from our patient contacts prior to the implementation of the RFTS staff in the clinic, patients found it difficult and confusing to register in the program. VoC was obtained in a variety of opportunistic venues including interdisciplinary resident collaborative sessions and green belt facilitated staff work out (WO) sessions.

3) Using process mapping to identify variation and waste and errors. Figure 2 is the initial process map before intervention.

4) Commitment to driving improvement based on data. All members of team must identify and commit to a defined set of quantifiable measurements that will be utilized to monitor performance on a continuous basis.

Upon completion of the “Define” stage the following elements were agreed upon as contributing to the current RFTS registration process.

- People: Workflow was dependent on patients being involved in the process and acting upon the request.
- Materials: Workflow was varied due to a lack of delegated staff in the high risk clinic.
- Measurements: Workflow did not have an embedded way to measure enrollments.
- Materials: A high volume, high risk system without continuity.
• Methods: Workflow depended on multiple staff members with multiple RFTS staff with limited follow up.

Measure

Paramount to “CAP/Work Out” process in the teaching hospital environment was to clearly establish a system within a care model where clients were seen in clinic setting and were interviewed and offered services by the Region 11/RFTS Regional Care Coordinator. A referral form was completed and sent to Designated Care Coordinators or other Regional Care Coordinators if the client agreed to accept services. The number of clients who refused services was tracked as well.

Following the DMAIC approach the next step was to measure the number of samples. Clients that were seen in the High Risk Clinic from January through June 2013 charts were pulled for benchmarking. A comparison was done for these 68 clients to determine if they enrolled into RFTS. The rate of the clients who were seen in the High Risk Clinic and accepted RFTS in 2013 was 26.4%. An initial study of the RFTS program in our clinics found that out of the 68 patients eligible for the care in the program in 2013, only 18/68 (26.4%) availed themselves of the services offered.

Analyze

In the process of measuring the RFTS enrollment process we found we had incomplete data on whether or not our patients were offered RFTS assistance and decided to either enroll decline services. We had no record on whether patients who decline had been offered enrollment.

Improve

With a focus on information received from the VoC in the Define Stage, the following (CTQ) elements where agreed upon by the team for the improve stage which would utilize the availability of the RFTS personnel in the clinic on-site;
• The RFTS personnel would attend the weekly high risk obstetrical clinic that focused on patients with substance abuse issues.
• The residents and faculty would inquire of each patient of their awareness or enrollment in the RFTS program.
• Each patient interested in enrollment was then referred immediately in clinic to the RFTS member in the high risk clinic.
• RFTS personnel then enrolled, or referred for enrollment in specific region/county.
• RFTS personnel would then follow up patients at subsequent high risk clinic visits to ensure enrollment.

These CTQ requirements then drove the design of the new process resulting in the following changes of care;

• 100% referral to in-clinic RFTS personnel
• Immediate enrollment by RFTS personnel
• Real time follow up of enrollment process in the clinic.

These workflow changes functionally changed the way work was performed in the clinic;

• The paper referral forms for RFTS were eliminated.
• All clinic personnel-residents, students, staff, and nursing staff became aware of RFTS and how to enroll the high risk patients.
• Delay of enrollment was eliminated.
• Excess paperwork was eliminated.
• Patient enrollment into RFTS was done in real time in the course of normal clinical care and flow of work
Return to Measure Stage

As the improvement test of change was implemented the following measures were monitored;

- Clients seen in clinic setting were interviewed and offered services by the Region 11/RFTS Regional Care Coordinator.
- Referral forms completed and sent to Designated Care Coordinators or other Regional Care Coordinators if the client agreed to accept services.
- Number of clients who refused services tracked.

We chose to compare the available clients seen from January through June of 2014 who were encouraged to sign up by the physician and then the RCC met with them and offered enrollment and explained the benefits of enrollment. The total number of clients during this period who enrolled in RFTS was 77/78 or 98.7%. The patient demographics were the same in the two cohorts.

Prior to the RFTS in-clinic referral process, we had no ability to track which patients were offered services and whether or not these patients accepted or refused enrollment. Thus, we were unable to compare the two cohorts with regard to patient refusal or patients offered services. However, we were able to perform a comparison analysis on our two cohorts with respect to the number patients who were eligible and enrolled in the RFTS program.

Control

Improved control was obtained by emulating the Six Sigma concept of “poka-yoke.” The use of an embedded asset enabled the prevention (yoke) of inadvertent lack of enrollment in the RFTS program (poka) by improving the control process through real-time access to the RFTS program. Source inspection embedded in the real-time enrollment process meant once the patient was enrolled and logged into the program, continuous tracking and feedback ensued. We worked within the DMAIC-control process error-proofing with the 7-step process. As noted in our “Define section:”
1) We mapped our enrollment process and identified the points for loss or enrollment.

2) We evaluated our previous RFTS program procedures and found it inadequate, confusing, and fraught with poor hand-offs.

3) Lack of enrollment could occur at provider, nursing, or patient level with no mechanisms to identify patients either not enrolled in RFTS or those never approached for enrollment.

4) The root causes were a large numbers of high risk patients with no way to document hand-offs, processing, or enrollment of patients.

5) The error-proofing process needed to be real-time, with contemporaneous feedback, and bidirectional (clinic-RFTS).

6) The solution created was an embedded resource in the high risk clinic.

7) The data presented in our paper above demonstrated the effectiveness in eliminating any lost or un-approached high risk patients for RFTS services.

Finally, in a system that is historically variable, ongoing tests of change and repeat cycles of learning began to demonstrate elements of improved “control.” We were able to reduce the waste and extra steps in the initial process and deliver the following in a streamlined process as demonstrated in Figure 3:

- Embedded a RFTS staff in the clinic
- Access within the workflow represents a real time evaluation for enrollment and/or if patient approached for enrollment.
- Assessment through the census enables the providers to arrange for any follow-up required by the patient.
- Build trust with patients

Results

After implementation of embedded RFTS personnel workflow process on 1 January-30 June 2014, we identified 78 patients eligible for enrollment in the RFTS program.
As a consequence of implementation of DMAIC process, changes made in personnel behaviors, use of RFTS personnel in the enrollment process, and real-time enrollment in RFTS in the high risk clinic resulted in an almost 100% enrollment in the RFTS program and 100% of patients approached for enrollment. Patient enrollment rose from a low of 26.4% to a new high of 98.7%. With the test of proportions, we found this was a statistically significant difference with z=9.13 and p <0.001. We now also have a standard means in our clinics of tracking whether or not our high risk obstetrical patients were being approached for the RFTS program, if they had enrollment completed, and if they follow up with their local RFTS resources.

**Limitations**

Limitations to our process include a single system project within a single clinic site. Multiple sites within different clinical systems might not be amenable to our process. The integration of diverse outpatient practices would pose the greatest challenge, although, the use of an embedded asset to track the enrollment processes seems the core of all excellent integrated clinical systems. Another limitation is that we cannot test for the direct cause of the improvement. It could have been due to the attention to enrollment system rather than the applied Six Sigma method. Finally, the process change to enrollment was not designed to determine if there was an improvement in healthcare outcomes or healthcare savings.

**Directions for Future Research**

Future research in our clinic will include continued tracking of our processes to validate our present success and non-enrollment avoidance. We also anticipate applying the concept of embedded personnel workflow to our other processes to provide on-site care, tobacco cessation, or possibly even our consultative referrals. All of these areas are amenable to embedded personnel in the workflow and ought to yield increased enrollment and compliance.

**Discussion**

Our lean process led to the prevention of the waste in time in the enrollment process for the RFTS program. Without formal evaluation of the process, merely adding an embedded asset could not be
assessed to determine if the cost to benefit was a cost effective use of the personnel. By no means do we have the type of sigma scores represented in automobile manufacturing or aerospace industry, but, we do have capacity and knowledge to now use control charts to monitor performance for improvement of variation.

Application of Six-Sigma management principles to residency teaching outpatient clinic resulted in an embedded personnel-team approach to solving the clinic’s lack of patient access to RFTS care without increasing personnel or personnel costs. We have not yet reached the goal of Six Sigma of 99.9997% error free processes enrollment and work flow. Perhaps the use of a workflow engine providing an automated, measurable and improved process for tracking enrollment in a complex educational environment with 12 residents, multiple staff physicians, and nurse midwives. Focused problem assessment, verification of process, and validation of outcomes anchor any attempts to couple increased enrollment in the RFTS program with improved patient care in the setting of a residency clinic. Our project supported using an embedded RFTS resource for more efficient use of staff time with enhanced resident care of high risk obstetrical patients. We think continued engagement, iterative evaluations, and refinement of our work flow will eventually allow us to continue the 98+% enrollment process necessary to our system.
References


Figure 1. Lean Six Sigma DMAIC to Improve RFTS Participation

**DEFINE**
- Low acceptance of clinic patients into RFTS program
- Clinic population: Low income, high risk pregnancy, substance abuse
- Measure: Rate of program acceptance
- Baseline: January 1, 2013-June 30, 2013
- Improved: January 1, 2014-June 30, 2014
- Team: VP of Outpatient services, maternal-fetal medicine faculty, clinic medical director, clinic nursing director

**MEASURE**
- Current system: Health care staff complete PRISI data collection; WV DHHS contact RFTS staff at W and C to notify them of patient eligible; RFTS calls eligible patient; set up meeting for enrollment
- Acceptance rate: 26%

**ANALYZE**
- Root cause of low participation rate
- *Lose referral info
- *No time
- *Don’t see benefit
- *Lack of trust
- *Difficulty reaching potential client
- Lack of data on whether all patients were asked and reason for decline
- Confusing system

**IMPROVE**
- Warm handoff
- RFTS personnel attend weekly high risk OB clinic
- Residents and faculty to inquire of each patient about their awareness and how to enroll in program
- Immediate referral to RFTS personnel in the clinic; immediately meeting with patient
- Help transportation
- RFTS personnel enrolls patient or refers to specific region/county
- RFTS personnel follow-up with patients at subsequent visit

**CONTROL**
- 100% referral into RFTS
- Eliminated referral paperwork
- Real time follow-up of enrollment process in clinic
- Enrollment rate: 77/78 (98.7%)
Figure 2. RFTS Enrollment Process prior to Modification

PRISI = Prenatal Risk Screening Instrument  
DHHS = WV Department of Health and Human Services  
DCC = Designated Care Coordinators  
RFTS = Right from the Start
Figure 3. RFTS Enrollment Process after Modification

PRISI = Prenatal Risk Screening Instrument
DHHS = WV Department of Health and Human Services
DCC = Designated Care Coordinators
RFTS = Right from the Start