Case Study: Use of Six Sigma Methodology to Improve Quality and Reduce Turnaround Times in Processing of Credentialing Applications

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Case Study: Use of Six Sigma Methodology to Improve Quality and Reduce Turnaround Times in Processing

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NSLIJ Health System

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Project Manager/Six Sigma Greenbelt
NSLIJ Health System

NSLIJ Health System

- Nation’s 14th largest healthcare system, based on net patient revenue, and the largest in New York State.
- Service area of 8 million people in the New York metropolitan area.
- 19 hospitals (6,400+ hospital and long-term care beds)
  - 5 tertiary • 9 community • 3 specialty • 2 affiliates • 3 SNFs
- 12,000 Medical and Allied Health Practitioners
- 23,000 appointments.
- Center for Learning and Innovation
  - Patient Safety Institute - The nation’s largest patient simulation center
- North Shore-LIJ CareConnect Insurance Company, Inc.
  - $7.8 billion annual operating budget
  - 54,000 employees — the largest private employer in NYS
Medical Staff Office Overview

Annual Statistics
17 Hospitals
• 1750 Initial Applications Processed
• 1550 Appointed
  • 3200 Hospital Appointments
• 6000 Reappointment Applications Processed
  • 1150 Hospital Reappointments
• 144 Credentialing Committees
• 168 Medical Executive Committees/Medical Leadership Councils
• 12 Board of Trustee Meetings
• 324 Total Annual Meetings

Medical Staff Office - Staffing

• Vice President
  • Senior Vice President, Medical Affairs, Associate Chief Medical Officer
• 3 Managers
• 3 Project Managers
• 25 Credentialing and Medical Board Coordinators
• 31 Initial & Reappointment Specialists
• 13 Credentialing Assistants
• 1 IT
  • 1 IT Manager
• 7 Data Analysts
Six Sigma Methodology Overview

Six Sigma is a focused, high impact process that relies on rigorous statistical methods and placement of control mechanisms to reduce process variation.

It is a business strategy used to tie together quality, cost, process, people and accountability.

- Links process to bottom line financial results
- Active senior management and leadership commitment
- Clear definition of success
- Focus on Customers and Process
- Data driven, statistically validated approach
- Solid infrastructure (Champions, MBB, BB, GB)

Rapid project completion (3-6 months)

What is a sigma?

The term sigma is used to describe variability, or spread about the mean, or Standard deviation from the ideal.

- For a process, it is a metric that describes how well the process is performing.
  - A HIGHER sigma value means LESS defect in the process.
- A defect is defined as anything that can result in customer “dissatisfaction”.
- The actual six sigma value represents defects per million opportunities (DPMO).

<table>
<thead>
<tr>
<th>Sigma</th>
<th>DPMO</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>308,537</td>
</tr>
<tr>
<td>3</td>
<td>66,807</td>
</tr>
<tr>
<td>4</td>
<td>6,210</td>
</tr>
<tr>
<td>5</td>
<td>233</td>
</tr>
<tr>
<td>6</td>
<td>3.4</td>
</tr>
</tbody>
</table>

3.8 sigma =99% defect free

As sigma increases, cost and cycle time go down and customer satisfaction goes up.

Process examples of Six Sigma

<table>
<thead>
<tr>
<th>3.8 sigma (99%)</th>
<th>6 sigma (99.99966%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20,000 wrong drug prescriptions a year</td>
<td>2 wrong drug prescriptions a year</td>
</tr>
<tr>
<td>5,000 incorrect surgical procedures a year</td>
<td>1.7 incorrect surgical procedures a year</td>
</tr>
<tr>
<td>20,000 lost article of mail per hour</td>
<td>7 lost article of mail per hour</td>
</tr>
<tr>
<td>Unsafe drinking water for almost 15 mins per day</td>
<td>One unsafe minute every 7 months</td>
</tr>
<tr>
<td>Two short or long landings at most airports every day</td>
<td>One short or long landing at most airports every 5 years</td>
</tr>
</tbody>
</table>
The essence of six sigma

Six sigma methodology will center the process and reduce the variability.

The Six Sigma Process

• Define: Who are the customers, what are their priorities
• Measure: How is the process performing, how is it measured?
• Analyze: What are the most important (critical to quality) causes of the defects?
• Improve: How do we remove the causes of the defects?
• Control: How can we maintain the improvements?

Define: The voice of the customer

Objective: Define who the customers are and their critical needs

Key Terms:
• CTQ: Critical to Quality—specific requirements critical to making the process run
• LSL, USL: Lower/Upper Spec Limit

Tools: SIPOC, CTQ Tree, Problem Statement, Goal Statement, Elevator Speech

ID Customers

Determine what you need to know

Generate list of customer needs

Translate needs into CTQs

Set CTQ Specs
**Measure**

**Objective:** Establish the baseline performance of the process by defining process standards and variables and then validating the measurement systems.

**Key Terms:**
- Sample size: Must be representative, adequate and random
- Continuous Data vs. Discrete Data
- Process Capability: Summary of the variation in a process, increases as process variation decreases

**Tools:** Data collection forms; Process Capability Microsystems Program

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**Analyze**

**Objective:** Examine the data collected in the Measure phase; Determine the most important causes of the defects.

**Key Terms:**
- Hypothesis Testing: Determines if there is a statistically significant difference between two observations vs. chance

**Tools:** Cause and Effect Diagram ("Fishbone"); Histogram; Box Plot; Run Chart; Descriptive Statistics; Pareto Chart

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**Improve**

**Objective:** Determine the best solutions to remove the defects identified.

**Key Terms:**
- Adding Principles: Increase value and benefit by adding time, resources etc.; solutions the customer is willing to pay for
- Reducing Principles: Minimize variability by eliminating, integrating or automating parts of a process
- Contrasting Principles: Solutions that involve implementing an opposite process (i.e., relocating work to/from an employee, decreasing/increasing range of alternatives)

**Tools:** Brainstorming, Design Matrix, Designing Experiments, Pilots, Push vs. Pull Systems
**Control**

**Objective:** Implement Processes to Maintain Improvements

**Key Terms:**
- Error Proofing: Technique for eliminating errors
- Process Monitoring

**Tools:** Risk Assessments, Control Charts, Milestones, Check-ins

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**Case Study**

**Project Description:**
Reduce the turnaround time for processing applications. Application processing was on average 62 day with a standard deviation of 35 days.

**Problem Statement:**
When a practitioner is not credentialed in a timely manner it results in dissatisfaction of staff and departments. The significant standard deviation caused uncertainty as to when the practitioner could begin working.

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**Project Overview**

**Potential Benefits**
- Faster processing of files
- Greater customer satisfaction
- Greater staff satisfaction
- Increased Revenue
- Practitioners join the Health System quicker

**Alignment with Strategic Plan**
- Customer Experience
- Quality
- Financial Performance
Project Scope

- All Initial Credentialing Applications – 17 Hospitals
  - Physicians & Allied Health
  - Voluntary & Employed
  - New vs. Cross Credential
  - Hot vs. Not Hot
  - Measure – Application Returned to Quality Review Complete
- Excluded
  - Reappointment Applications
  - Time Between:
    - Application Requested & Received
    - Quality Review Complete & Hospital Appointment

Process Flow Diagram

- Production
  - Credentialing Assistants
    - Send/Receive Applications
    - Data Entry
    - Application is Complete
    - Missing Application Elements
- Operations
  - Credentialing Specialists
    - Initiate Application
    - Send/Receive Verifications
    - Process the Applications
- Quality Review
  - Credentialing Coordinators
    - Quality Reviews
    - Send/Receive - Chair
    - Credentialing Committee
    - MEC
    - Board of Directors
Define

SIPOC

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Input</th>
<th>Process</th>
<th>Output</th>
<th>Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant</td>
<td>Mail back</td>
<td>START: Application Returned</td>
<td>Application assigned – for data entry</td>
<td>Credentialing Assistant</td>
</tr>
<tr>
<td>Credentialing Assistant</td>
<td>Data entry</td>
<td>Processed by Production</td>
<td>Application Assigned</td>
<td>Credentialing Specialist</td>
</tr>
<tr>
<td>Credentialing Specialist</td>
<td>Verification</td>
<td>Processed by Credentialing Specialist</td>
<td>Application Assigned</td>
<td>Coordinator / QA</td>
</tr>
<tr>
<td>Coordinator / QA</td>
<td>GA Review</td>
<td>END: Processed by Quality</td>
<td>GA goal = send portal GA bad = returned to specialist</td>
<td>Chair</td>
</tr>
</tbody>
</table>

Spaghetti Diagram for Operations Specialists: They walk in patient, face, and the Manager. Each line represents each time a Specialist gets up to walk in one of these places. We hope to decrease the amount of walking that needs to be done.

Define

Turnaround Time Components

What is the Right Y (CTQ) to Measure? How will it be measured?

Big Y = Overall TAT = Time from Application Returned to Quality Review Completed.

Big Y = Y1 + Y2 + Y3

Y1 = Time in Production = App Returned to Operations Assignment
Y2 = Time in Operations = Operations Assignment to Quality Review Assignment
Y3 = Time in Quality = Quality Review Assignment to Quality Review Complete.

All Ys measured in days.

What are the data sources? How will the data be collected?

Echo Credentialing Database, plus data collected from forms.

What is our goal?

Our goal is to reduce the turnaround time of Initial Files by 7 days from 62 to 55 days, and also to reduce the corresponding variation by 50%, from 35.34 to 17.67.
Multiple tools: A tool was created for each phase of the process; however, all forms have the same header (shown above) that captures baseline information that is used to track a file through the entire process.

Lesson Learned: Based on our observations and suggestions from the external team, we updated the forms after an initial trial run. These verifications were spread out in the form and were modified to be grouped together to better capture the operations process.

Challenges: Parts of our process required multiple reviews. We had to design our form to be able to capture the back and forth interaction between the teams all on one form.
Measure
Form 2 for Operations

Interruptions in Processing of Claim Forms

Days of the Month

| Day | Number of Interruptions | Number of Interruptions (Approximate) | Exact Total Interruptions (
<table>
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</tbody>
</table>

What are the specification limits? (LSL, USL)
LSL = None
USL = 62 days

What is the Y (CTQ)?
Big Y = Time from Application Returned to Quality Review Completed.
Measured in days.

What is the mean of our process? What is the standard deviation?
Mean = 61.85 days
Standard Deviation = 35.34
Sample Size Calculation = 102

What is our process capability (Z score, DPMO, % Defects)?
DPMO = 394707
Our Z Score = 1.77
We are only meeting our customer’s expectations 60.5% of the time.

Measure
Overall “Big Y”

Continuous Data

Process Capability of Turnaround Time

DPMO = 394707
Our Z Score = 1.77
We are only meeting our customer’s expectations 60.5% of the time.
Measure

Production "Y1"

What is the Y (CTQ)?
Y1 = App Returned to Operations Assignment
Measured in days.

What are the specification limits? (LSL, USL)
LSL = None
USL = 9 days

What is the mean of our process? What is the standard deviation?
Mean = 12.34 days
Standard Deviation = 18.38
Sample Size Calculation = 84

What is our process capability (Z score, DPMO, % Defects)?
DPMO = 400185
Our Z Score = 1.75
We are only meeting our customer’s expectations 60% of the time.

Measure

Continuous Data

Production "Y1"

Process Capability of Production Time

Measure

Operations "Y2"

What is the Y (CTQ)?
Y2 = Operations Assignment to Quality Review Assignment
Measured in days.

What are the specification limits? (LSL, USL)
LSL = None
USL = 50 days

What is the mean of our process? What is the standard deviation?
Mean = 48.48 days
Standard Deviation = 30.64
Sample Size Calculation = 77

What is our process capability (Z score, DPMO, % Defects)?
DPMO = 365671
Our Z Score = 1.84
We are only meeting our customer’s expectations 63.4% of the time.
Continuous Data
Operations "Y2"

Measure

Process Capability of Operations Time

- LSL = None
- USL = 5 days
- Sample Mean = 2.61 days
- Standard Deviation = 5.99
- Sample Size Calculation = 36

Continuous Data
Measure

Measure "Y3"

What is the Y (CTQ)?

Y3 = Quality Review Assignment to Quality Review Complete

What are the specification limits? (LSL, USL)

- LSL = None
- USL = 5 days

What is the mean of our process? What is the standard deviation?

- Mean = 2.61 days
- Standard Deviation = 5.99

What is our process capability (Z score, DPMO, % Defects)?

- DPMO = 129281
- Our Z Score = 2.63

We are meeting our customer’s expectations 87% of the time.
Is our measurement system adequate?

Gage Passed!!
94% Part to Part Variation

STAKEHOLDER ANALYSIS – Measure Phase

Identifying Vital X’s
Identifying Vital X’s: Verifications

Result: There was a difference in means regarding the number of hospital and work history verification letters sent.

Take Away: Review the verification processes.

Summary of Vital X’s

What X’s (inputs) are causing most of our variation?

Y1. Production - 78.8% of Delays
   1. CV Requirement
   2. Fully Completed Application
   3. Peer Reference Forms
   4. Delineation of Privilege Forms

Y2. Operations
   1. The number of peers contacted
   2. The number of verifications
   3. The number of verification attempts
   4. Process variation among Specialists
      - Over Processing of Files

Y3. Quality
   1. Quality Review variation among Coordinators

Tools Used to Identify Improvements

- Brainstorming
- KANO
- Threats VS Opportunity
- SIPOC
### Improvement Y1: Apps Returned to Operations Assignment

**Action Plans:**

- **Realigned Production Process - Broke Down Linear Process**
  - Credentialing Assistants Report to Initial Team Manager
- **Redefined Role of Credentialing Assistant – Two Models**
  - **Model 1**: Created “Teams”
    - Credentialing Assistant & Specialist Work Together
    - Data Entry & Initiation of File
    - Combined Process Between Assistant & Specialist
    - One Email to Applicant with All Missing Information
  - **Model 2**: Changed Role of Credentialing Assistant
    - Direct Data Entry by Specialist
    - Creds Assistant Role Changed to Follow Up

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### Improvement Y1: Apps Returned to Operations Assignment

**Action Plans:**

- **CV Requirement**
  - Application “Rules”
  - Eliminated for Cross Credentialing File
- **Credentialing Application**
  - Reformatted Application
    - “User Friendly”
  - Eliminated Signatures on a Number of Pages
  - Reduced Critical Elements
    - Consent & Completed DoP

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### Improvement Y1: Apps Returned to Operations Assignment

**Action Plans:**

- **Peer Reference (Requirement 3)**
  - Created a Page in Application Outlining Requirements
  - Added Spaces for Additional Peer Names
  - Pre Application DoP Request Form
  - Applicant Directs Selection of DoPs
BOARD CERTIFICATION

Primary specialty: ________________________________________________________________________
Certification Date: _____/_____/_____
If you are not board certified, are you board admissible? _____ yes ____ no

Sub-specialty: ____________________________________________________________________________
Certification Date: _____/_____/_____
If you are not board certified in your sub specialty, are you board admissible? _____yes _____ no

FACILITY DEPARTMENT LISTING

This section is used to identify the actual facility/ies to which you would like to apply and includes a description of the applicable department specific requirements. Each applicant must meet the department specific eligibility criteria in order to be considered. The list of departments is not intended to be all inclusive, therefore, please consult the Physicians Group Application pages for an updated list of all departments.

For Forest Hills Hospital:
Category: [ ] Admitting [ ] Non-Admitting
Department:
[ ] Anesthesiology
[ ] Emergency Medicine
[ ] Medicine
[ ] Obstetrics and Gynecology
[ ] Orthopaedic Surgery
[ ] Pathology and Laboratory Medicine
[ ] Pediatrics
[ ] Radiology
[ ] Surgery

Specialty you intend to practice: ___________________________________________________

For Long Island Jewish Medical Center:
Category: [ ] Admitting [ ] Non-Admitting
Department:
[ ] Anesthesiology
[ ] Cardiology
[ ] Cardiovascular and Thoracic Surgery
[ ] Dental Medicine
[ ] Dermatology
[ ] Emergency Medicine
[ ] Family Medicine
[ ] Medicine
[ ] Neurology
[ ] Neurosurgery
[ ] Obstetrics and Gynecology
[ ] Ophthalmology
[ ] Orthopaedic Surgery
[ ] Otolaryngology and Communicative Disorders
[ ] Pediatrics
[ ] Pathology and Laboratory Medicine
[ ] Physical Medicine and Rehabilitation
[ ] Population Health
[ ] Psychiatry
[ ] Radiology
[ ] Radiation Medicine
[ ] Surgery
[ ] Urology

Specialty you intend to practice: ___________________________________________________

* Applicants for the Department of Surgery, Division of Plastic Surgery must be approved and interviewed by the Chairman of the Department prior to having an application sent. Medical Staff Services will contact the Department Chairman to obtain your approval.

** Applicants requesting privileges in Ophthalmology at North Shore University Hospital, Long Island Jewish Medical Center and/or Syosset Hospital must request privileges at all 3 sites. Applicants must be approved and interviewed by the Chairman prior to having an application sent. Medical Staff Services will contact the Department Chairman to obtain your approval.

Pre Application DoP Selection Form

Improvement 1: Impacting Y1 - Apps Returned to Operations Assignment

Impact:
• Reduced the Number of Incomplete Applications Received
• Eliminated Holds in Production Area
• Eliminated Sending Applications Pages Back to Applicant for Signatures
• Reduced Applications Sent with Wrong DoP
**Improvement Strategies**

**Improvement Y2: Operations to Quality**

**Action Plan:**
- Algorithm for Follow Ups
  - Fax & Emails Followed Up with Phone Calls
  - After 3 Attempts – Report to Manager
  - Drive Standardization Amongst Specialists
- Competency Assessment
  - Reduced the Competencies to 10 Years “Look Back”
  - Increased Time Frame from 6 Months to 1 Year
  - Modified Peer Requirements
    - One Peer for Both Hospital Affiliation & Peer Reference

**Improvement Y2: Operations to Quality**

**Action Plan:**
- Expedited Process for Cross Credentialing Applications
  - Verification “Look Back” 5 Years
    - Hospital Affiliations & Work History
  - w/ NSLUJ - 4 Competencies – Chair + 3 Peers
- SOPs for Staff
  - Cheat Sheets
- Distributed Contact List
  - Posted on “SharePoint”
- Accountability Reports
  - 50+, 40+, 30+ Day Reports
  - Files Flagged
  - Manager Follow Up

**Improvement Y3: Quality Review Assignment to Quality Review Complete**

**Action Plan:**
- Initial File Meetings
  - Specialists and Coordinators
  - Troubleshoot Files with Issues
  - Created Quality Standards
  - Eliminated Variation Amongst Coordinators
    - Reduced Over Processing of Files
- Management “Huddles”
  - Specialists and Coordinators
  - Huddle Form Placed in File
**Improvement Strategies**

**Improve Improvement Y3: Quality Review Assignment to Quality Review Complete**

**Action Plan:**
- SOPs for Staff for Quality Reviews
  - Educated Both Teams on Quality Process
  - Split Issues for Failing Quality
    - Half Corrected by Coordinators
    - Other Half Sent Back to Specialist for Correction
  - Monitoring Quality Failures
    - Between Both Specialists and Coordinators

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**Process Capability Comparison**

<table>
<thead>
<tr>
<th>Process Capability</th>
<th>Z Score</th>
<th>DPMO</th>
<th>Mean</th>
<th>St. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>1.77</td>
<td>394,707</td>
<td>61.85</td>
<td>35.34</td>
</tr>
<tr>
<td>Goal</td>
<td>2.21</td>
<td>197,353</td>
<td>55.00</td>
<td>17.67</td>
</tr>
<tr>
<td>Current</td>
<td>2.21</td>
<td>239,786</td>
<td>45.80</td>
<td>22.58</td>
</tr>
</tbody>
</table>

**Reduction in AVG TAT**

- **27% Reduction**

The average TAT is reduced and so is the presence of outliers. *P = 0.000 Statistically Significant*

- **Before 9/30**
  - Process is much more stable since September (when we started implementing improvements) with very few outliers in over 500 files measured.
<table>
<thead>
<tr>
<th>Day Type</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Reviews</td>
<td>Friday Meetings</td>
</tr>
<tr>
<td>Number of verifications sent</td>
<td>Individual Specialist Reports</td>
</tr>
<tr>
<td>Number of peer letters sent</td>
<td>ECHO database</td>
</tr>
<tr>
<td>Days in Process Monitoring Reports</td>
<td>Echo Database</td>
</tr>
</tbody>
</table>