PERFORMANCE IMPROVEMENT-HOW IT ALL WORKS

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Disclosures

I do not have any disclosures
Objectives

- Describe Performance Improvement
- Understand basic and advanced methods used for PI
- Give examples of a robust PI Program

What is Performance Improvement?

Transformation of healthcare—quality improvement

Many in healthcare today are interested in defining “quality improvement”. We propose defining it as the combined and unceasing efforts of everyone—healthcare professionals, patients and their families, researchers, payers, planners and educators—to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development. This definition arises from our conviction that healthcare will not realize its full potential unless change making becomes an intrinsic part of everyone’s job, every day, in all parts of the system. Defined in this way, improvement involves a substantial shift in our idea of the work of healthcare, a challenging task that can benefit from the use of a wide variety of tools and methods.

What is “quality improvement” and how can it transform healthcare?  
Why Improve?

Improvement comes from the application of knowledge:

- There are five fundamental principles:
  - Knowing why you need to improve
  - Having a feedback mechanism to know that you are improving – data
  - Developing an effective change that will result in improvement
  - Testing a change before you implement it
  - Know when and how you can make the change permanent

Manage and Improve Performance

One element that is common in both approaches is that management must accept and demonstrate leadership if quality is to be achieved.
What is Quality Assurance?

- Quality
  - A degree or grade of excellence or worth.
  - Products and services that meet or exceed customers expectations

- Assurance
  - The act of giving confidence, the state of being certain or the act of making certain

- Quality Assurance
  - The planned and systematic activities implemented in a quality system so that quality requirements for a product or service will be fulfilled (ASQ)

What is Quality?

- Dr. Joseph Duran’s definition of quality resolves around his concept of “fitness for use”. His approach is based on the development of interdisciplinary teams that use a variety of diagnostic tools to understand why process produce products that are not fit for use

- Dr. W. Edward Deming, defines quality as a “never-ending cycle of continuous improvement”

- One element that is common in all both approaches is that management must accept and demonstrate leadership if quality is to be achieved

QA & PI - They Are Not The Same!!!

Quality Assurance:
• Reactive; works on problems after they occur
• Regulatory
• Led by management
• One point at a time
• Errors punished

Performance Improvement:
• Proactive – works on processes before problems occur – system focused
• Led by staff – team effort
• Continuous
• Exceeds expectations
• Errors seen as opportunities for learning

Is it PI or is it QA?

Performance Improvement GOES BEYOND Quality Assurance!
Are We Doing Both?

**QUALITY ASSURANCE** relates to Monitoring & Compliance. It *GUARANTEES* quality

- Standards met? Deficiencies corrected?   **QA is . . . . reactive!**

**PERFORMANCE IMPROVEMENT** relates to Learning & Improving. It *RAISES* quality and almost guarantees improvement

- Quality can’t always be assured. Ongoing efforts to identify opportunities for improvement are needed. PI relies on measurement & data-driven decisions to improve outcomes. **PI is . . . proactive!**

Synonymous with Quality/Performance Improvement

- ISO 9000
- Quality Management System
- Quality time
- Six Sigma – Black Belt, Green Belt
- Lean
- Total Quality Management
- Model for Improvement
Design and Scope

“Transplant programs must develop, implement, and maintain a written, comprehensive, data-driven QAPI program designed to monitor and evaluate performance of all transplantation services, including services provided under contract or arrangements.”

- “Roadmap” of the QAPI program
  - Membership
  - Frequency
  - Structure
  - Scope
  - Process

Let’s Get Started!

Here We Go!!

So how do we actually do this when we are:

- Short staffed
- Busy with lots of complicated patients and lots of other distractions
- Short on resources, especially well trained Quality staff
- Lacking QA/PI skills-we don’t have an app for that!
Where Should I Start?

Focused areas:
- High risk
- High volume
- Low volume
- Low performing measures
- Sentinel events/yours or theirs

How to Identify a Project?

Quality Indicators
- Transplant Database
- Hospital Clinical record
- Billing system
- NPSG
- Core measures
- Infection Control Data

Patient Satisfaction
- Patient Complaints

Benchmark data from other programs

Industry best practices

System not working
- Unet + Donor Net
- SRTR
- OPO

Employee dissatisfaction with system

Regulatory requirement or corrective action
The Building Blocks

1. Start with the basic structures – one block at a time
2. Evaluate & determine priorities – based on current processes and outcomes
3. Decide on Performance Improvement Metrics based on hard data – baseline performance
4. Analyze data/evaluate performance
5. Plan and implement changes for improvement
6. Measure and monitor Performance Improvement over-time with set milestones

What Will You Need?

- Leadership at the Board level
- PI Committee - multidisciplinary
- Hospital PI plan and a Transplant specific plan
- PI calendar – with milestones/deliverables
- Clinical practice guidelines with appropriate policies & procedures
- Ability to do chart audits/clinical reviews and QA reviews
- Track and trend patient satisfaction surveys
- Clinical events “tracking system”
- Credentialing and privileging system
- Data sources
What Support Do I Need?

- Quality has to be seen as an integral part of the organization’s “culture”
- Buy-in at all levels - Board, management, staff and patients
- Resources, staff time, meetings, information systems and on-going support
- Remember PI never stops, it is continuous

Board Leadership

*Critical to Achieving Better, Safer Care*\(^{1}\)

- Better outcomes are associated with hospitals where...
  - The Board spends >25% of time on quality issues
  - The Board receives a formal quality performance measurement report
  - There is a high level of interaction between the Board & the medical staff on quality strategy

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1) Kroch et al., Hospital Boards & Quality Dashboards, *Journal of Patient Safety*, Volume 2, Number 1, Mar 06
Data versus Information

- **Data** = raw facts and figures which are collected as parts of the normal functioning of the hospital

- **Information** = data which have been processed and analyzed in a formal, intelligent way, so that the results are directly useful to those involved in the operation and management of the hospital. (Austin 1983).

Data collection tools

- **Create data collection tools:**
  - Create instructions for data collection tools
  - Train personnel who will collect data
  - Conduct pilot test of tool

- Establish process of communicating with staff about measurement process

- Collect data – track over time – and then STOP
Now What Do I Do?

- Analyze data and review the results
- Identify areas where additional data is required
- If historical data are available, compare for trends
- Display and distribute data to communicate findings and results – don’t be afraid of the dark!
- Identify areas for improvement and select a quality improvement project

Three Key Questions

1. What are we trying to accomplish?
2. How will we know that a change is an improvement?
3. What changes can we make that will result in improvement?
Forming The Team

The Multidisciplinary Team

A team is not the same as a committee…

**Committee**
- Individuals bring representation
- Productive capacity = single most able member

**Team**
- Individuals bring fundamental knowledge
- Productive capacity = synergistic (more than the sum of all individual team members together)
Create a Desire for Improvement

- Must be client focused in every aspect of operations

- Staff must be motivated to improve
  - Believe in the organization
  - Enjoy work
  - Take pride in the organization and their part in it
  - Time to participate in improvement activities
  - Recognize and appreciate efforts, not just gains
  - Intrinsic desire to improve

Identifying the Team

- Team leader
- Leadership champion/facilitator
- Team members
  - Choose team members from high – middle performers
  - Low performer will not become high because you include them
  - Avoid the negative, nothing ever changes, this is how we have always done it
  - Choose artistically inclined individuals
  - Make sure the team is diverse enough to address the problem e.g. not just the MD's and RN's what about the UA's and PFA's
PI: Assembling the Pieces of the Pie

- Listen to the customers
- Use data to make data-driven decisions
- Continually improve the processes
- Use recognized PI methods and tools
- Work together - a team approach is best
- Ask the 3 Key Questions!

The Facilitator Role

- Meet with team
- Refocus on problem identified
- Identify short term goal
- Place other good ideas on backburner
- Review current process for each program
- Collate all tools currently used

Second Meeting

- Decided on plan for discharge medication instruction to align with hospital policy on medication reconciliation
- Create one standard ‘home’ medication instruction set
  - Allowed intestine program to continue to use web based program

Challenge

- One major naysayer
Developing a Change

- What are the sources of the problem?
- What time of day does it occur?
- What do the customers/patients want
- Is performance being maintained after a change
- When developing a change the focus should be on changes that alter how work activity gets done

Maintain the Momentum

- Quick wins are essential
- Break big problem into multiple steps that can be measured and quantified
- Data essential to measure benefit of change
- Celebrate the losses and the wins
- Keep meetings on time and productive
- Ensure follow-up on off line work
- Communicate work being done to transplant team
Problem Solving Tools

Benefits of Problem Solving Tools

- It encourages creativity through a brainstorming process
- It provides a structured process to identify and understand the causes of a problem
- It provides a visual image of the problem and potential categories of causes
- Process leads to the identification of solutions that address the primary cause of the problem, rather than a symptom
Some Common PI Tools

- Process Mapping
- Cause and Effect/Fishbone Diagrams
- Five Whys
- Run Charts
- Pareto Charts
- Check Sheets

Understand Your Process & Make Sense of Your Data!

PDSA and Using Performance Improvement Tools

- Using tools as part of the PDSA cycle (plan do study act)
- Some tools will be useful in the planning stage
- Others will help you to implement your PI project
- And/or will help you study the impact of your process change
- Clearly identifying data to collect and act on will be key for success
Basic PI Tools

- Process Mapping
- Check Sheets
- Pareto Charts
- Cause and Effect Diagrams
  - Fishbone Diagrams
  - The 5 Whys
- Run Charts

Process Mapping
Performance Improvement Works on Existing Processes

- A process is a series of steps or actions performed to achieve a specific purpose

- It describes how things get done

- Your work is made up of many processes

What is a Process Map?

- A pictorial representation of the sequence of actions that describe a process
Why is Process Mapping Important?

• It’s an opportunity to learn about the work being done

• It involves documenting the obvious, as well as all that which goes without saying

• Helps to discover inconsistencies

• Most processes today are undocumented

• Helps to control the “evolution” of a process

• It’s a good historical record of the existing process before performance improvement takes place

• It puts everyone on the same page

Process Maps are Used To

• Document the way we do our work

• Analyze and improve on processes
How Do We Prepare to Process Map?

• Assemble the PI Team

• Agree on the process you want to document

• Agree on the purpose of the process

• Agree on beginning and ending points

How Do We Prepare to Process Map?

• Agree on the level of detail to be displayed – not every aspect has to be documented

• Begin by preparing an outline of steps and then proceed to more details

• Identify and recruit other people that should be involved

• Agree that the process map clearly reflects the process
These are the Symbols Used in Process Mapping

• Start and End of the Process:

• A process Activity:

• A process Decision:

• A Break in the process:

Helpful Tips to Keep in Mind

• Process Map what is, the actual process

• Process Mapping is dynamic

• Clearly define the boundaries of the process

• Have a start, middle and end
Laboratory Services: Bottlenecks and Workarounds

Lab process is complex and prone to delays and workarounds at many different steps:

- Tube system is unreliable
- Lack of organization in lab receiving can lead to some priority samples being delayed
- Blood bank samples are often sent to the stat lab first

An Example of a Functional Process Map
Summary

- We Process Map to learn
- We Process Map to document a baseline of performance
- We Process Map to discover where data may be hiding
What is the Purpose of a Check Sheet?

- To turn observational data into numerical data
  - From records
  - Newly collected

- To find patterns using a systematic approach that reduces bias—everyone collects data the same way

- Use check sheets when data can be observed or collected from your records

Check Sheets

- Decide what you want to observe
- Define the key elements
- Establish a shared understanding

- Identify where, when, & how long, hours, days, weeks
- Think about confounding factors
  - That you want to eliminate
  - That you want to study
Check Sheet

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<th>Name: A. Dawson</th>
<th>Time: 9am – 5pm</th>
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<td>Location: Transplant Clinic PH 14</td>
<td>Dates: 9/11 – 9/30 2014</td>
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<td>1</td>
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<td>2</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Service was difficult to access</td>
<td>10</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>2</td>
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<td>0</td>
<td>1</td>
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<td>12</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>61</td>
</tr>
</tbody>
</table>

Check Sheets

- Identify and train your observers – critical to overall project success
- Practice, practice, and review
- Collect data
- Review & make amendments as needed
- Summarize data across observations & observers
- Study the results
- Publish the results
Tips for Using Check Sheets

• Make sure you’re getting clean data
  • Define, train, check, adjust, & repeat!
  • Consider and address potential sources of bias
  • Consider the observers and make sure they are all collecting the data the same way

• Use “other” categories sparingly and avoid long lists of individualized observations

• Strike a balance
  • Fine vs. inclusive categories
  • Few vs. many categories

Pareto Charts

80/20
What is a Pareto Chart?

- To identify the causes that are likely to have the greatest impact on the problem if addressed
- “80% of the effects come from 20% of the causes”
- To bring focus to a small number of potential causes

What is the Purpose of Pareto Charts?

- To guide the process of selecting improvements to test
- Use when you have, or can collect, quantitative or numeric data on several potential causes
Pareto Charts

- Identify potential causes of the problem you wish to study
- Develop a method for gathering your data
  - Historical data
  - Collection of new data
- Collect your data
  - Each time the problem occurs, make note of the primary cause
- Order your results & calculate the percentage of incidents that fall into each category
- Make sense of your results by examining your data

GE Memory Jogger II, Six Sigma The Way We work, A Pocket Guide of Tools For Quality, Michael Brassard & Diane Ritter.

Pareto: offers a comparison of causes of problems in a process and rank-order (prioritizes). Determine where to focus improvement efforts
Tips for Using Pareto Charts

• You’ll only learn about causes that you investigate - be inclusive!

• Check and double check your data

• Results can be used in more than one way and they can be used differently at different points in time

Cause & Effect Diagrams
Seeing Beyond the Tip of the Iceberg

These are the Symptom

These are the Causes

Problem Solving & Root Cause

• When confronted with a problem most people like to tackle the obvious symptom and fix it without really identifying the root cause – why don’t pts turn up for apt?

• This often results in more problems

• Using a systematic approach to analyze the problem and find the root cause is more efficient and effective

• Tools can help to identify problems that aren't apparent on the surface (root cause)
The Ishikawa “Fishbone” Diagram

Instructions:
1. Describe the problem on the far right side of the diagram.

2. Draw a long horizontal arrow pointing to the box.

3. Identify potential causes and group them into major categories along the "bones" of the Fishbone Diagram.

Construction of a Fishbone Diagram
• Draw an arrow leading to a box that contains a statement of the problem

• Draw smaller arrows (bones) leading to the center line, and label these arrows with either major causal categories or process categories
Construction of a Fishbone Diagram

Then for each cause identify deeper root causes

The Ishikawa “Fishbone” Diagram
Case Example #1

**Problem**: Unfavorable hand hygiene compliance in the PACU of XYZ Hospital

**Scenario**: During the last two quarters, hand hygiene compliance in the PACU at XYZ Hospital was just 70%, significantly below the annual hospital target of 96%.

Hospital management held a focus group to hear from PACU staff about what they perceived to be the barriers preventing them from meeting the hand hygiene target compliance rate.

Staff reported the following barriers:

- Lack of education about hand hygiene
- It’s difficult to find gloves
- Staff dislikes alcohol-based hand rub
- Alcohol-based soap is not available
- No punishment for non-compliers
- Frequent interruptions in PACU Care
- No reward for good behavior
- Gloves are used as a substitute for washing hands
- Lack of written guidelines
- No reminders from leadership
- It takes too much time to wash hands
- There is only 1 working sink
Case Example #1 cont’d

PEOPLE
- Lack of education
- Staff dislikes Purell
- Repeat non-compliers

PROCESS
- It takes too much time to find the Purell
- Lack of reminders from leadership
- Frequent interruptions for emergency care
- Gloves are used as a substitute for washing

POLICY
- No punishment or rewards
- Lack of written guidelines

MATERIALS
- Can’t find gloves
- There is only one sink
- Alcohol-based soap not available

The 5 Why’s
What is the 5 Whys?

- A question asking method used to explore the cause/effect relationships underlying a particular problem
- The goal is to determine the ROOT CAUSE of a problem

Cause Analysis: 5 Whys

CAUSE/BARRIER: Staff feel it takes too much time to find Purell

- Staff must search for a Purell dispenser
- The nearest dispensers are often empty
- The dispensers aren’t regularly refilled
- EVS didn’t know it was empty
- There is no process to inform EVS that it’s empty

Therefore...
Limitations of the 5 Whys

- Does not always lead to root cause identification
- Can lead to bad judgment calls when used in the absence of data
- Process changes are then made that address the wrong root cause
- This can make the situation worse

Summary

- Use Fishbone and 5 Whys to explore and graphically display in increasing detail all of the possible causes related to the problem
- Use Fishbone and 5 Whys to find dominant causes rather than symptoms
- Use Fishbone and 5 Whys to identify the root cause of the problem we seek to improve
Run Charts

What is the Purpose of Run Charts?

To study data measured over time

- Run charts help to:
  - Study the performance of a process
  - Identify trends
  - Measure change in performance following a change in process

Use when you have, or can collect:

- Quantitative data
- Data measuring the performance of a process
- Data collected over time

GE Memory Jogger II, Six Sigma The Way We work, A Pocket Guide of Tools For Quality, Michael Brassard & Diane Ritter.
Run Charts

- Decide what data you need
- Determine the timeframe
- Determine the number of data collection points

- Gather your data

- Graph your data
  - On the Y-axis, set up a scale that corresponds with your measure
  - On the X-axis, set up a scale that corresponds with your measurement timeframe
  - Plot your data on the chart, placing one dot at each measurement point
  - Draw a line through your dots
  - Calculate the mean score and draw a line at the mean
  - Mark the timing of your process change on the line

Run Charts

- Make sense of your results by examining your data
  - Does the mean reflect an appropriate level of service or outcome of your process?
  - Is there a trend that should be investigated?
  - Do you see a **shift** in your data? Are there 8 or more consecutive points on one side of the center line?
  - Do you see a **trend** in your data? Are there six consecutive jumps in the same direction (up or down)?
  - Do you see a pattern in your data? Does a pattern recur eight or more times in a row?
PI Tools - Run Chart

Percent of Patients with Planned Care Visits

- GOAL
- Tried encounter forms
- Nurse Smith left
- Implemented registry

Tips for Using Run Charts

- Every process will have some variation
- Be sure to track data over a long enough period of time
Pie Chart, Control Chart, Bar Chart and Line Chart

Pie Chart or Circle Graph: used to display parts of a whole (proportional relationships)
Control Chart: a display of normal variations and “out of control” variations over time

Bar Chart: comparisons between different groups
Line Graph

Mortality Report/RRT

Mortality rate continues to decrease in 2010 except for the couple of months. Again if RRT is decreased, mortality rate increased.

METHODOLOGIES AND APPROACHES

SDLC
Software/System Development Life Cycle - SDLC

Requirement Analysis
Evolution
Design
Testing
Implementation
PDCA

1. Problem
2. Goal
3. Point of Cause
4. Root Causes
5. Counter Measures
6. Follow-up
7. Standardization

Common PI Methodologies or Approaches:
- PDCA was developed by Walter Shewhart in the 1920s and Edwards Deming adapted the process and called it PDSA Cycle
  - **Plan**
    - Plan change
    - Study a process by collecting necessary data
    - Evaluate the results
    - Formulate a plan for improvement
      - Set goals and target
      - Determine methods for reaching goals
  - **Do**
    - Implement the plan (trial, house-wide)
    - Educate / train
  - **Check or Study**
    - Gather data and evaluates results of the change
    - Determine success of action taken
    - Modifications needed
  - **Act**
    - Implement the plan changes
    - Not successful, abandon the plan and rework the cycle
**FOCUS - PDCA Model**

- Originated with the Hospital Corporation of America now HCA Healthcare. It assumes that a PI or a QI process is already in place to improve.
  - **F** = Find a process to improve
    - define the process, identify the process
    - who will benefit from the improvement
    - how the process fits within the org priorities
  - **O** = Organize a team that knows the process
    - people knowledgeable about and involved in the process
    - manageable team size, appropriate members
    - method to document team progress (WWW)
  - **C** = Clarify current knowledge of the process
    - gather and review current knowledge
    - analyze to distinguish between expected and actual performance
  - **U** = Understand variable and causes of variation
    - Plan and implement data collection
    - Measure using appropriate indicators
  - **Select** = the process improvement
    - Identify action to improve


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**Sequential Building of Knowledge With Multiple PDSA Test Cycles**

Model for Improvement
= Three questions + PDSA cycle

The Three Questions

• The Model for Improvement begins with three fundamental questions

  • 1. **The Aim:** What are we trying to accomplish? (How good do we want to get and by when?)
  • 2. **The Measures:** How will we know a change is an improvement?
  • 3. **The Changes:** What change can we make that will result in improvement?
How to use the PDSA Cycle

- use plan-do-study-act cycles to conduct small-scale tests of change in real settings
  - plan a change
  - do it in a small test
  - study its effects
  - act on what learned
- team uses and links small PDSA cycles until ready for broad implementation

The Model For Improvement

What are we trying to accomplish?
How will we know that a change is an improvement?
What change can we make that will result in an improvement?

ACT  PLAN  
STUDY  DO

Langley, Nolan, Nolan, Norman & Provost 1999
The PDSA Cycle

ACT
Determines what changes are to be made

PLAN
Change or test

STUDY
Summarizes what was learned

DO
Carry out the plan

Langley, Nolan, Nolan Norman & Provost 1999

Change concepts …

… are general ideas, with proven merit and sound scientific or logical foundation that can stimulate specific ideas for changes that lead to improvement.

Nolan & Schall, 1996
9 Categories of Change

- eliminate waste
- improve work flow
- optimize inventory
- change the work environment
- enhance the producer/customer relationship
- manage time
- manage variation
- design systems to avoid mistakes
- focus on the product or service

Langley, Nolan, Nolan, Norman & Provost 1999

The Improvement Process

Interventions phase

Identify appropriate interventions
Implement changes identified in the diagnostic phase
Undertake one or more PDSA cycles

Undertake one or more PDSA cycles

PDSA Cycle - single test

Hunches, theories and ideas

Changes that result in improvement

PDSA Cycle – multiple tests

Impact and Implementation Phase

1. Measure impact of changes/interventions
2. Record the results
3. Revise the interventions
4. Monitor impact

Sustaining the Improvement Phase

1. Once an intervention has been introduced, the intervention and any improvements need to be sustained.

2. This may involve:
   • **standardization** of existing systems and processes
   • **documentation** of policies, procedures, protocols and guidelines
   • **measurement** and review of interventions to ensure that change becomes part of “standard” practice
   • **training and education** of staff

Sustaining improvement phase


Lean And Six Sigma

6σ
What’s the Goal?

The Goal

*Our goal is Six Sigma Quality.*  **Quantitatively,** this means that the average process generates less than 3.4 defects per million opportunities.

* Culturally, this means we need to learn how to be nearly flawless in executing our key processes.

What is Six Sigma?

- **Measure of Quality**
- **Process for Continuous Improvement**
- **Enabler for Culture Change**
Process Capability Needs to be Better Than You Think!

<table>
<thead>
<tr>
<th>Sigma</th>
<th>Patient Personal Items</th>
<th>Coding Processing</th>
<th>Scheduling Time</th>
<th>DPMO</th>
<th>% Yield</th>
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<tbody>
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<td>3σ</td>
<td>3.660 Patients With Misplaced Personal Items Every Day</td>
<td>770 Coding Errors Every Day Require Correction</td>
<td>257 Calls Each Day Exceed The Two Minute On-Hold Time</td>
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</table>

Sometimes 99% is just not good enough

Six Sigma Methodologies

**DMAIC**: To improve any existing product or process

- **Define**: Who are the customers and what are their priorities?
- **Measure**: How is the process performing and how is it measured?
- **Analyze**: What are the most important causes of the defects?
- **Improve**: How do we remove the causes of the defects?
- **Control**: How can we maintain the improvements?
The Difference Six Sigma Brings

<table>
<thead>
<tr>
<th>Traditional Quality Program</th>
<th>Six Sigma</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Driven internally</td>
<td>• Driven by the customer</td>
</tr>
<tr>
<td>• Focuses on outcomes</td>
<td>• Focuses on processes</td>
</tr>
<tr>
<td>• Fixes defects</td>
<td>• Prevents defects</td>
</tr>
<tr>
<td>• Pays attention to factories</td>
<td>• Pays attention to total business</td>
</tr>
<tr>
<td>• Improves quality</td>
<td>• Improves entire system</td>
</tr>
<tr>
<td>• Looks backward</td>
<td>• Looks forward</td>
</tr>
<tr>
<td>• Concentrates on product</td>
<td>• Concentrates on CTQs</td>
</tr>
<tr>
<td>• High on theory and people</td>
<td>• High on methodology and data</td>
</tr>
</tbody>
</table>

Lean vs Six Sigma

- Six Sigma = Use of Statistical tools to reduce **VARIATION** in a process

- Lean = Use of basic change management tools to reduce **WASTE** in a process.
Lean

• The goal is to identify and eliminate waste, also known as Muda

• Value Added
  • The functions, steps or equipment location actually change something about the product or service
  
  • Additional steps might be considered value added if the customer is willing to pay for it

Summary

• Lean can be used as a tool itself

• Lean has transactional applications not just manufacturing

• Lean concepts can be used in conjunction with Six Sigma projects to increase detailed analysis and to even help define projects.

• If you are looking to fix all the aspects of a process, you might just use Lean
Examples of Robust PI Projects

<table>
<thead>
<tr>
<th>Organ</th>
<th>Phase</th>
<th>Metric Type</th>
<th>Metric</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Liver Transplant</td>
<td>Transplant Admission</td>
<td>Outcome</td>
<td>Post-Paracentesis Complications</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Post-Transplant</td>
<td>Process</td>
<td>Development of a complications database</td>
<td>Closed</td>
</tr>
<tr>
<td>Lung Transplant</td>
<td>Pre-Transplant</td>
<td>Process</td>
<td>Time from referral to first appointment</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome</td>
<td>Post-Transplant Airway complications</td>
<td>Not started</td>
</tr>
<tr>
<td></td>
<td>Post-Transplant</td>
<td>Outcome</td>
<td>One-Year Patient Mortality Review</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Heart Transplant</td>
<td>Pre-Transplant</td>
<td>Process/Outcome</td>
<td>Adherence to selection criteria</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Transplant Admission</td>
<td>Outcome</td>
<td>Unplanned Returns to the OR</td>
<td>Closed</td>
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<tr>
<td></td>
<td>Outcome</td>
<td>Surgical Site Infection</td>
<td></td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>Primary Graft dysfunction</td>
<td></td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>Rejection/Infection requiring rehospitalization</td>
<td></td>
<td>Ongoing</td>
</tr>
<tr>
<td>Pediatric Heart</td>
<td>Transplant Admission</td>
<td>Process/Outcome</td>
<td>ABO-incompatible blood product ordering</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td>Post-Transplant</td>
<td>Outcome</td>
<td>Inpatient transplant complications monitoring/review</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome</td>
<td>Outpatient transplant complications monitoring/review</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome</td>
<td>Treatment of CAD in post-transplant patients</td>
<td>Ongoing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Process</td>
<td>Rituximab Infusion Process</td>
<td>Closed</td>
</tr>
</tbody>
</table>

Not all change is improvement … but all improvement is change.
(Donald Berwick)
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