



## Introduction to Lean Six Sigma in Rural Hospitals



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**Presented by: John L. Roberts, MA  
Lean Healthcare Black Belt**

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## TODAY'S AGENDA

- Six Sigma
- Lean Metrics
- Developing a Lean Culture

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## Six Sigma



..... is the amount of variation present in a process relative to customer requirements and specifications.

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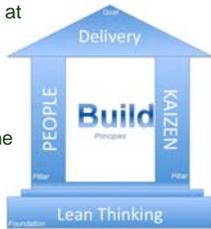
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## Two Complementary Approaches

**Lean....**

- Is a mindset, toolkit and methodology
- Provides tools for analyzing process flow and delay times at each activity in process
- Removes non-value-added steps in process
- Provides a means for quantifying and eliminating the cost of complexity



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## Two Complementary Approaches

**Six Sigma....**

- Emphasizes need to recognize opportunities and eliminate defects
- Recognizes that variation hinders ability to reliably deliver high-quality services
- Requires data-driven decision and incorporates a comprehensive set of standard tools for effective problem solving
- Provides a highly prescriptive cultural infrastructure effective in obtaining sustainable results (continuous improvement through an empowered work force)



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## Where do We want to go? Six Sigma Process Improvement

- Six Sigma builds on Lean and seeks to improve the quality of process by:
  - *identifying and removing the causes of defects (errors) and variation.*
  - *Identifying and removing sources of waste within that process*
  - *Focusing on outputs that are critical to customers*



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## Lean vs. Six Sigma



- **Lean tends to be used for shorter, less complex problems.** Often time driven. Focus is on eliminating wasteful steps and practices.
- **Six Sigma is a bigger more analytical approach** – often quality driven – it tends to have a statistical approach. Focus on optimizing the important steps – reducing defects.
- **Some argue Lean moves the mean, SixSigma moves the variance.** But they are often used together and should not be viewed as having different objectives.
  - Waste elimination eliminates an opportunity to make a defect
  - Less rework means faster cycle times
- **Six Sigma training might be specialized to the "quality" department,** but everyone in the organization should be trained in Lean

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## SIX SIGMA Defined



Six Sigma is named after a statistical concept where a process only produced 3.4 defects per million opportunities (DPMO).

1 sigma = 690,000 DPMO =	32% efficiency
2 sigma = 308,538 DPMO =	69% efficiency
3 sigma = 66,807 DPMO =	93.3% efficiency
4 sigma = 6,210 DPMO =	99.38% efficiency
5 sigma = 233 DPMO =	99.977% efficiency
<b>6 sigma = 3.4 DPMO =</b>	<b>99.99966% efficiency</b>
7 sigma = 0.019 DPMO =	99.999981% efficiency

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## The POWER of Six Sigma



+ 99%	99.9997%
The Classic View of Quality	The Six Sigma View of Quality
"99% Good" (Z = 3.8σ)	"99.99966% Good" (Z = 6σ)
➔ 20,000 lost articles of mail per hour	➔ Seven lost articles of mail per hour
➔ Unsafe drinking water almost 15 minutes each day	➔ One minute of unsafe drinking water every seven months
➔ 5,000 incorrect surgical operations per week	➔ 1.7 incorrect surgical operations per week
➔ 2 short or long landings at most major airports daily	➔ One short or long landing at most major airports every five years
➔ 200,000 wrong drug prescriptions each year	➔ 68 wrong drug prescriptions each year
➔ No electricity for almost 7 hours each month	➔ One hour without electricity every 34 years

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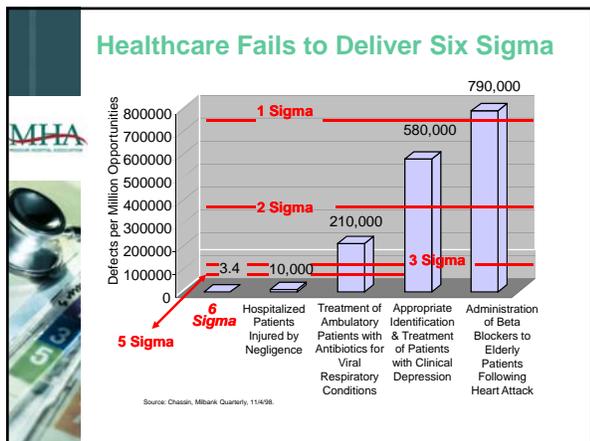
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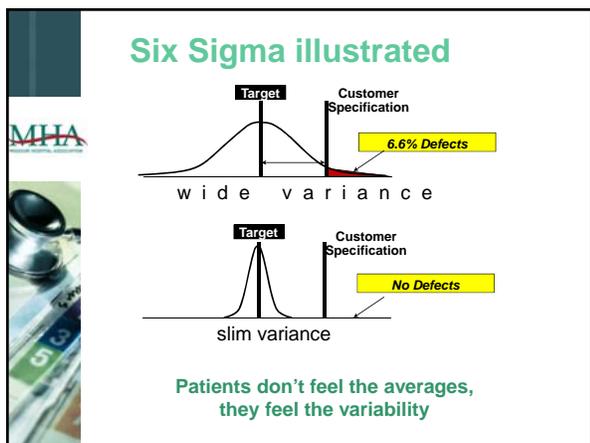
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### Six Sigma Methodology

#### DMAIC

<b>D</b>  <b>Define</b> Define the problem.	<b>M</b>  <b>Measure</b> Quantify the problem.	<b>A</b>  <b>Analyze</b> Identify the cause of the problem.	<b>I</b>  <b>Improve</b> Implement and verify the solution.	<b>C</b>  <b>Control</b> Maintain the solution.
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### Variation



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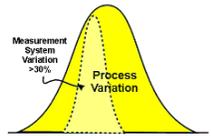
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### Variation

Everything varies.  
Nothing is exactly 100 percent repeatable (no two snowflakes...).  
That is the way things normally occur.



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### Six Sigma Focuses on the Elimination of Variation

The diagram illustrates three target states. The 'Off-Target' target (top left) shows points scattered far from the center. The 'On-Target' target (bottom center) shows points clustered in the center. The 'Unpredictable' target (top right) shows points scattered in a different pattern. Arrows indicate 'Center Process' from Off-Target to On-Target and 'Reduce Spread' from Unpredictable to On-Target.

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### Types of Variation

Common Cause

- Refer to situations, usually within systems and processes that are more ongoing, chronic, and persistent

Special Cause

- Refer to sentinel events, one-time occurrences, or other unique out-of-the-ordinary circumstances

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### Understanding Variation

The consequences of not knowing the type of variation are:

- Seeing trends where there are no trends
- Blaming individuals for things they have no control over
- Giving credit to others for things they have no control over
- “tampering” or making changes to a process (without knowing the type of variation) can actually make it worse

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### Stable Process

- When only normal variation is present in a process, the process is said to be stable
- Stable processes are predictable.
- Stable processes are in (statistical) control.
- Stable processes have a known process capability.

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### Control

A process is said to be in statistical control when, through the use of past experience, we can predict how the process will vary in the future.

### Control=Predictability

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### Focus on Customers

# CTQ's

(Critical To Quality)

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## Critical-to-Quality (CTQ) Measures



There are only two types of defect-related problems—not enough of a good thing or too much of a bad thing, either of which should be measurable and easily depicted with a control chart.

Some examples include:

- Complaints are defects.
- Missed commitments (e.g., operating room cancellations of start times) are both defects and time problems
- Waste and misuse of supplies, floor space, computers, networks, or people are cost problems
- Taking care of a patient injured by a medical mistake, fall, or other preventable error is rework
- ‘Never events’ are a defect.

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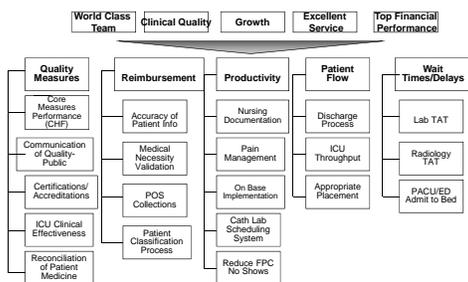
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## CTQ's




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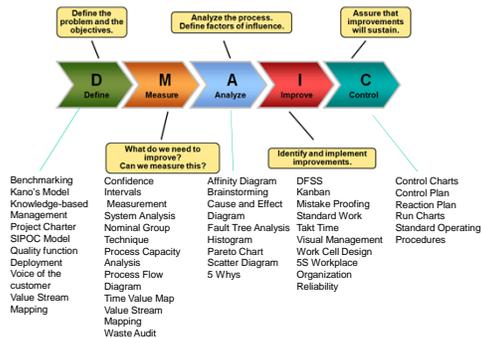
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## Lean and Six Sigma Together




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## Lean Metrics - Data and Information

“Where performance is measured,  
performance improves. Where  
performance is measured and reported,  
the rate of improvement accelerates.”  
- Thomas S. Monson

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### What Are Lean Metrics?



A lean metric is a standard measurement that is used to gauge the performance of a process or organization.

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### Why Measure?

- Successful measurement is a cornerstone of successful improvement.
  
- How do you know if the changes you are making are leading to improvement? Simple: you measure.
  
- Measurement doesn't have to be difficult or time consuming the key is to pick the right measurements.

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### Why Use Metrics?



**There Is Only One Reason!** → **Metrics highlight improvement opportunities.**

**Key Insights**

- You must understand the process to improve.
- Metrics lead to process scrutiny.
- Make sure metrics measure true need.

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### Metrics Used in Lean Initiatives



Metrics enable organizations using Lean and Six Sigma to:

- Identify and target the right problems during Lean and Six Sigma events and projects
- Evaluate potential process improvements and select appropriate actions for implementation
- Establish baselines for process performance and track progress over time
- Understand and communicate the results (outcomes) of Lean and Six Sigma efforts
- Inform and monitor efforts to deploy Lean and Six Sigma throughout an organization

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### Process Metrics

**Time**  
Time metrics evaluate the time to produce and deliver a product or service to customers, the portion of time that is spent processing the product or idle time, whether customers receive products or responses on time, and other time-related considerations.

**Cost**  
Cost metrics measure cost savings and the costs of products or processes, such as the amount of full-time equivalent employees needed for a process.

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### Process Metrics

**Quality**  
Quality metrics examine the quality of products or services, such as customer satisfaction and whether Patient information/data are complete and accurate.

**Outputs**  
Output metrics track the production or activity of the organization's processes.

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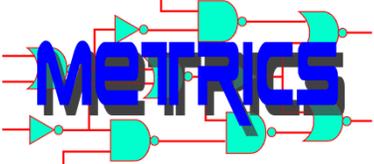
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### Process Metrics

**Process complexity**  
Process complexity metrics describe the complexity and nature of a process, such as the number of handoffs and steps in the process.



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### Organizational Metrics

**Lean Deployment**  
Lean deployment metrics measure the status of Lean implementation at an organization, such as the number of Lean events or trainings conducted.

**Morale:**  
Morale metrics pertain to employee satisfaction and staff retention, including responses to staff surveys and turnover rate.

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### Process Metrics Support Several Objectives

- ✓ Measuring wastes (non-value added activity) in processes (e.g., comparing processing time or value-added time to the total time to produce a product, including idle time)
- ✓ Informing selection of specific process improvement actions
- ✓ Evaluating progress made to address those wastes and the benefits of Lean and Six Sigma projects (e.g., cost savings, reductions in process steps, etc.)
- ✓ Assessing the overall performance of a process (e.g., customer satisfaction, percent of services delivered on time, etc.) .

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### Steps to Good Data Collection

**Plan for data collection.** This is where you would specify the goals and objectives for the data to be collected.

**Standardize how cycle times are measured.** It may be a challenge to obtain exact cycle times for some of the activities within a process, but do not let that stop you – be as accurate as you can and improve from there.

**Collect the data.** This is a collection of data as defined by the parameters in (1 and 2).

**Analyze and present the data.** This is where you determine the data's repeatability, accuracy, and stability.

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### Types of Data Collection

**Historical Data (or using current data available)**

Data can be collected by creating various reports from internal databases or from other vendor electronic information systems.

**Advantages:**

- Inexpensive
- Data available
- Can identify trends over time
- Very efficient use of people's time
- Sample size good

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### Process vs. Results Metrics

Process Metric	Results Metric
How we are doing	How we did
Great for action	Great for reflection
Help find root causes	Help develop strategy
More important for frontline teams / leaders	More important for senior leaders
Short cycles (immediate PDCA)	Big picture review

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### Sample Metrics

Process Metric	Results Metric
Average time to answer phone	Customer Satisfaction
Rolled-through yield on production line	Warranty Claims
Days of work in queue	On-Time Delivery
% of 'A' parts on <i>kanban</i>	Inventory Turns

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### Steps to Developing Metrics

1. Understand the "Voice of the Customer (VOC)".
2. Know your strategy.
3. Evaluate your daily management.
4. Establish goals.
5. Define the process metrics.

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### Steps to Developing Metrics



6. Make a data collection plan.
7. Compile the data.
8. Evaluate the information.
9. Take action.

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### Guidelines for Measurement



- Information gathered should be
  - Strategic
  - Relevant
  - Important
  - Compelling
- Use multiple measures
- Don't track too many process measures, choose appropriate statistics
- Use sampling to make measurement efficient and representative
- Integrate it into peoples daily routine
- Plot data and measures over time

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### Common Metrics



% On Time Delivery	Productivity	Average Seconds to Answer
Parts Per Million (Quality)		Uptime
Satisfaction	Inventory Turns	Audit Scores

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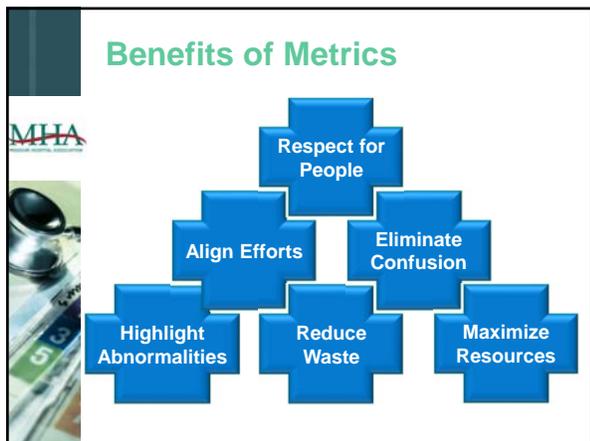
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**Example – Pain Management Project**

A visual analog scale (VAS) is used routinely in the department to assess the patient's perception of pain and is included in the nurses' computerized charting.

An acceptable level of pain is VAS of 4 or less.

Moderate to severe pain was defined as VAS 4 or higher.

A search will be conducted of total knee patients using the VAS criteria and \_\_\_\_\_ charts will be randomly audited using a chart screening tool.

Time to pain management is defined as the interval between VAS assessment and the administration of a pain medication or other intervention as documented in the nursing record.

The rate of pain treatment is defined as the number of patients who received a pain intervention divided by the number of patient encounters audited.

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**Example - Define your metrics more specifically:**

Number of patient reporting a VAS of 4 or more dropped from \_\_\_\_\_ to \_\_\_\_\_ percent

Time to pain management went from \_\_\_\_\_ minutes to \_\_\_\_\_ minutes

Untreated pain dropped from \_\_\_\_\_ to \_\_\_\_\_ percent.

Patient satisfaction scores improved from \_\_\_\_\_ to \_\_\_\_\_.

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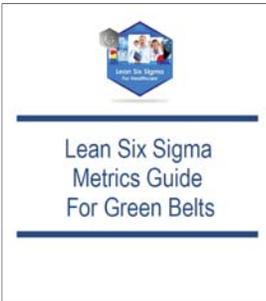
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### Resource in Your Handouts



Lean Six Sigma  
Metrics Guide  
For Green Belts

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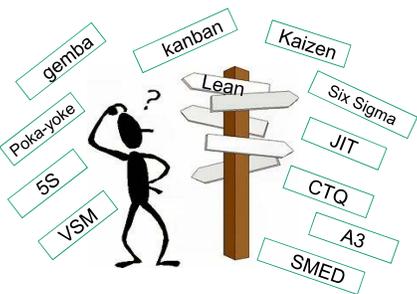
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### Cultural Transformation



gemba  
kanban  
Kaizen  
Lean  
Six Sigma  
Poka-yoke  
JIT  
5S  
CTQ  
VSM  
A3  
SMED

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### Healthcare People “Get” Lean

- Healthcare is the diagnosis and treatment of illness
- Lean is the diagnosis and treatment of processes

The goal is to give healthcare professionals a new way to look at their processes using a small Lean toolset

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### Transformation Has Two Elements Technical and Cultural

<p><b>Technical Tools and Techniques</b></p> <ul style="list-style-type: none"> <li>Pursuit of Perfection</li> <li>Value Stream Thinking</li> <li>Disconnected Process Improvement</li> <li>Tools Deployment</li> </ul>	<p style="color: red;">↑</p> <p style="color: red;">The Path to Lean</p> <p style="color: blue;">↓</p>	<p><b>Social Tools and Techniques</b></p> <ul style="list-style-type: none"> <li>Learning Organization</li> <li>Advanced Teambuilding</li> <li>Employee Empowerment</li> <li>Employee Engagement</li> </ul>
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### Lean Leaders Facilitate & Rigorously Apply Lean Management System

Technical Tools  
5S, Visual Controls, Standard Work, Mistake Proofing...

Cultural  
Lean Management System

...without which Lean Techniques and Related Kaizen Simply Becomes Unsustainable

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### Changing Cultures

<p><b>Traditional Culture</b></p> <ul style="list-style-type: none"> <li>- Provider focus</li> <li>- Problem hiding</li> <li>- Functional Silos</li> <li>- Blame people</li> <li>- Reward individuals</li> <li>- Guard information</li> <li>- Lower cost</li> <li>- Expert driven</li> <li>- Manage from the office</li> </ul>	<p style="color: green;">➔</p>	<p><b>Lean Culture</b></p> <ul style="list-style-type: none"> <li>- Patient focus</li> <li>- Problem highlighting</li> <li>- Process is visible</li> <li>- Respect for worker</li> <li>- Manager teach/empower</li> <li>- Root cause analysis</li> <li>- Rewards group sharing</li> <li>- Decrease waste</li> <li>- Process driven</li> <li>- Walk the process</li> </ul>
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## Change Leadership Role

**The Shifting Role of the Leader\***

**Today's Leader**

- Fire fighting (70%)
- Improving (20%)
- Maintaining (10%)

**Lean Leader**

- Fire fighting (10%)
- Improving (70%)
- Maintaining (20%)

**Three Keys to Leadership**

- 1. **Go See**  
"Senior Management must spend time on the front lines."
- 2. **Ask Why**  
"Use the "Why" technique daily."
- 3. **Show Respect**  
"Respect your people."

Legend: ■ Fire Fight ■ Maintaining ■ Improving

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## Key Characteristics of a Lean Thinking Organization

- Small teams of people reflecting each and every day on how well the value stream performed yesterday and how we may make it better today.
- Leadership focused on building the problem-solving "muscle" of the organization.

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## Cultural Transformation

- **Prepare Leadership**
  - An initial working session where senior leaders reflect on their strategic goals and learn where Lean fits into their organization's overall strategy starts to build the necessary infrastructure.
- **Create the Infrastructure**
  - The overriding objective in this area is to translate your hospital's strategy into a tactical process improvement plan that guides value stream selection project prioritization and oversees program management activities to ensure appropriate leadership focus, strategic alignment and timely execution of all process improvement activities.

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## Cultural Transformation

- **Build Competency**
  - Deploying Lean is not for amateurs. Just as it takes time and dedication for a runner to get ready for a marathon, preparation for Lean deployment starts months in advance. It takes physical training, mental preparation, a progressive program of skill advancement and overarching support from sponsors.
  - Before starting a broad-based education program, it is important to understand the current state of the work environment.

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## Cultural Transformation

**Establish Your Base with Yellow Belts**

- Effective education for Yellow Belts is designed to develop competencies in: process observation techniques, process analysis using Lean methods, current-state and future-state value stream mapping, opportunity analysis, and prioritization.
- GB Trainers also teach them how to facilitate rapid cycle improvement events known as Kaizens and how to anticipate and respond to cultural resistance when it occurs in the change process — as it very often will.

**Start the Journey**

- Creating a Lean-thinking culture requires a long-term commitment from leadership, purposeful alignment to your strategic vision and talented resources. You also need a clear strategy for creating a change-oriented culture of people ready to work alongside the Lean leaders to improve delivery of patient care.

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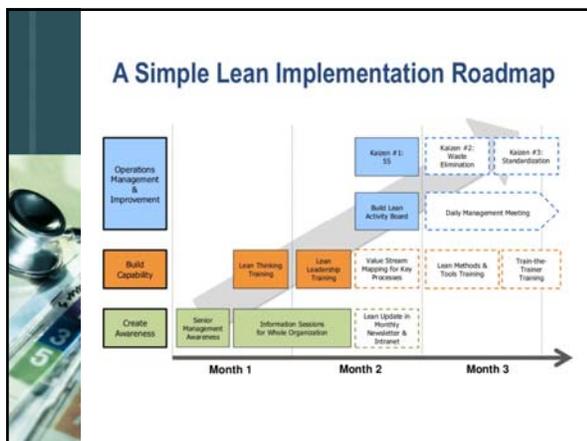
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## Sustaining a Lean Culture

- Management commitment
- Alignment to vision and mission
- Availability of resources
- Address “what is in it for me”
- Success measures and KPIs
- Management review
- Rewards and recognition

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## The Formula for Success

Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	Performance Change!
Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	Chaos & Confusion
Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	Fear & Anxiety
Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	Slow/No Change
Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	Aggravation Frustration
Vision Mission Purpose	+	Leadership	+	People	+	Processes & Resources	+	Plan & Program	=	False Starts

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## Building a True Lean Culture

- Means winning “one heart and soul at a time”
- Each individual comes to a full commitment at their own individual pace
- Be patient - some who embrace it slowly become the strongest advocates
- You know you’re there when all employees engage in identifying and eliminating waste every day

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### THE TIPPING POINT

**"CAUTIOUS LEARNERS" AND "NERVOUS STUDENTS"**

- Decoding those strategies
- Social: Others were producing results
- Common approach and articulation
- "Believers" and "Non-believer" tension

**MANAGEMENT SYSTEM\***

- Creating an "engine" of waste removal
- Consistent of engagement
- Provides competitive advantage
- Persistence effort

*(Note: A diagram shows a green triangle on the left and an orange line rising to the right, representing a tipping point.)*

Getting to the "tipping point" requires:

- Learning the tools, methods and technical content of the Lean Healthcare System
- Transforming the culture
- Implementing lean management systems that sustain gains and drive continuous improvement

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## Keep Your Eye on the Goal

**PATIENT & FAMILY SATISFACTION**

FULL SATISFACTION	QUALITY	CLINICAL QUALITY
	COST	SERVICE QUALITY
	DELIVERY	DIRECT HEALTHCARE COSTS
	SAFETY	INDIRECT HEALTHCARE COSTS
	ENGAGEMENT	ACCESS   NEW TREATMENTS/SERVICES
		PATIENTS   STAFF
RESPECT AND ENGAGE EVERYONE IN CONTINUOUS IMPROVEMENT		

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## Lean Transformation Lessons Learned

- Commitment from Leadership is the foundation of any transformation effort
- Resistance from Physicians, Clinicians and Staff is to be expected
- Look for opportunities to engage Physicians, Clinicians and Staff in improvement activities
- Lean implementation activities has been staggered with constant reflection for continuous improvement
- Important for Physicians, Clinicians, and Staff to understand how Lean is different from other process improvement initiatives
- Persistence is key!

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**Thank you!**

**John L. Roberts, MA**  
Midwest Health Consultants, Inc.  
7160 South 29<sup>th</sup>, Suite 6  
Lincoln, NE 68516  
402-421-2356  
jroberts@mwhc-inc.com

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