Improvement Science Methodologies
Agenda

• Overview
• Methodologies
  1. Six Sigma
  2. Lean
  3. PDSA
• Summary
• Q&A
Overview

Session Objectives

By the end of this workshop you will be able to:

• Describe 3 improvement science methodologies

• Explain how to incorporate improvement science tools into your sepsis work

• Facilitate at least one improvement science tool without assistance

• Coach other participants in effective tool use, delivery and facilitation
What Is Improvement Science?

The Concept
The concept of improvement science emerged to provide a framework for research focused on healthcare improvement. The primary goal of this scientific field is to determine which improvement strategies work as we strive to assure effective and safe patient care.

The Goal
The overriding goal of improvement science is to ensure that quality improvement efforts are based as much on evidence as the best practices they seek to implement (Shojania & Grimshaw, 2005). Simply put, strategies for implementing evidence-based quality improvement need an evidence base of their own.
Tools Utilized To:

- Increase customer satisfaction
- Decrease process variance
- Decrease process defects
- Decrease cycle times
- Engage frontline employees
- Sustain change through process redesign
- Reduce non-value activities
### Improvement Science Decision Matrix

<table>
<thead>
<tr>
<th>Issues</th>
<th>Six Sigma</th>
<th>Lean</th>
<th>PDSA</th>
<th>Capstone</th>
<th>Microsystem</th>
<th>Simulation</th>
<th>FTD</th>
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<tbody>
<tr>
<td>How Much Time Is Needed</td>
<td>4-6 months</td>
<td>&lt;30 days</td>
<td>1-5 days</td>
<td>6-8 Weeks</td>
<td>30-90 days</td>
<td>6-8 Weeks</td>
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<td>Long Cycle Times</td>
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<td>Excessive Process Defects</td>
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<td>Excessive Motion</td>
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<td>Complex Problem</td>
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<td>Multiple Step Process</td>
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<td>Excessive Or Hidden Rework</td>
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<tr>
<td>Asses Value-added Activities</td>
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<tr>
<td>Rapid Implementation Needed</td>
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<td>X</td>
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<tr>
<td>Know Current Process Capability</td>
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<td>Long Term Control Mechanism</td>
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<td>X</td>
<td>X</td>
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</table>
**What is Six Sigma?**

- Six Sigma is a rigorous, focused, high-impact methodology that uses proven quality principles and techniques to reduce process variance.

- Six Sigma relies on rigorous **statistical methods** and puts control mechanisms in place in order to tie together quality, cost, process, people and accountability.
The Six Sigma Methodology

• Six Sigma begins with an understanding of the “customer’s” needs, requirements and values (The Voice of the Customer)

• Once the customer’s needs and values are defined, Six Sigma identifies those factors that are critical to customer satisfaction

• The processes that are involved in these “critical to..” factors are then measured and analyzed
**Six Sigma Goals**

- The goal of Six Sigma is to **reduce the variance** and control processes in order to assure compliance with the “critical to” specifications.

- Six Sigma aims at virtually **error free performance** by focusing on defect reduction, cycle time reduction, and cost savings.
Why Does Six Sigma Work?

• Focuses on Customers and Processes
• Links processes to bottom line financial results
• Requires active senior management commitment and leadership
• Rapid project completion (3-6 months)
• Clear Definition of success
• Solid Infrastructure (Champions, MBB, BB, GB)
• Sound data driven statistically validated approach
• Uses disciplined approach (DMAIC)
**Six Sigma Roles and Responsibilities**

- **Executives**
  - Owns vision, direction, integration, results
  - Leads change
  - Project owner
  - Implements solutions
  - Agent manager

- **Project Team Members**
  - Part-time
  - Project-specific

- **All employees**
  - Understand vision
  - Apply concepts to their job and work area

- **Champions/Sponsors**

- **Master Black Belts**
  - Full time
  - Trains and coaches Black Belts

- **Green Belts**
  - Part-time
  - Help Black Belts

- **Black Belts**
  - Full time
  - Facilitates problem solving
  - Trains and coaches Project Teams

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  - Understand vision
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  - Trains and coaches Project Teams
**The Nature of Sigma**

- $3\sigma$ to $6\sigma = 20,000$ times improvement
- Most companies report that they operate at the 3-4 Sigma level. But most actually operate at 2-3 Sigma

<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>

Exponential, not linear
Six Sigma DMAIC Framework

Define
Who are the customers and what are the 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?
Define Phase

• Critical to Quality Requirements (CTQ’s)?
• Problem Statement
  • What’s the problem?
  • When or under what conditions does it occur?
  • Where does it occur?
  • What is the extent of the problem?
  • What is the impact of the problem?
• Goal Statement
  • What will success look like?
• Project Team
• High Level Process Map
  • SIPOC Map
Measure Phase

- How will you measure the process performance?
- What data do you need?
- Is the data valid and accurate?
- What’s the current level of performance?
- Do we need to “shift the mean” or “reduce the variation”?

...measure what you care about; know your measure is good...

\[ \begin{align*}
\text{Process X’s or Factors:} & \quad X_1 \\
& \quad X_2 \\
& \quad X_3 \\
& \quad X_4 \\
\text{Outputs:} & \quad Y_1 \\
& \quad Y_2 \\
& \quad Y_3
\end{align*} \]
Analyze Phase

• What are the most likely causes?
  • “Vital Few” vs. the “Trivial Many”
• How do you know?
  • Graphical Tools
  • Statistical Tools

Y = F(X₁, X₂, X₃…Xₙ)

Regression Plot
Y = 7.51284 + 3.08433 X
S = 5.33974      R-Sq = 98.0 %      R-Sq(adj) = 98.0 %

... look for root causes; generate a prioritized list of Xs...

Process X’s or Factors

Outputs

X₁
X₂
X₃
X₄

Y₁
Y₂
Y₃

Effect
**Improve Phase**

- How can we fix the process?
  - Generate alternatives
  - Assess the risks
  - Test the alternatives
  - Select the best alternative

...determine and confirm the optimal solution...

Before

![Histogram Before](image)

<table>
<thead>
<tr>
<th>Lower Spec</th>
<th>Upper Spec</th>
</tr>
</thead>
</table>

After

![Histogram After](image)

<table>
<thead>
<tr>
<th>Lower Spec</th>
<th>Upper Spec</th>
</tr>
</thead>
</table>

**Process X’s or Factors**

- $X_1$
- $X_2$
- $X_3$
- $X_4$

**Outputs**

- $Y_1$
- $Y_2$
- $Y_3$
Control Phase

- How can we sustain the solution so that the problem stays fixed, permanently?
  - Mistake Proofing
  - Robust Design
  - Process Monitoring

...be sure the problem doesn’t come back...
QUESTION: Which patient has Sepsis?

Project Team

Sponsor: Martin Doerfler, MD
Champion: Boris Khodorkovsky, MD, FACEP
Process Owner: Boris Khodorkovsky, MD, FACEP
Master Black Belt: Nancy Riebling
Black Belt: Sara Gonzalez, Esq.
Core Team: Holly Acierno, RN
Cynthia Benson, DO
Zebulan Frayne, RN
Karen Lefkovic, RN
Ted Maniatis, MD

ANSWER: They both do!

Don’t allow compensation to become decompensation. Early identification and treatment of Sepsis saves lives. Let’s work together to get our patients the treatment that they deserve. Know the signs, and what you can do to help your patients.
<table>
<thead>
<tr>
<th><strong>Vital X</strong></th>
<th><strong>Root Causes</strong></th>
<th><strong>Solution Details</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ABX Admin &gt;180 minutes</td>
<td>1. ABX not readily available</td>
<td>1. Pyxis to be stocked with ABX most commonly used in treating sepsis</td>
</tr>
<tr>
<td></td>
<td>2. ABX ordered &quot;next round&quot;</td>
<td>2. ABX to be ordered &quot;First Dose NOW&quot; or &quot;STAT&quot; to alert the pharmacy that it is needed [quickly] and the receiving RN that the meds should be administered immediately, upon receipt. Physician education at Grand Rounds</td>
</tr>
<tr>
<td></td>
<td>3. Staffing (RN:PT ratio causes difficulty in administering med upon arrival on the unit)</td>
<td>3. RN Managers (PCUM &amp; APCUM) to assist during busier hours - to be discussed at unit RN staff meetings</td>
</tr>
<tr>
<td></td>
<td>4. No prioritization as to which patient receive have meds first</td>
<td>4. Physicians should communicate with RN regarding which patients should have the medications administered first</td>
</tr>
<tr>
<td></td>
<td>5. &quot;Wait and See Approach&quot;</td>
<td>5. Sepsis Alert in EDIS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. STAT Sepsis sticker</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Code Sepsis/RRT</td>
</tr>
<tr>
<td>Failure to Order Serum Lactate and/or Blood Cultures</td>
<td>1. Wait and See approach</td>
<td>1. Badge Buddies: Visual guide as to process in treatment once sepsis is identified</td>
</tr>
<tr>
<td></td>
<td>2. Higher priority on one over the other</td>
<td>2. Bundle the tubes for Serum Lactate and Blood Cultures together</td>
</tr>
<tr>
<td></td>
<td>3. Time to receive results</td>
<td>3. Alert in EDIS: When ordering a Serum Lactate, it asks the user if they are suspecting sepsis and, if yes, to order the Blood Culture as well</td>
</tr>
<tr>
<td></td>
<td>4. Failure to diagnose</td>
<td>4. Code Sepsis / RRT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Use ABG as an alternative for serum lactates</td>
</tr>
<tr>
<td>Failure to Diagnose</td>
<td>Physician diagnoses all criteria but not the actual sepsis</td>
<td>1. Posters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Badge Buddies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Education</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Huddles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Code Sepsis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Serum Lactate &gt;4 as critical value</td>
</tr>
</tbody>
</table>
Why Use This Approach?

**Takeaways**

- Structured DMAIC approach to process improvement
- Identify key sources of variation and defects through rigorous statistical methods and data analysis
- Solid team infrastructure and empowerment of frontline staff
Lean

Six Sigma

PDSA

Lean
Origins of Lean

- Pioneered by Toyota, adopted by other Japanese manufacturers, discovered much later by Western manufacturers

- Focused on eliminating the seven wastes:
  1. **Transportation** (moving material/product/information from one place to another)
  2. **Inventory** (material/product/information waiting to be processed)
  3. **Motion** (excess movement and/or poor ergonomics)
  4. **Waiting** (delays caused by shortages, approvals, downtime)
  5. **Overproduction** (producing more than is needed)
  6. **Overprocessing** (adding more value than the customer is paying for)
  7. **Defects/Rework** (correcting mistakes)

- Remembered using the acronym T.I.M.W.O.O.D.

- Another waste is: People (untapped and/or misused resources)

- A bias for action and implementing Toyota Production System tools
Northwell Health LEAN Methodology

**Kickoff**
- Meet the sponsor
- Define/understand the problem
- Scoping, meet the team, understand roles

**Pre-work**
- Collect baseline data
- Perform high-level analysis

**Lean Event**
- Brainstorm/causes and solutions
- Prioritize causes and solutions

**Sustain**
- Assign actionable action items and accountable metrics
Overview of Lean - Concepts

- Lean means Speed, Low Cost, Flexibility and is applied through a variety of tools and techniques:
  - Kaizen events to effect rapid impact/changes
  - Value stream mapping for opportunity identification
  - 5S for cleanliness and organization
  - Kanban for “pull” from the customer
  - Setup reduction for flexibility
  - Queue Reduction for productivity improvement
  - Value-Add Analysis
  - Work flow / layout improvement to reduce non-value add transportation
  - Process Balancing to identify time traps, balance workloads, and increase throughput
  - Mistake-Proofing to eliminate rework through mistake-proofing (defect prevent)
  - Complexity analysis for procurement activities
  - Hiejunka (work leveling) to manage capacity/resource needs
## Value Add Time A Customer Perspective

<table>
<thead>
<tr>
<th>Customer Value Add (CVA) Questions</th>
<th>Business Value Add (BVA) Questions</th>
<th>Non-Value Add (NVA) Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>◆ Does the task add form, feature, or function to the service?</td>
<td>◆ Does this task reduce owner financial risk?</td>
<td>◆ If the customer knew we were doing this, would they request that we eliminate the activity so we could lower our prices?</td>
</tr>
<tr>
<td>◆ Does the task enable a competitive advantage (reduced price, faster delivery, fewer defects)?</td>
<td>◆ Does this task support financial reporting requirements?</td>
<td>◆ Does the task fit into either of the other two categories?</td>
</tr>
<tr>
<td>◆ Would the customer be willing to pay extra or or prefer us over the competition if he or she knew we were doing this task?</td>
<td>◆ Would the process of selling the service break down if this task were removed?</td>
<td>◆ Can I eliminate or reduce the activity?</td>
</tr>
<tr>
<td></td>
<td>◆ Is this task required by law or regulation?</td>
<td></td>
</tr>
</tbody>
</table>
Kaizen: Primary Improvement Vehicle of Lean

- Kaizen is the focused application of lean tools to reduce muda (waste) to improve cost, quality, delivery, speed, flexibility and responsiveness to internal and external customer needs.

- Kaizen focuses on incremental change and is the continuous improvement vehicle utilized by the Toyota Production System.

- Kaizen is a vehicle for driving quick hit value by implementing “do-now” solutions through employee involvement (process \times \text{acceptance} = \text{results}).

- Kaizen is used when the scope and boundaries of a problem are clearly defined and understood and when results are needed immediately – \textit{i.e., cost and waste elimination, cycle time improvements, quality improvements}.

- Kaizen is also applicable during long-term projects to gain momentum, build credibility, and accelerate process improvement results, as a change agent when there is resistance to stimulate change, or as a project launching tool leading to multiple follow-on projects/kaizen events.

- Kaizen assembles cross-functional teams in a focused, 3-5 day dedicated event to attain sustained results:

| Pre-Event Prep (3-5 days) | Kaizen! Event (3-5 days) | Event Follow-up & Control (15-20 days) |
Lean Strategies for Improvement

- Changeover Reduction
- Downtime Reduction
- 5S
- Layout improvement
- Kanban/Work Control
- Standardized Operations
- Defect Elimination
- Variation Reduction
- Visual Controls
Swim Lane Process Map – Identify the Waste
Brainstorm & Prioritize Solutions
# 1. Improper collection & specimen handling

<table>
<thead>
<tr>
<th>Solution</th>
<th>WHO</th>
<th>WHEN</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inservice to raise awareness to RN/PCA</td>
<td>Maria</td>
<td>2/11/2013</td>
<td>Complete</td>
</tr>
<tr>
<td>Contact lab &amp; RN educator</td>
<td>Maria</td>
<td>2/11/2013</td>
<td>Educational Tool - Meeting Feb 25, March 5 with RN for Education</td>
</tr>
<tr>
<td>Describe issues for inservice focus-(labeling &amp; proper tube)</td>
<td>Maria</td>
<td>2/11/2013</td>
<td></td>
</tr>
<tr>
<td>Develop education process</td>
<td>TBD</td>
<td>2/11/2013</td>
<td></td>
</tr>
<tr>
<td>Role out education</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit specimens &amp; Feedback</td>
<td>Deveka</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Role/Responsibilities of the ED tech**

<table>
<thead>
<tr>
<th>Solution</th>
<th>WHO</th>
<th>WHEN</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inform RN Manager of the plan</td>
<td>Mike</td>
<td>2/12/2013</td>
<td>Complete</td>
</tr>
<tr>
<td>Inservice tech during morning/afternoon brief</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Automate generation of second lactate label**

<table>
<thead>
<tr>
<th>Solution</th>
<th>WHO</th>
<th>WHEN</th>
<th>STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speak with IT about feasibility</td>
<td>Tara</td>
<td>2/11/2013</td>
<td>E-mail is sent but not heard back</td>
</tr>
<tr>
<td>Create Program</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Update staff on change</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implement</td>
<td>TBD</td>
<td></td>
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</table>
**Why Use This Approach?**

**Takeaways**

- Structured approach to process improvement
- Identify and implement large opportunities quickly
- Culture change driven by frontline staff engagement and leadership support
- Continuous improvement
Roadmap: Model for Improvement

Three 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?
Methods for Improvement

Profound Knowledge: The Science of Improvement
Application of the PDSA Cycle

- Planning requires prediction
- Prediction requires a theory
- A single observation may require us to modify our theory
- Multiple PDSA cycles can accelerate the learning process
- Choice of plan depends on our “degree of belief” about the change
The PDSA Approach

- Is useful as a roadmap for small, simple projects as well large-system projects
- Is useful for process and system improvement
- Can be used for design of new products and services
- Is applicable to all types of organizations
- Is applicable to all groups and levels in an organization
- Facilitates the use of teamwork to make improvements
- Encourages planning to be based on theory
- Allows project plans to adapt as learning occurs
- Provides a simple way to empower people in the organization to take action
Definitions

- **Testing**: Trying and adapting existing knowledge on small scale. Learning what works in your system.
  - Change is not permanent
  - Failure very useful here, even expected
  - Fewer people impacted than during implementation

- **Ramp**: A set of related cycles that test the ideas of change for every possible conditions to provide and design a reliable process

- **Spreading**: adapting change to areas or populations other than your pilot populations

- **Implementing**: Making this change a part of the routine day-to-day operation of the system in your pilot population
  - Don’t expect failure here
  - More people impacted than during testing
  - Increased resistance compared to testing
  - Generally requires more time than testing
**PDSA**

- **Adjust** – modified

- **Expand** - increased in scope
  - Tested under other conditions

- **Discard** – change the plan

*Figure 4.1. Elements of the PDSA Cycle.*
**PDSA Form Utilization Logistics**

1. First Meeting: “Plan” a change

2. Test the change

3. Next Meeting:
   a) “Do”: discuss observations in carrying on the improvements
   b) “Study”: develop run charts, histograms, or bar graphs
   c) “Act”: use the graphs to make decision (brainstorm->prioritize)
   d) “Plan”: the **Next Cycle** (new PDSA WWW)

4. Continue step 2 (weekly/biweekly) and 3 until you have a reliable process
PDSA Testing Conditions

• Trying new ideas on small scale while the old system is still in place

Testing Conditions:

Time:
• New idea for specific time of a day
• Shift Change

Location:
• New Idea in a specific circumstances/units
• Learning what works in local systems

Resources:
• Focused and specific groups of people/ machines
• Pioneers who are willing to try

Samples:
• 1-5 trials to make sure that specific setting is working
Using a Family of Measures

- **Outcome Measures**: Voice of the customer or patient. How is the system performing? What is the result?
- **Process Measures**: Voice of the workings of the system. Are the parts/steps in the system performing as planned?
- **Balancing Measures**: Looking at a system from different directions/dimensions. What happened to the system as we improved the outcome and process measures? (e.g. unanticipated consequences, other factors influencing outcome)

### Perioperative Example

<table>
<thead>
<tr>
<th>Type of Measure</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
<td>Percentage unplanned returns to the OR</td>
</tr>
<tr>
<td>Process</td>
<td>Percentage of patients with on-time antibiotic administration</td>
</tr>
<tr>
<td>Balancing</td>
<td>Volume of surgical cases per OR/day</td>
</tr>
</tbody>
</table>
**Run Charts**

- Graphical display of data plotted in some type of order
- Easy to construct & interpret
- Enables team to determine if a change resulted in an improvement
- Visual tool for sustainability
- Can be computer generated or constructed manually
Common Cause vs. Special Cause Variation

**Common Cause**: Those causes that are inherent in the process over time, affect everyone working in the system and affect all outcomes of the system.

**Special Cause**: Those causes that are not part of the system all the time or do not affect everyone, but arise because of specific circumstances.

The distinction between common and special causes of variation is fundamental to developing effective improvement strategies.
How to Scale Up

Identify people and circumstances that will adopt the change:

• Modify the idea
• Test new ideas
• Expand test time
• Expand test location
• Expand resources
• Increase samples

What strategy to get people involved (CAP):

• Create a shared need
• Shaping a vision
• Mobilizing commitment
• Making change last
• Monitoring
ED Repeat Lactate Process

Primary RN
- Draw blood for initial lactate
- Start IV fluids

ED M.D.
- Assess patient verbalize orders with RN
- Order sepsis order set automated second lactate
- Review lactate results Communicate with M.D.
- Lactate > 4.0?
  - Yes: Draws second lactate
  - No: Cancels 2nd Lactate

Lab
- Process initial lactate
- Process second lactate
The Sepsis team had their weekly team meeting in which they used the PDSA form to Plan out their test of change.

**Team Meeting #1**

**PLAN:** What is the hypothesis to test?
- Have you identified on your process map where this Ramp/Cycle will observe/test? Yes ☑ No ☐
  Process Map attached? Yes ☑ No ☐
- Describe the issue you are trying to resolve
  ED doctors do not consistently use the sepsis order set
- What is the objective of this PDSA Cycle?
  Improve MD compliance with using the sepsis order set
- Describe the test of change
  Place Sepsis Order Set reminder cards on computer stations in ED. Test on day shift only.

**Data Collection Plan:** How will you know that the test is successful using PDSA data?

<table>
<thead>
<tr>
<th>PDSA Metric</th>
<th>Where to Find Data</th>
<th>Frequency of Collection</th>
<th>Who is Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance with using Sepsis Order set.</td>
<td>EMR</td>
<td>Weekly</td>
<td>Susan</td>
</tr>
<tr>
<td>Numerator: # times order set used</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denominator: Total # of identified septic patients</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WWW**

<table>
<thead>
<tr>
<th>What</th>
<th>Who</th>
<th>Where</th>
<th>When</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design reminder cards</td>
<td>Mike</td>
<td>ED</td>
<td>9/9/2016</td>
<td>Complete</td>
</tr>
<tr>
<td>Print and post cards on computer stations</td>
<td>Kelly</td>
<td>ED</td>
<td>9/11/2016</td>
<td>Complete</td>
</tr>
<tr>
<td>Educate MDs</td>
<td>Mike</td>
<td>ED</td>
<td>9/12/2016</td>
<td>Complete</td>
</tr>
<tr>
<td>Educate RNs</td>
<td>Amy</td>
<td>ED</td>
<td>9/12/2016</td>
<td>Complete</td>
</tr>
<tr>
<td>Inform the Lab</td>
<td>John</td>
<td>ED</td>
<td>9/12/2016</td>
<td>Complete</td>
</tr>
<tr>
<td>Put data in run chart</td>
<td>Susan</td>
<td>ED</td>
<td>9/19/2016</td>
<td>Complete</td>
</tr>
</tbody>
</table>
The team carried out the test of change for one week and collected the data. They then had their second team meeting to discuss how the test of change went.
Digging deeper into the 13 missed opportunities the team found:

- Many doctors didn’t know how to get to the order set.
- Early in the week doctors weren’t aware we were doing this test of change.
- A few doctors said they don’t like using the order set because it takes too many clicks.
- Overall, the staff were accepting of the test of change.
- The run chart shows a slight increase in compliance.
Team Meeting #2: Do/Study/Act

- How did the test go?
- What did you hear?
- What did you see?
- What did the data show?
- What would you change to make the test better?

**DO – Observations in Carrying out the Plan**
List observations that were not part of the test of change:
- A.
- B.
- C.
- D.
- E.

List what could have gone better the test of change:
- A.
- B.
- C.
- D.
- E.

**STUDY – Feedback and Lessons Learned**
Is Baseline Data Available for the PDSA Metric(s)? Yes ☐ No ☐

Questions to be answered from this PDSA Cycle:
- A. How was the staff educated on this test of change?
- B. How did the staff respond to this test of change? (Acceptance / Resistance)
- C. How many times did the staff run the test of change?

Questions to be answered from the data collection:
- A. How did the metric change?
- B. How many opportunities did we miss?
- C. Should we add/modify the metrics?

**ACT – What changes are to be made?**
As a result of this PDSA we are **Adopting** ☐ **Adapting** ☐ **Rejecting** ☐ the changes that were tested.

If Adopting/Rejecting, please describe the adoption/issue and the strategy below:

<table>
<thead>
<tr>
<th>Adaption / Issue</th>
<th>Improvement Strategy</th>
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</table>
Team Meeting # 2: Do/Study/Act

**Observations**

**DO – Observations in Carrying out the Plan**

List observations that were not part of the test of change:

A. RNs prefer when sepsis order set is used
B. MDs forget to cancel 2nd lactate if it isn’t needed
C. D.
E.

List what could have gone better the test of change:

A. Improve format/color of the reminder card
B. Improve MD education on use of sepsis order set
C. D.
E.

**Data**

**STUDY – Feedback and Lessons Learnt**

Is Baseline Data Available for the PDSA Metric(s)? Yes [X] No [ ]

Questions to be answered from this PDSA Cycle:

A. How was the staff educated on this test of change? One time at the beginning of the test of change
B. How did the staff respond to this test of change? Acceptance
C. How many times did the staff run the test of change? For 1 week

Questions to be answered from the data collection:

A. How did the metric change? The average compliance slightly increased
B. How many opportunities did we miss? 13 times the sepsis order set was not used
C. Should we add/modify the metrics? Not at this time

**Team Decision**

**ACT – What changes are to be made?**

As a result of this PDSA we are **Adapting [X]** Adapting [ ] Rejecting [ ] the changes that were tested.

If Adapting / Rejecting, please describe the adaptation / issue and the strategy below:

<table>
<thead>
<tr>
<th>Adaptation / Issue</th>
<th>Improvement Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Sepsis Order Set reminder card was not clear and hard to read</td>
<td>Modify the format of the reminder card</td>
</tr>
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</tbody>
</table>
**PDSA Process Recap**

**Step 1:** Fill out the Plan side of the PDSA form

**Step 2:** Collect data and make a run chart

**Step 3:** Fill out the Do/Study/Act side of the PDSA form

---

**Plan**

**Do/Study/Act**

**Run Chart**
Why Use This Approach?

**Takeaways**

- Structured approach to process improvement
- Small scale tests of change
- Rapid learning cycles acted on until intended objective is achieved
- Provides a simple way to empower people in the organization to take action
Improvement Science Collaborative Roadmap

1- Map the Current Process
2- Identify Wastes and Opportunities for Improvement
3- Brainstorm the Causes of Problems/Issues in the Process
4- Categorize Issues
5- Prioritize issues
6- Design PDSA Cycle
7- Scale up PDSAs in a Ramp
8- Move to Next Ramp

- Test PDSA and use Run Charts To Graph Your Metric
**Summary**

- Described three improvement science methodologies
  1. Six Sigma
  2. Lean
  3. PDSA
- Pick the methodology that works for you
- Engagement of frontline staff and leadership support are vital components to process improvement efforts
- Improvement science tools can be incorporated into your sepsis work
- Mix and match the tools to meet your need
Thank You!