Rural Health Care Symposium
Using Lean Methods to Improve CAH Performance

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The Critical Access Hospital Network (CCAHN)

How are hospitals improving performance?

• Surprisingly, nearly all are using Lean or versions of it (TPS, Six Sigma, QI, PI, IE, Baldridge, etc. etc.)
• Recommended by IHI, VHA, major provider systems, etc.
Presentation

1. Intro, plan today’s session
2. A Lean overview
3. Identify issues and its components
4. Mapping tool
5. Value Stream Map (VSM)
6. Other tools to implement and sustain change

Plan for Today

- **Intent is … put Lean to work for you, share your challenges**
- Everybody:
  - Who is here?
  - What are your issues?
  - Are you familiar with Lean?
- Overview of Lean
- Are some problems at multiple sites?
- Overview of tools specific to issues identified
- **Work on each topic using PI tools**
- Discuss next steps
What is Lean?

- A set of tools that work
- Applicable to a wide range of problems
- An organized way to do improvement projects
- Creates a culture of ongoing improvement
- Popular in healthcare

*It really works!*

Outline for Today

1. Explain the basic Lean ideas
2. Some Lean tools you can use
   - Starting a project
   - Finding the important improvements
   - Making the change
   - Implement and sustain results
3. Discuss next steps

*Ask questions.*
Some Typical Lean Projects

- Better experience for patients (in ED, clinic visit, room stay)
- Increased patient access
- Reduction of materials supply costs
- Reduction in cycle time (such as the patient discharge process)
- Improvement in workplace safety
- Improved workflow and movement for staff
- Elimination of errors
- And lots more

What is Lean?

- "Lean" is a management approach derived from the Toyota Production System (TPS). Focus on reduction of waste and to improve overall customer value.
- The Toyota Production System is a comprehensive system that focuses on continuous improvement. Key elements include:
  - Strategy and objective alignment
  - Focuses on aligning people with purpose and goals
The Goal of Lean in Health Care

Bring the highest quality care to our patients, with the best possible service (as fast as possible), with the lowest cost attainable!

- This is achieved through:
  - Focusing **on the patient’s viewpoint**: what is most important to them – what they are willing to pay for!
  - Reducing/eliminating waste in our all of our processes.
  - Systems perspective: breaking - down silos.

Engaging staff in improvement work
Tools

- Process mapping
- Spaghetti diagram
- Waste reduction
- Five whys
- Value-stream mapping
- Five Ss
- Poke Yoke
- Kanban
- Gemba
- Kaizen event
- Flow
- Pull
- Takt time
- Standardized work
- Andon
- Active Daily Management
+ & more

無駄 Muda, waste

A traditional Japanese term for an activity that is wasteful and doesn't add value or is unproductive. Reducing Muda (waste) is an effective way to increase profitability.
### Waste Categories in Health Care

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excess Motion</td>
<td>Searching for materials, people, information; gathering supplies from multiple carts/closets, walking between work station</td>
</tr>
<tr>
<td>Waiting</td>
<td>Waiting for others to complete tasks before work can begin on the next task; waiting for tests results; physician waiting for access to OR (between cases)</td>
</tr>
<tr>
<td>Over-Processing</td>
<td>Using more supplies than required to perform the job; gathering more information than required; over-utilization in clinical practice (tests, medications)</td>
</tr>
<tr>
<td>Inventory</td>
<td>Overstocked meds or supplies; supplies not available when/where needed; expired supplies.</td>
</tr>
<tr>
<td>Unused creativity</td>
<td>Variation in practices, confusion/lack of clarity, idle staff, staff not performing at their level of capability</td>
</tr>
<tr>
<td>Over-production</td>
<td>Auto-copies of reports; multiple forms w/ same information, left-over food at meetings</td>
</tr>
<tr>
<td>Rework</td>
<td>Unclear orders; correcting mistakes/errors; redoing work; medication errors; incorrect billing</td>
</tr>
<tr>
<td>Transportation</td>
<td>Moving patients, supplies, equipment from one location to another</td>
</tr>
</tbody>
</table>

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### Defining the Problem Better

- Here are some tools
**Cause & Effect (Fishbone diagram)**

- Result
  - Causes
  - Effect

*A basic tool to organize, visualize and discuss a problem*

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**Fishbone Diagram**

- Draw, key issue or problem at head
- Causes or related items are diagrammed
Tools to Analyze Problems

Affinity Diagram

- A collaboration and group discussion tool
- List the possible issues, then group logically, visually

Understanding the Problem Better

- Mapping helps in many ways
Why Make a Map?

- Often the good improvement first step
- Provides understanding, identify problems, share understanding
Process Map (Swim-Lane Type)

Basic Process Flowchart Symbols

- Beginning / End
- Database
- Document
- Process Step
- Decision
- Direction
More Symbols Exist

See readings

Example from Last Week
Flowchart Standard Symbols

- An oval is used to show inputs/outputs to the process or start/end of the process.
- Block arrows are used to show transports.
- A rectangle is used to show a task or activity.
- Feedback loop
- Arrows show the direction of flow of the process.
- A diamond is used to show those points in the process where a choice can be made or alternate paths can be followed.
- D shapes are used to show delays.
- End

Process Map
(also called a flowchart, process chart, process map, workflow diagram, etc.)

- Is there a best way?
- When to do it and what does it take?
- Why diagram?
- Who diagrams?
A Simple Example

We decide to buy a book, what are the steps?
(old style, before Amazon)
1. Decide to buy a book
2. Go to the book store
3. Find the book?
4. If no, leave (or buy another book)
5. If there, take it to cashier
6. Leave (with book)
Simple Patient Visit Process Map

Now This is Where it Gets a Little Complicated
Questions?

- How much detail?
- Where do you get the info
- What tools are helpful? Necessary?
- How do you know it is correct?

Systems View of Health Care

<table>
<thead>
<tr>
<th>INPUT</th>
<th>Transformation Process</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td></td>
<td>Goods or Services</td>
</tr>
<tr>
<td>Material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Feedback
Hospital Lab Flowchart

- Lab – interviewed two managers
- Reviewed flow with managers and revised diagram accordingly (versions 2 & 3)
Example; an Evolving Map
They always get revised if the process being mapped is complex

Became this, 2nd Version
Suggestions:

- Use “clouds” for unclear portions
- Start with beginning and end
- Observe, watch entire process more than once
- Look for steps that are redundant, are loops, are unnecessary (no significant impact if not done)
- Do at various (perhaps 2) levels of detail
- Boundaries; important to make clear
- Identify who are sources, who are users
- Can be used for training purposes

Points where a delay could be caused.
More Suggestions for Useful Flowcharting

- Distinguish between the ideal processes and the actual set occurring
- Note assumptions and sources
- Incorporate useful details such as time and costs of processes
- Review diagrams with sources
- Test against actual observations
- Include intangible and mental steps
- Ideally, have a second person compare the chart to observation

Process Map (Swim-Lane Type)
Flowchart showing activities by department or function.

“Swim Lane” type.
GI Clinic Swim Lane Process Map

Patient
- Arrives at
- Self-parks / valet parking
- Walks to lobby
- Gets badge
- Walks to clinic
- Enters clinic and signs in
- Checks scheduling system for patient
- Within 15 minute grace period?
  - No
  - Reschedule patient
  - Puts sign in sticker on patient list
- Yes

Medical Assistant
- Checks patient into system
- Gives corrected information
- Finds pre-assembled patient packet
- Verifies their information
- Places chart in pending patient chart area
- Updates patient information in system
- Checks patient into system
- Patient's chart in pending patient chart area
- Places chart in pending patient chart area

Nurse
- Picks up patient in waiting room and walks patient to vitals room
- Walks to clinic front desk and grabs patient chart
- Places patient in waiting room and walks patient to vitals room

Doctor
- Chooses new appointment date

Information correct?
- Yes
- Go to
- No
- Give corrected information

Fills patient information

Patient

4/1/2016
Using Your Flowchart

- Identify who is responsible for what
- Identify ways to simplify
- Identify opportunities for elimination of a step
- Look for unnecessary decisions
- Locate cost only steps
- Can loops be eliminated or shortened?
- Identify bottlenecks
- Use it as a learning and training tool

Other types of maps.
- Diagrams are a good way to present complex information.

- There are many ways to usefully and graphically describe information.

See also http://gsociology.icaap.org/methods/presenting.htm

Overlays are sometimes useful.
Bed Turnaround Process

**Patient leaving**
- Discharge Order written by doctor
- Bed Control Notified
- Discharge Waiting Rm. notified
- Pt. Transport Called
- Pt. Transport Arrives

**Patient 2**
- Patient 2 Arrives
- Pt. Transport Called
- Pt. Transport For Pt 2 Called
- Discharge Waiting Rm. notified
- Patient 2 Departs
- Housekpg Called
- Housekpg Complete
- Patient Assigned

**Bed Control Room Assignment**
- Bed Available

**Bed Turnover Time**

**Bed Management**

- Bed Control
- Separation Desk
- Nursing Director (staffing)
- Affinity (beds, patients)
- Housekeeping
- ER (pre admit, patients waiting)
- Housekeeping info
- Patient Flow Coordinator
- DWU
- CDU
- Nursing Administration (bed closures)
- Related reports
- Wards (patients leaving, pre discharge, beds closed, beds available, etc.)
- OPD (patients waiting)

Patients
- Telephone calls, paper
- Computer system
Diagrams are Sometimes Needed Rather than a “Map”

1. Surgery end to wheels out
2. Room turnover, wheels out to wheels in
3. Wheels in to surgery start

Wheels In Time
Wheels Out Time

Room Turnover Time, includes:
- Wheels out prior patient
- Move out equipment from prior case
- Clean room
- Move in equipment for following case
- Interview patient in Pre Op
- Assemble patient in Pre Op
- Transport patient to operating room
- Wheels in following patient
- Potential causes of delay:
  - Patient not ready in Pre Op
  - Patient paperwork not ready
  - Lab tests not ready
  - Transport staff not available
  - Room not clean
  - Surgeon, anesthesiologist or nursing not available to interview patient or family
  - Move not ordered

Room Turnover Time, includes:
- Assemble of clinical staff (surgeon, anesthesiologist, surgeon)
- Confirmation of plan, “time out” stop
- Move patient from transport bed to surgery bed
- Prep of patient
- Induction of patient
- Potential causes of delay:
  - Surgeon, anesthesiologist or nursing not available
  - Checking nurse not available for needed communications
  - Equipment & materials not ready
  - Lab tests &/or paperwork not ready
Activity and Role-Lane Mapping

<table>
<thead>
<tr>
<th>Activity</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take insurance information</td>
<td>Clerk</td>
</tr>
<tr>
<td>Move patient</td>
<td></td>
</tr>
<tr>
<td>Record vital signs</td>
<td></td>
</tr>
<tr>
<td>Take history</td>
<td></td>
</tr>
<tr>
<td>Examine patient</td>
<td></td>
</tr>
<tr>
<td>Write pathology request</td>
<td></td>
</tr>
<tr>
<td>Deliver pathology request</td>
<td></td>
</tr>
</tbody>
</table>
Analyzing the Map

- Value Stream Map (VSM)

Value Stream Map

- VA: Value-added time
- NVA: Non-Value added time

Wait time plus Non-value added time = 76 minutes & 20 seconds
Value-added time = 16 minutes & 40 seconds
Total visit time = 93 minutes
Value added time percentage = 18% of visit
Example from Last Week

Value Stream Map
Example: Value Stream Map

Clinic Visit

Check-In
1. Patient completes form (5 m)
2. Receptionist reviews form/verify ID (1.5 m)
3. Entered into computer (6 m)

Prep
1. Takes Vitals (4 m)
2. Documents in Chart (1 m)
3. Reviews patient form (.5 m)
4. Questions patient on chief complaint (1.5 m)

Exam
1. Asks chief complaint (1 m)
2. Completes exam (8 m)
3. Does form for test orders (1 m)
4. Writes RX (1.2)
5. Documents orders & RX in chart (2)

Check-Out
1. Schedules follow-up appointment (1.5 m)
2. Collects co-pay (2 m)

<table>
<thead>
<tr>
<th>VA</th>
<th>6.5</th>
<th>5</th>
<th>10.2</th>
<th>3.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>NVA</td>
<td>6</td>
<td>8</td>
<td>22</td>
<td>5</td>
</tr>
</tbody>
</table>

Value-Added 36%
Non Value-Added 64%
Other tools

Spaghetti Diagram
- To understand actual movement and opportunities for improvement
- Simple, but effective
Pareto Chart

- Identify issues, topics, problems
- Sort count by frequency, then graph or bar chart
Responsibilities Matrix

- Developed by interviews, observation
- Find undesirable duplication, improvement opportunities
- Basis for new processes and assignments

<table>
<thead>
<tr>
<th></th>
<th>Physicians Order</th>
<th>Surgery Consent</th>
<th>Surgery Consent</th>
<th>Blood Consent</th>
<th>Schedule Surgery</th>
<th>Receive Medical Record</th>
<th>Medical Record Audit</th>
<th>Check In Admitting</th>
<th>Check Out Admitting</th>
<th>Get Patient from waiting room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinic Clerk</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Scheduler</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Pre-Op Nurse</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
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<td></td>
<td>x</td>
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<tr>
<td>Registration Clerk</td>
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<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Op Clerk</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Five Whys Technique

- Ask **why** the condition occurred
- Ask again **why** for each answer (up to five times is a good rule of thumb)
Other Methods to Evaluate Current Practices or Alternative Changes

- Scatter Diagrams
- Failure Mode and Effects Analysis
- Theory of Constraints
- SIPOC Summarizes: suppliers, inputs, process, outputs, and customers
- Maturity Model of the organization

Value Stream Map

- Patient Arrival
- Registration: VA: 2’30”, NVA: 1’
- Triage: VA: 4’10”, NVA: 1’20”
- Physician Treatment: VA: 10’, NVA: 10’

- VA: Value-added time
- NVA: Non-Value added time

Wait time plus Non-value added time = 76 minutes & 20 seconds
Value-added time = 16 minutes & 40 seconds
Total visit time = 93 minutes
Value added time percentage = 18% of visit
Kaizen Event

- An organized Workshop or event to analyze the current work process (value stream map)
- Brainstorm how to eliminate waste in work process
- Pilot or plan pilot for selected ideas
- Develop plans for full-scale implementation
- Report out to Management/Champion
- Rules for Champion:
  - “Yes, I support this”
  - “No, I cannot because…”
  - “I would like to support, but need more information, specifically…”
Process Map

**Burn Clinic**

**Current Process**

1. Patient is registered
2. RN takes Vital Signs
3. RN changes the dressing
4. Patient is Discharged

**Proposed Process**

1. Patient is registered
2. RN takes Vital Signs
3. RN changes dressing
4. Patient is Discharged

Clinic Visit Map
Failure Mode and Effects Analysis
An effective tool to reduce errors. A structured approach to:
Identifying the ways in which a product or process can fail

<table>
<thead>
<tr>
<th>HFMEA Subprocess Step Title and Number</th>
<th>Potential Causes</th>
<th>Severity</th>
<th>Probability</th>
<th>Hazards</th>
<th>Score</th>
<th>Single Point</th>
<th>Weakness</th>
<th>Existing Control Measure</th>
<th>Detectability</th>
<th>Proceed?</th>
<th>Person</th>
<th>Responsible</th>
<th>Management Concurrence</th>
</tr>
</thead>
</table>

HFMEA Step 1 - Hazard Analysis
HFMEA Step 2 - Failure Mode Analysis
HFMEA Step 3 - Identify Effects
HFMEA Step 4 - Hazard Analysis
HFMEA Step 5 - Identify Actions and Outcomes

PDSA
- Plan, Do, Study, Act (or PDCA)
- Implementation of change is a cycle, not completed in one step
- Small, incremental change is a good approach
Rapid Improvement: Multiple Cycles

- The cycle:
  - If there is no improvement, try the cycle again!
    - Try another solution/change
    - Collect data based on the change
    - Pause to plan...what’s your prediction for the next test?
  - If there is improvement you can:
    - Test in a different shift, area, group
    - Decide how to make the change part of daily work
    - Select another area in process to improve

The PDSA Action Plan Worksheet

- Use the PDSA Action Plan to:
  - Plan tests you will run
    - Who
    - What
    - When
  - Capture predictions
  - Document results and learning
  - Document agreements about next steps
A-3

- Single page for objectives, plans and status
- Shared throughout organization
- Standardized format
Standard Work

- All procedures should have a clear description
- Consistency is critical to clinical practices
- Written procedures are for training and assuring quality
- Change isn’t done until standard work is written and everybody knows about it and uses it

Still More Lean Improvement Ideas

- Continuous flow
- Materials efficiency; Kanban, JIT
- Pull vs. Push
Neatness Reduces Waste

5-S
- Neatness supports effectiveness
- Sorting, Set in order, Systematic cleaning, Standardizing, and Sustaining
- Detail tools available

Before

After
Neat & Clean, Place for Everything, Poke Yoke

Before

After

How might you be able to use pictures for your project?

Poke Yoke

See:
Six Sigma

- Measure and reduce variability
- Overlaps with Lean, but more focus on Data and Quality than on Productivity and Waste
- Control chart

Other Methods to Improve Current Practices

- SMART goals (specific, measurable, attainable, relevant and time-bound)
- Design of Experiments
- Facility Layout methods
- Checklists
- Change Management
- Cost Effectiveness, ROI analysis
Departmental Performance Boards

- Department goals and performance metrics
- Focus on process performance
- Updated weekly with stats and trended where indicated
- Identify Improvement opportunities
- Displays feedback from patients (i.e., staff recognition, and/or complaints, etc.)

Is a huddle site.

How Lean Works

A gradual, methodical process of small improvements, performed every day by everyone. It can be summed up as “continuous improvement.”

True North Focus – everyone from top leadership to staff on the line are aligned to the same purpose.

Continuous Flow – work is balanced, roles and expectations are clearly defined, and there is good communication between team members.

Just-in-Time (Pull) – so work is initiated when needed by the customer.

Responsiveness – so the workforce is able to change their activities in response to demand and shifts in daily work requirements.

Workplace Organization – no physical obstacles are in the way, things are easy to find.

Built-in Quality – errors are eliminated reducing the need for rework.
Example: Improve Discharge Process

- Assess the problem
  - Analyze problem with team (Kaizen Event)
  - Mapping the process, verify
  - Root cause analysis, identify where are defects, waste
  - Value Stream Map; steps, time, value
- Develop solutions
  - Change via Kaizen, PDSA cycles, develop Standard work
  - Control chart, benchmarking (HFMA, others)
- Implement and sustain change
  - Set goals and monitor results, distribute broadly
  - Use huddles, performance boards

First Things, First

- Gather a cross-functional team for Kaizen Event with representation from all parts of the process being investigated
- Don’t forget ancillary or support staff
- Don’t assume that all of the necessary knowledge is in the room
- Be prepared to learn things you did not necessarily want to know!
Getting Started - planning

• You must have a plan as well as an understanding of where you are going (A-3, Gantt)
• Think about where Lean fits in your journey
• Successful Lean efforts are integrated in the overall vision of the hospital

A good video about a hospital using Lean is at:
https://www.youtube.com/watch?v=jZLtbye--sg
and http://www.pbs.org/newshour/videos/#174146
Also, there are many books, including:
• Lean Hospitals: Improving Quality, Patient Safety, and Employee Satisfaction, by Mark Graban
• Transforming Health Care: Virginia Mason Medical Center's Pursuit of the Perfect Patient Experience, by Charles Kenney (Author), Donald M. Berwick (Foreword)
• The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer, by Jeffrey Liker
• The Lean Six Sigma Pocket Toolbook: A Quick Reference Guide to 100 Tools for Improving Quality and Speed, by Michael L. George
Additional Sources
- Books and periodicals
- Professional organizations; AHRQ, IHI, IIE/SHS, SHIP, INFORMS, ACHE, ASQ & others
- Web sites for organizations and consultants, as well as social networking discussions

Questions?
(I may have covered too much, too fast)

Next steps? Pick a problem or more and form a team (Kaizen).

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Questions?

Thank You!

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