LEAN
Process Improvement
Anthony N. Cascio
November 8, 2013

Agenda
• Disclosures
• Introduction
• The State of Healthcare
• Process Improvement and Lean Philosophy Overview
• Type of Waste
• Lean Tools
• The Project Journey: A Case Study
Disclosure: Anthony N. Cascio

With respect to the following presentation, there has been no relevant (direct or indirect) financial relationship between the party listed above (and/or spouse/partner) and any for-profit company in the past 24 months which could be considered a conflict of interest.

About me…

Emergency!
Cadet (Explorer)
UMBC Emergency Health Services
Montgomery County, Maryland
Newark, NJ
Native Air
STAT Flight
Robert Wood Johnson University Hospital
About RWJUH…

- Flagship hospital of the RWJ Health System
- Primary Teaching Hospital for the Rutgers/RWJMS
- Level 1 Trauma Center
- Comprehensive Stroke Center
- Primary Angioplasty with CT Surgery
- International Center for Terror Medicine
- University Center for Disaster Preparedness and Emergency Response
RWJ Mobile Health Service

Comprehensive system

- Regional Communications
- Tiered System
  - BLS
  - ALS
  - SCT
- Education
- Research

BLS
- Non-Emergency Transports
- 4 municipalities
- 112 square miles
- 266,000 residents
- 13 units at peak
- 20,000 responses annually

ALS
- 2 Counties
- 230 square miles
- 440,000 residents
- 7 units at peak
- 19,000 responses annually
RWJ Mobile Health Service

Research
Special Events
TEMS Unit
NJ EMS Task Force
• Central Host Agency

NJ EMS Task Force

“To provide New Jersey and the region with a highly trained, equipped and specialized EMS resource to support operations at major incidents and pre-planned events using a well coordinated, robust all-hazards approach through the State’s Emergency Management System”
Today Objectives

• Introduce the basics of Lean Philosophy
• Increase ability to identify Lean opportunities
• Emphasize importance of involvement and benefit of using Lean Methodology
• Learn and have fun

The State of Healthcare....

...in a changing environment
Healthcare Costs
Per Capita Spending

Penalties

• “penalizes hospitals if patients are **re-admitted** to the hospital within one month of a visit for a condition that should have been dealt with on the first trip”

• “When a hospital does not meet a performance standard for the performance period, the DRG **payment is decreased**”

• “**Reduced Medicare payment** to certain hospitals for hospital-acquired conditions (effective FY 2015)”
Health Reform
Means cuts to Reimbursement

Sample figures for a 500 bed hospital
Courtesy of: Premier

Industry Snapshot

To Fix Health Care, Hospitals Take Tips From Factory Floor
Adopting Toyota Techniques Can Cut Costs, Wait Times; Ferreting Out an Infection

• “Potentially serious medication errors occur in 6.7 of every 100 patients” — Journal of the American Medical Association

• “$4700 in Medical errors per preventable adverse drug event” — Journal of the American Medical Association

• “3.7% of Hospital admissions result in injury as a result of care” — The New England Journal of Medicine
Industry Imperatives

- Grow the business
- Control costs
- Drive outcomes

Have you heard about the new pirate movie?

- It’s rated AARRRRRGGH!
Process Improvement Overview

What is Process Improvement

Process Improvement is the **proactive task** of *identifying, analyzing and improving* upon existing business processes for optimization and to meet standards of quality.
What is Process Improvement

- It means setting aside the customary practice of blaming people for problems or failures.
- Structured, systematic problem-solving approach to fix what's not working well.

It is a way of looking at how we can do our work better

Improvement Methodologies used at RWJ

- Lean
- Lean Six Sigma
- Waste Walk
Lean ...

...the relentless pursuit of the perfect process through waste elimination

Lean: Myth vs. Reality

<table>
<thead>
<tr>
<th>Myth What Lean Is Not</th>
<th>Reality What Lean Is</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Tangible Recipe for Success</td>
<td>A Way of Thinking</td>
</tr>
<tr>
<td>A Management Project or Program</td>
<td>A Total Management Philosophy</td>
</tr>
<tr>
<td>Not just a Set of Tools for Implementation</td>
<td>Focus on Total Customer Satisfaction</td>
</tr>
<tr>
<td>A System for Production Floor Only</td>
<td>An Environment of Teamwork and Improvement</td>
</tr>
<tr>
<td>Can implement in a Short or Mid-term Period</td>
<td>A Never Ending Search for a Better Way</td>
</tr>
<tr>
<td>Quality Built in Process</td>
<td>Organized, Disciplined Workplace</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Evolutionary</td>
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</tbody>
</table>
What is Lean?

• Increasing customer value by eliminating waste throughout the value stream*

We Spend 75-95% of Our Time Doing Things That Increase Our Costs and Create No Value for the Customer!

* Based on definition in the book Lean Thinking, Womack & Jones, Simon & Schuster

Focus on the Patient

What does the patient need from our process?
How does the patient measure our process?
How would the patient like our process to perform?
What can we do better?
How does the patient view our process?
Patient Experience Equation

\[ \text{Value} = \frac{\text{Quality} + \text{Patient Experience}}{\text{Cost}} \]

How do you define a quality experience?

If the Air Travel Worked Like Health Care
Value and Waste in Healthcare

- **Value**
- **Minimize**
- **Improve**
- **Eliminate**

**Activity**

- What is waste?
  - Give examples of waste in the EMS service
Benefits of Lean

Any process or value stream

Before

After

Lean attacks inefficiencies here

Higher customer satisfaction
- Reduced cycles
- Better delivery
- More capacity
- Better quality
- Productivity

Examples of Where Lean is Used

Flow of materials, products, etc.
- Dispatch
- Materials Management and Make Ready,
- Clinical

Flow of Patients
- MCI
- ED Triage

Flow of Information
- Dispatch
- ePCR
- Billing

Spatial Planning
- Dispatch
- Ambulance
- HPCPR

Lean methods can be applied effectively in any environment dependent on people and processes
There are 7 Types of Waste

- Waiting
- Inventory
- Defects
- Extra Processing
- Transportation
- Overproduction
- Motion

Why identify and Eliminate Waste?

- Improve patient care and safety
- Reduce cost
- Reduce wait time between processes
- Improve productivity
- Improve quality
- Make the agency more competitive
- Encourage teamwork and staff involvement
- Improve staff satisfaction
Waste - *Waiting*

- Waiting for anything, be it people, equipment, signatures, supplies or information.

**Typical causes:**
- Idle time due to lack of standard operations
- Waiting for decisions (dispositions, inspections, materials, etc.)
- Waiting for shared equipment
- Work flow not level or planned for

*Eliminate waiting. Create smooth flow.*

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*Waiting - Examples are:*

Waiting for a bed at the Emergency Department
Excessive signatures or approvals

What are some of examples of *waiting* in your agency?
Waste - *Inventory*

Excess stock, work piles, and supplies. Inventory in the value stream is non-value-added.

**Typical causes:**
- Push production
- Over-ordering
- Too many shelves
- Too much floor space
- “Just-in-case” inventory

Inventory hides problems.

*Inventory – Examples are:*

Supply cache - ambulance
Insufficient cross-training of staff

What are some examples of *inventory* waste in your agency?
**Waste - Defects**

Mistakes, work that requires extra processing to correct the mistake; excessively checking work

**Typical causes:**
- Variation in processes, non-standardized work
- Collecting unnecessary inspection data
- Poor information
- Poor communication
- Lack of cross-training

*The worst form of waste. Results in rework.*

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**Defect – Examples are:**

Re-reporting (i.e. Trauma Team)
Medication errors
Wrong patient information
Missing information
How about your agency?
Waste - *Extra Processing*

Putting more work or effort into things that a patient, physician, healthcare provider, etc does not want or ask for

**Typical causes:**
- Work is not standardized
- Tasks/steps are not coordinated between individuals
- Operations are not understood
- Non-value added steps

*Eliminate excess work!*

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*Extra Processing – Examples are:*

Blood tubes

Requesting and processing information that will never be used

What are some examples of *extra processing* from your agency?
**Waste - *Transportation***

Excess movement of work, products, information or patients that does not add value

**Typical causes:**
- Unnecessary inventory
- Poor layout
- Poor scheduling or planning
- Excess materials
- Lack of automation
- Excessive record retention

**Movement does not equal work!**

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**Transportation – Examples are:**

Moving a patient from one side of the Emergency Department and then to the other side.

Improper posting plan.

What are some examples of *transportation* in your agency?
**Waste - Over-Production**

Unnecessary service; providing a service prior to it being required or requested. Production of items beyond what is needed for immediate use.

**Typical causes:**
- Production schedules & push production
- Cost justification for expensive equipment
- Working on the wrong parts at the wrong time
- Poor quality
- Excess paperwork

*Overproduction creates inventory. Inventory needs to be managed.*

**Overproduction – Examples are:**

Entering repetitive information on documents or forms
  - CAD/ePCR interface

What are some examples of *overproduction* in your agency?
Waste - *Motion*

Any excess movement of people, equipment, paper information, or electronic exchanges (e-mails)

Typical causes:
- Poor equipment or office layout
- Materials are in storage
- Work supplies or equipment not where work occurs

Minimize wasteful movements. Movement ≠ work

*Motion – Examples are:*

Communications Center Layout

What are some examples of *motion* from your agency?
Lean as a Philosophy

Create And Standardize Operating Mechanisms

BELIEFS
- Follow Standard
- Stop on Defect
- Solve Problem

THINKING
- Self Continuous Improvement

Lean is not BORN from WHAT we SEE
Lean is BORN from HOW we THINK

What kind of socks does a pirate wear?

AARRRRGGGHyle!
Lean Tools

Lean Toolkit - Improvement methodologies

**Process Stabilization** - 5S + 1

**Visual Management** – VSM, e/white boards, signaling devices.

**Process Analysis** – Time Value Analysis/Circle of Work

**Motion Analysis** – Spaghetti Mapping,

**Standardization** – Standard Work

**Heijunka** – Line Balancing/Work Sequencing

**Just in Time** (JIT) – Flow, Replenishment, Kanban, Water Spiders

**Jidoka** – Mistake proofing, autonomination, electronic systems and informatics

**Kaizen** – Rapid Cycle Improvement
Batching v. First in First Out (FIFO)

- Batching versus Single Piece Processing
- Avoid Batching at all times….
- “Maximized” First In – First Out processing

Process Map: A Mailing Process - Batch
### Process Map: A Mailing Process

**Single Piece Flow**

1. Print One Document
2. Fold All Documents for One Envelope
3. Stuff One Envelope
4. Address One Envelope
5. Stamp One Envelope
6. Seal and Send One Envelope

### Optimizing flow

- Movement of product/transaction down the value stream
- Continuous… any stop or reverse is waste
- Flow reduces processing time and good things happen

- **Time**
- **Quality**
- **Delivery**
- **Cost**
Management by Sight

“Management by Sight” assures that what is “supposed” to happen, “does” happen, on time every time.

• The work area should be:
  – Self-explaining
  – Self-regulating
  – Self-improving
Visual Management

• Prevent and Detect Defects
  – Automobile lights that automatically turn off

Visual Management – EMS Examples

• Monitor - out of range values
• Automated alert in CAD - LVAD
• IV Pump malfunctioning
Visual Controls

- Built in Standards
  - Traffic lights

Visual Displays

- Communicate Information
  - Bulletin Boards
Visual Displays – EMS Examples

- Dynamic Gauges
- Key Performance Indicators
What is 5S?

- A structured process for creating and maintaining an organized, clean, safe and high performance work place.
- The foundation for continuous improvement, like zero defects, cost reduction, and safe work area.
- A system that allows anyone to distinguish between normal and abnormal conditions at a glance.

5S reduces waste

5S: Workplace Organization

The 5S’s are the foundation blocks upon which visual management is established:

- **Sort**: to separate the needed items from the un-needed items which are then removed to a “red-tagged” location
- **Set In Order**: to arrange in a way for how the remaining items will be used
- **Shine**: to maintain the work area for the already sorted and set-in-order items
- **Standardize**: to ensure sort, set-in-order, and shine are consistently followed across all users
- **Sustain**: to maintain and improve sort, set-in-order, shine, and standardize
Spaghetti Diagram (Motion Analysis)

- Focus on area layout
- Used to identify waste of travel and motion
- Keep flow within a process
Awareness Tools

Walk the Process (Gemba – Go to where the work is done)

Observations

Voice of the Customer

Observations

Lean Process Observation Template

1. Date: 1/1/2011 Observation Start Time: 8:00am Observation End Time: 9:00am
2. Department Expert Name: John Smith Title: CCT
3. What process (stream) you are observing: Taking a call
4. What is the Initiation step of process (Step 0): Phone rings
5. High Level Process Flow: Major Process Step
6. Observation Capture – What process (step) is happening:

<table>
<thead>
<tr>
<th>Process Step / Sub Step</th>
<th>Time</th>
<th>Step Time</th>
<th>Value Added</th>
<th>Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Rings</td>
<td>8:00</td>
<td>0.5MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>John Picks up the Phone</td>
<td>8:00:30</td>
<td>5 MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>John puts the patient on hold</td>
<td>8:05:30</td>
<td>0.5 MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>John searches for papers</td>
<td>8:06:00</td>
<td>4 MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>John takes patients off hold</td>
<td>8:10:00</td>
<td>0.5 MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>John answers patient’s question</td>
<td>8:10:30</td>
<td>1.5 MIN</td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
<tr>
<td>Hang up phone</td>
<td>8:12:00</td>
<td></td>
<td>VA / NVA / NVAE</td>
<td>WIDETOM</td>
</tr>
</tbody>
</table>
Voice of the Customer

A process used to capture the requirements or feedback from the customer (internal or external) to provide customers with the best service/product quality.

This process is proactive and constantly innovative to capture the changing requirements of the customer with time.

- Survey/comments
- Patient and family participation in teams
- Interviews

Voice of the Customer

- Interviews
- Patient Surveys
- Other Surveys
- Patient/Family Groups Feedback
- Other Customers: physicians, other agencies, patient families
Why did the pirate go on vacation?

He needed some AARRRRGGHHH and AARRRRGGGHH!
The Project Journey:
Conception – Implementation – Sustainment

- Case Study: Response Times

The Road Map
Scoping

- Current Response Times
- Financial impact of reducing response times
- What is the scope / Who are the team members

30 Day

<table>
<thead>
<tr>
<th>Pre-Scope</th>
<th>30 Days</th>
<th>60 Days</th>
<th>90 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Opportunity</td>
<td>Develop Charter</td>
<td>Develop Improvement Plan (Future State)</td>
<td>Validate improvement measurements, financial impact, balancing measures, employee patient satisfaction scores</td>
</tr>
<tr>
<td>Can Problem Be Substantiated</td>
<td>Stakeholder Analysis</td>
<td>Pilot / Test Improvement</td>
<td>Develop control plan to assure sustain</td>
</tr>
<tr>
<td>Does Data Exist to Investigate Problem (Measurable)</td>
<td>Establish and verify financial metric</td>
<td>Launch Improvement</td>
<td>Develop and implement a process for sustain monitor</td>
</tr>
<tr>
<td>Is Problem Within Control of Hospital and ECM Systems</td>
<td>Develop high-level process map</td>
<td></td>
<td>Transition to process owner and hand off</td>
</tr>
<tr>
<td>Evaluate Financial Impact</td>
<td>Develop Work Plan 30-60-90 Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop Problem Statement and Business Case for Project</td>
<td>Develop a communication plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Develop current state map</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Establish financial baseline</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Validate Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Analyze data for Real Client Analysis</td>
<td></td>
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</tr>
</tbody>
</table>
Problem Statement: Current response times for RWJUH ALS and BLS units are above industry standards (ALS=15.9 and BLS=14.4 :March 2013). Additionally, the TAT measure for “patient arrival to ED” to “unit back in service” is high (32 mins), therefore negatively impacting capacity.

Objectives:
• Improve ALS and BLS TAT times by decreasing the amount of time that a unit is out of service.

<table>
<thead>
<tr>
<th></th>
<th>Baseline (in minutes)</th>
<th>Goal (in minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALS Response</td>
<td>15.9</td>
<td>12</td>
</tr>
<tr>
<td>BLS Response</td>
<td>14.4</td>
<td>9</td>
</tr>
<tr>
<td>Back in Service TAT</td>
<td>32</td>
<td>15</td>
</tr>
</tbody>
</table>

Project Scope Information:
• In Scope: Priority 1 Responses, Units dispatched by Med Central
• Out of Scope: Cancelled calls prior to dispatch
• Process Begin: Call received in Med Central
• Process End: Unit back in service
• Key Milestone:
  • Kickoff June 6, 2013
  • 30 Day check-in
  • Charter
  • 60 Day check-in
  • Improvement/pilot
  • Handoff /Control Plan

Project Charter for: Mobile Health Services (EMS) Response Time

Executive Sponsor: Mike Antoniades
Project Owner: Anthony Cascio
Team Leader: Kamal Singh
PI Facilitator: Niki Irons, John Yanoschak
GB: Achalanka Dalawella
Team Members:
• Danielle Homza
• Paul Mikita
• Kamal Singh
• Jamie Chebra
• Scott Powers

Start Date: June 6, 2013
Planned End Date: July 29, 2013
Baseline (in minutes) Goal (in minutes)
ALS Response 15.9 12
BLS Response 14.4 9
Back in Service TAT 32 15
Current State Map

60 Days – Improvement / Pilot

- Use data from current state to develop improvements
- Pilot and test improvements to see if successful
90 Days – Control / Sustain

• Develop mechanisms to monitor and ensure sustained gains
• Hand off project to process owner

One last pirate joke…

What’s me favorite letter?
One last pirate joke…

Most people think it’s the AARRRRGGHH but it’s really the Sea!

Thank You!