The Lean Hospital: What does it mean?

Kristin Furfari, MD
Outline

• Waste in the US Health Care System
• Lean principles: The Toyota Method
• Application to hospital medicine
• Discharge throughput: A UH example
Disclaimers
Per Capita Health Care Spending (US$PPP)

Source: Organization for Economic Cooperation and Development, OECD Health Data 2002
National Health Expenditures (in billions)

Source: Centers for Medicare & Medicaid Services, Office of the Actuary
(1) Expressed in 1980 dollars; adjusted using the overall Consumer Price Index for Urban Consumers
National Health Care Expenditures as a Percent of GDP

Institute of Medicine Report on Medical Errors

50,000-100,000 deaths annually

950,000 patients injured annually

$15 billion-$30 billion in cost
Care Setting

Emergency Department Care

Surgery and Inpatient Acute Care

Skilled Nursing Care

Home Health Care

Every Hour of Patient Care Requires:

- 1 Hour of Paperwork
- 36 Minutes of Paperwork
- 30 Minutes of Paperwork
- 48 Minutes of Paperwork

Wasted Time for Hospitalists

Percentage Breakdown of Time

- **Direct Patient Care**: 18%
- **Indirect Patient Care**: 69%
- **Professional Development**: (indicated by green)
- **Education**: (indicated by blue)
- **Travel**: (indicated by purple)
- **Personal**: (indicated by light blue)

**University of Colorado Hospital**

*Anschutz Medical Campus*
Waste in healthcare

“The national numbers for waste in healthcare are between 30% and 40% but the reality of what we’ve observed by minute-to-minute observation over the last three years is closer to 60%.... It’s everywhere: patient care and non-patient care alike.”
The Problem

- Too little efficiency
- Too much waste
Toyota Production System

- Largest manufacturer in the world
- Eight times more profitable than the industry average
- Produced 40% of the “most reliable” car models on the market in the last decade
Toyota Production System

• Taiichi Ohno: Father of the TPS
• Developed his ideas from observing:
  The Indianapolis 500
  The River Rouge plant
  American supermarkets
Toyota in Healthcare

• Creating an environment of stability

• Elimination of waste

• Rapid identification and correction of errors
What is Lean Thinking?

• A methodology to produce the highest quality product in the shortest amount of time, at the lowest possible cost by eliminating the “seven wastes.”

• Fosters a culture which encourages all employees to continually look for improvement.
The “Seven Wastes”

- Waste of Overproduction
- Waste of Time (waiting)
- Waste of Product Transport
- Waste in Excess Processing
- Waste in Inventory
- Waste in Movement
- Waste in Producing Defects
The “Seven Wastes”

• Waste of overproduction
  Separate intern, resident, attending, social services rounding cycles
  Entering repetitive information on multiple documents or forms
• Waste of time on hand (waiting)
  Primary team waiting for support services
  Patients waiting to make followup appointment
  Delays for bed assignments
• Waste of processing
  Multiple computer programs to document patient care information
  Ordering more diagnostic tests than the diagnosis warrants
  Retesting
- Waste of stock on hand (inventory)
  
  Duplicate medications and supplies in excess of normal usage
  
  Unnecessary instruments in operating room kits
  
  Obsolete charts, files, equipment, paperwork
• Waste in transportation
  Primary team traveling to different floors to see patients
  Waiting for transportation to arrive to take patient to testing, surgery, discharge
• Waste of movement
  
  Nurses leaving patient rooms for common supplies
  Searching for charts, patients, medications
• Waste of producing defects
  - Iatrogenic illness
  - Medication errors
Understanding Value

• Understand value as defined by our customers
  Patients, families, payers, regulators
  Physicians, nurses, hospitals

High-quality, safe, efficient, appropriate
Understanding Value: Lowry Clinic

- Check in at front desk
- Wait in waiting room
- Walk with nurse to assessment room
- Nurse takes vitals
- Walk to exam room
- Wait for physician
- Physician exam
- Wait for physician to return
- Physician consult and treat
- Wait for nurse follow-up
- Walk to laboratory waiting room
- Wait for labs
- Get labs drawn
- Check out
Payment posted to account

Is there a credit balance?

Is the balance over $1,000?

No

Yes

Print screen

Give to credit analyst

Credit analyst waits for EOB

Run weekly credit balance report (on Monday)

Download to excel

Manipulate excel based on criteria (if 2 adj - reverse if 2 pmts - refund etc.)

Refund appropriate?

Yes

No

Process reverse adjustment

Research (*)

Yes

No

Complete excel form (1 form per refund)

Print excel form

Batch with EOB <$50K per account?

Yes

No

Create batch in HPA (group of 25)

Post transactions

Print batch header

Bundle up EOBs, batch header, excel form

Deliver to A/P

Yes

No

Payment posting

Refund Clerk

A/P

25 refunds?

Supervisor sign-off

Billing Office Manager sign-off

No

Yes

Write vendor# on excel form, key visit, $, date, G/L into Lawson

Vendor in system?

Yes

No

Does batch balance?

Audit batch / fix

Release batch for printing

Checks printed (next day)

Copy of 2nd copy of check made for Billing Office

Audit checks vs. paperwork

Scan checks and paperwork

Checks distributed

- Non Value

- Value Enabling

- Value Add
Toyota Production System

University of Colorado Hospital - To-Be Credit Process Map

Payment posting

Refund Clerk

Vendor in system?

Batch balance?

Audit batch / fix

Release batch for printing

Checks printed (next day)

Copy of 2nd copy of check made for Billing Office

Checks distributed

Billing Office Manager sign-off

Refund appropriate?

NO

YES

Research (*)

Download to excel

Non Value

Value Enabling

Value Add
Process Improvement

Preparation

Current state

Future state

Implementation plan
Kaizen

Kai: “Take Apart”

Zen: “Make Good”
# The Lean Week

## Pre-Lean

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>Identify, map and measure current process</td>
</tr>
</tbody>
</table>

## Lean Week

<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon</td>
<td>Learn tools</td>
</tr>
<tr>
<td>Tues</td>
<td></td>
</tr>
<tr>
<td>Wed</td>
<td>Develop solutions</td>
</tr>
<tr>
<td>Thurs</td>
<td></td>
</tr>
<tr>
<td>Fri</td>
<td>Go-live</td>
</tr>
</tbody>
</table>

## Post-Lean

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor, measure, control, close</td>
</tr>
</tbody>
</table>
Standardization

- Standardization is the basis for continuous improvement and quality
  - Repeatable, stable methods provide a predictable, regular output
  - Creates a safe culture to point out problems and a standard way to fix them
Standard Work

• The technique of achieving consistent performance by creating a consistently applied method of doing a task
• The creation of the method by the people doing the work
• Should lead to continual improvement
University of Colorado Hospital
 PATIENT CARE ORDERS

SUBCUTANEOUS INSULIN: GLARGINE & LISPRO

INDICATED for patients receiving po meals, bolus tube feedings or NPO.
NOT INDICATED for renal patients with creatinine > 3 mg/dL unless contraindicated for patient.

Dispensing by non-proprietary name under dispensing system is permitted, unless checked here: [ ]
Date / / 
Time: 

Attending Physician: [ ] 
UPI #: [ ] 
Note: Admission Order Form must be completed

Ordering Healthcare Provider: GME UPI #: [ ] 
Payer: [ ] 

Condition of Patient: Allergies: 

Primary Diagnosis:
Also Designate: [ ] Diabetes Type 1 OR [ ] Diabetes Type 2 AND [ ] If applicable [ ] DM Uncontrolled (see guidelines)
[ ] Steroid Induced Hyperglycemia [ ] Stress Hyperglycemia [ ] Other/Unspecified

1. ORDER GLARGINE (Lantus®) 
   LONG-ACTING BASAL INSULIN DOSE:
   □ [ ] units Glargine subcutaneously in abdomen at [ ] 0600 daily OR [ ] 2200 daily OR
   □ [ ] Meal weight x 0.2 units x [ ] units Glargine subcutaneous in abdomen at [ ] 0600 daily OR [ ] 2200 daily OR 
   □ [ ] No Glargine dose. Use Replic Acting insulin only. (Patients with Type 1 Diabetes always need basal insulin)
   Total Daily Dose of insulin is best calculated as 50% long acting and 50% rapid acting, for most patients.
   DO NOT MIX GLARGINE IN THE SAME SYRINGE WITH OTHER BULB OR MEDICATIONS

2. ORDER ONE OF THE FOLLOWING CATEGORIES FOR LISPRO (Humalog®) ADMINISTRATION:
   □ Patient eating po meals:
     • Check blood glucose just before meals and at 2200. Send BG to lab if meter reading less than 50 mg/dL or greater than 450 mg/dL, or if clinical picture does not correlate with meter reading.
     • Administer Linspor immediately after meal to assure calories are consumed (approximately 0800-1200-1700)
     • At BREAKFAST, LUNCH, AND DINNER, administer Linspor from the ordered table below for "Receiving Calories"
       ○ If less than ¼ of the meal was consumed, administer Linspor from the ordered table for "No Calories"
       ○ If patient is temporarily NPO (e.g., for a procedure) administer Linspor from the ordered table for "No Calories" for the missed meal.
     • If BG blood glucose > 250 mg/dL, administer HALF the Linspor dose from the ordered table for "No Calories" at 3:00 rounded up to the nearest whole unit as needed.

   □ Patient receiving bolus tube feedings
     □ Every 4 hours OR □ Every 6 hours
     • Check blood glucose before each scheduled tube feeding.
     • Administration Linspor ONLY with the tube feeding, following the ordered table below for "Receiving Calories"

   □ Patient NPO or on clear liquids:
     • Check blood glucose every 6 hours at 2400 - 0600 - 1200 - 1800.
     • Administer Linspor from the ordered table below for "No Calories" at 2400 - 0600 - 1200 - 1800 ONLY.
     • At 2400 administer half the Linspor dose from the ordered table for "No Calories" to avoid nocturnal hypoglycemia. Round up to the nearest whole unit as needed.

3. ORDER RAPID-ACTING INSULIN TAMI®: LISPRO (Humalog®) Subcutaneous injection.

<table>
<thead>
<tr>
<th>Blood Glucose</th>
<th>Insulin Sensitive</th>
<th>Insulin Resistant</th>
<th>Customized</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ ] [ ]</td>
<td>[ ] (BMI &lt; 26 or normal body weight)</td>
<td>[ ] (BMI &gt; 26 or overweight)</td>
<td>[ ] Customized</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E 70</th>
<th>Implanted Hypoglycemic orders</th>
<th>Implanted Hypoglycemic orders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Receiving Calories</td>
<td>No Calories</td>
</tr>
<tr>
<td></td>
<td>71-124</td>
<td>3 units</td>
</tr>
<tr>
<td>125-169</td>
<td>3 units</td>
<td>No insulin</td>
</tr>
<tr>
<td>160-199</td>
<td>4 units</td>
<td>1 unit</td>
</tr>
<tr>
<td>200-239</td>
<td>5 units</td>
<td>2 units</td>
</tr>
<tr>
<td>240-299</td>
<td>6 units</td>
<td>3 units</td>
</tr>
<tr>
<td>300-399</td>
<td>7 units</td>
<td>4 units</td>
</tr>
<tr>
<td>350-399</td>
<td>8 units</td>
<td>5 units</td>
</tr>
<tr>
<td>400</td>
<td>Call MD</td>
<td>Call MD</td>
</tr>
</tbody>
</table>

Physician Signature / Title / GME # / UPI #: [ ] [ ] [ ]
Transcribed by: [ ]
Title: [ ]
Date: [ ]
Time: [ ]

Verified by: [ ]
Title: [ ]
Date: [ ]
Time: [ ]

END 0185246 (2/2015) DOD
Standardization

“Today’s standardization...is the necessary foundation on which tomorrow’s improvements will be based. If you think of standardization as the best you know today but which is to be improved on tomorrow—you get somewhere. But if you think of standards as confining, then progress stops.”

Henry Ford, 1921
Virginia Mason Medical Center

- Ventilator-associated pneumonia
University of Michigan

• PICC lines placed within 24 hours of request:
  – Initially: 50%-70%
  – After Lean: 90%-95%

Overall 36% decrease in average time to placement
12 West Lean Outcome Data
October 2008-April 2009

Percentage of Discharges by 2pm

- Baseline: 22%
- Oct: 44%
- Nov: 42%
- Dec: 29%
- Jan: 50%
- Feb: 54%
- Mar: 72%
- April: 84%
Opportunities

- Identify and reduce waste in the 7E discharge process
- Identify hospital system throughput delays
- Recommend process improvements for hospital-wide discharge process barriers
- Understand how efficiency of the discharge process affects patient satisfaction
Goals

• Reduced time from room empty to room occupied

• Double the percentage “clean to occupied bed time” in less than 60 minutes from 22% to 44%

• Improve daily median discharge time by 1 hour for Monday through Friday discharges

• Create a control plan to monitor and sustain improvements
Baseline Data
Median Discharge Time by Day of Week:
10/1/09-12/31-09
Baseline Data

Clean to Occupied Bed Time:
10/1/09 – 12/31/09

Percentage of Beds That Changed From Clean To Occupied Within 60 Minutes
Patients Admitted From ED

- Oct 09: 26%
- Nov 09: 12%
- Dec 09: 20%
Phase II

• Compare staff interview and observation process maps

• Meet with 7E staff to identify wastes in the process and determine Kaizen events

• Implement solutions

• Monitor data compared to baseline/goals

• Create plan for sustainability of project
References

• Berczuk, C. The Lean Hospital. *The Hospitalist*. 2008; June
Questions?