 DARTMOUTH-HITCHCOCK

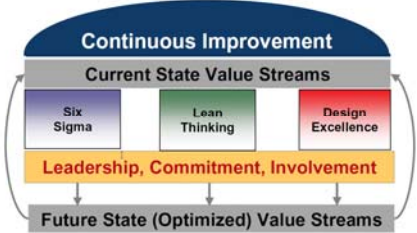
Laboratory LEAN Project
NERCE presentation April 13, 2010
Jonathan P. Park, Ph.D., CG(ASCP)^{CM}

Continuous Improvement

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Background

LEAN in Context




Continuous Improvement

Current State Value Streams

Six Sigma Lean Thinking Design Excellence

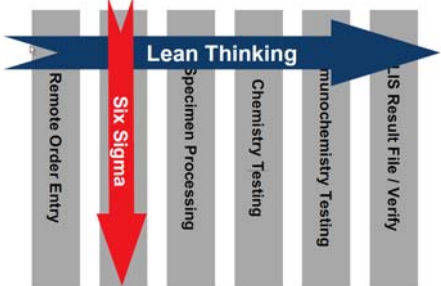
Leadership, Commitment, Involvement

Future State (Optimized) Value Streams

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LEAN vs. Six Sigma



Lean Thinking

Remote Order Entry Specimen Processing Chemistry Testing immunochemistry Testing LIS Result File / Verify

Six Sigma

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Why LEAN?


Challenges in Healthcare

Personnel <ul style="list-style-type: none">• Excessive overtime• High cost of labor• Keeping high potential employees• High turnover, shortages	Performance <ul style="list-style-type: none">• Turn around time• Growing demand• Customer satisfaction• Physician satisfaction• More complex patient issues
Business <ul style="list-style-type: none">• Reimbursements• Litigation• Increasing costs	Facilities <ul style="list-style-type: none">• Space constraints• Out of date buildings• New capital equipment

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DHMC Lab Challenges/Opportunities

- Suboptimal wait/turn around times
- Staff fatigue
 - Overtime/turnover
- Non-standardized work environment
 - Impact on quality, efficiency, supply S, and training
- Quality
 - Unacceptable error rate
- Limited space
 - Safety, ergonomic, efficiency, and image issues
- Increasing job complexities
 - New IS and automation systems
- Increasing workload
 - Historical, current, anticipated

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LEAN is not new.

- The term “lean manufacturing” or “lean production” was first used in 1990
- Taiichi Ohno (Toyota)
- Henry Ford
 - Using “LEAN” concepts in 1913
 - Continuous improvement
 - “Our own attitude is that we are charged with discovering the best way of doing everything, and that we must regard every process employed in manufacturing as purely experimental.”
 - Continuous flow
 - “The key is to keep everything in motion, this is the real principle of our production.”

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LEAN is: (1)

The integration of the Factors of Production

- People
- Materials
- Machines

into carefully arranged and well designed processes in order to provide

- the right products or services
- at the right time
- at the highest quality
- and the lowest possible cost.

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LEAN is: (2)

The creation of continuous flow of

- Product
- Operator
- Information

and the elimination of waste in order to increase the “value-added” portion of the process.


- “value-added” is from the consumer’s perspective
 - Must change fit, form, or function of a product
 - Customer is willing to pay for it
 - Must be done right the first time

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LEAN is: (2 continued)

- “waste” per *The Toyota Production System* can be

- Waste of overproduction
- Waste of waiting
- Waste of transportation
- Waste of over-processing
- Waste of inventory
- Waste of motion
- Waste of defects


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LEAN is: (3)

An empirically-based and systematic approach to solving complex process problems.


Processes for improvement must have

- well defined products, steps, and demarcations (authority/control),
- clearly understood customer's expectations and needs,
- and comprehensive, convenient, and reliable pre- and post-improvement metrics.
 - units per time
 - satisfaction

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Pathology Pilot Areas of Focus

- Pre-analytic
 - Outpatient Phlebotomy (3L)
 - Staff
 - 17 FTE
 - Hours
 - 0700-1900 Weekdays
 - Work Units
 - 275 Patients per day

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Pathology Pilot Areas of Focus


- Pre-analytic
 - CP Specimen Receiving/Processing
 - Staff
 - 13 FTE
 - Hours
 - 0500-2000 Weekdays (pilot)
 - Work Units
 - 1500 Patient Specimen per day

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Project Resources

- 10 Member Lab Team
 - AP, CP, Phlebotomy, Receiving/Processing
 - Representation from practice experts
 - 5 Week full-time effort
 - Training
 - Data collection/analysis
 - Pilot/implementation
 - Monitoring and Adjustment

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Project Resources (cont.)

- Consultants



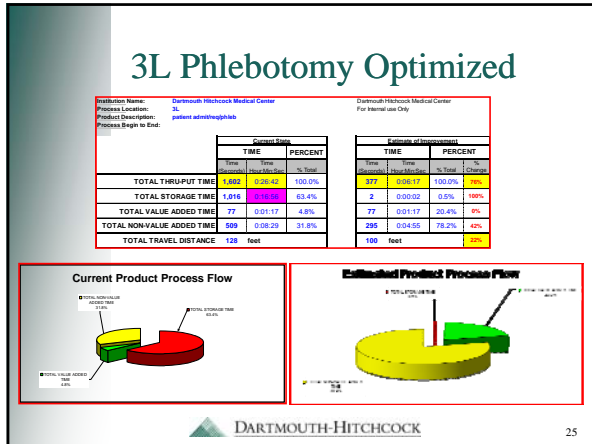
a Johnson & Johnson company

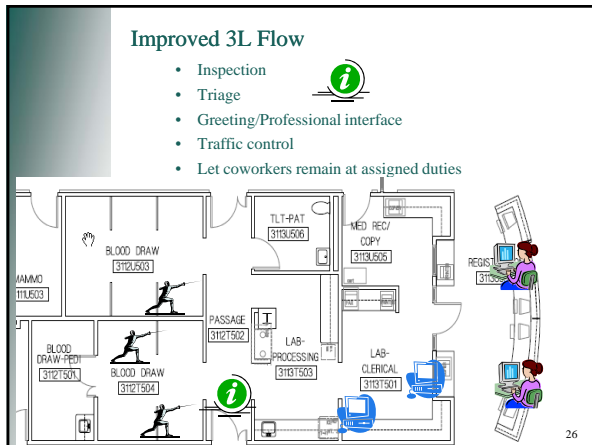
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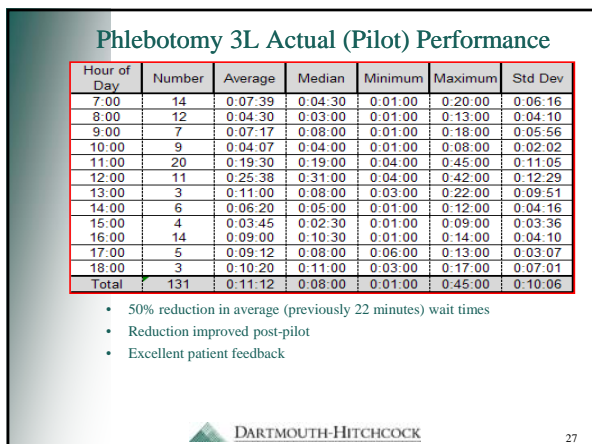
Data Collection

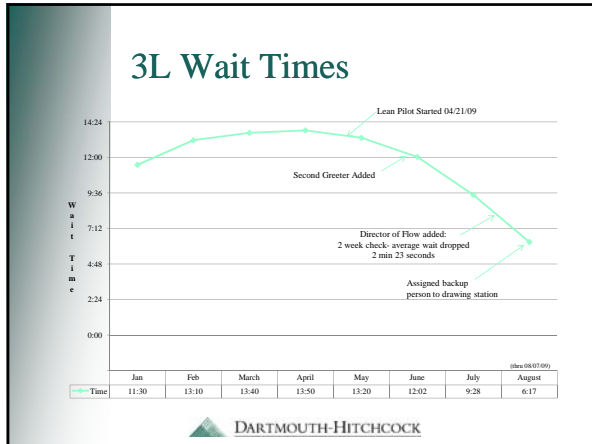
- Staff input throughout process
- Manual counts and timings
- 400 still photographs
- 40 video recordings
 - 22 hours total record
 - All shifts, all areas
 - Follow operator
 - Follow product

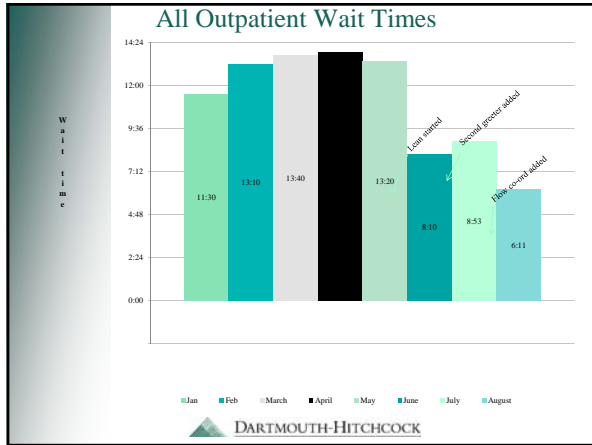
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Post-Lean Scorecard of Performance

10/08 LEVEL 3						
Hour of Day	Number	Average	Median	Minimum	Maximum	Std Dev
5:00	0	N/A				
6:00	3	0:03:00	0:03:00	0:03:00	0:03:00	0:00:00
7:00	23	0:03:31	0:04:00	0:00:00	0:07:00	0:02:04
8:00	24	0:03:13	0:02:00	0:00:00	0:09:00	0:02:58
9:00	29	0:04:00	0:05:00	0:00:00	0:10:00	0:02:26
10:00	21	0:02:51	0:02:00	0:00:00	0:14:00	0:03:10
11:00	17	0:03:00	0:03:00	0:00:00	0:09:00	0:02:34
12:00	19	0:05:08	0:02:00	0:00:00	0:26:00	0:08:18
13:00	20	0:04:51	0:03:00	0:00:00	0:32:00	0:07:08
14:00	24	0:04:13	0:04:30	0:00:00	0:07:00	0:02:31
15:00	23	0:03:29	0:03:00	0:00:00	0:12:00	0:02:48
16:00	24	0:05:10	0:05:30	0:00:00	0:11:00	0:03:10
17:00	8	0:02:23	0:02:30	0:00:00	0:05:00	0:01:41
18:00	2	0:01:00	0:01:00	0:00:00	0:02:00	0:01:25
Total	237	0:03:58	0:03:00	0:00:00	0:32:00	0:04:00

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PathWest/CP Times - Pilot

- Averages

Section	Pre-Lean	Pilot	%
Hematology Collect to Verify	59 mins.	41 mins.	31%
Coagulation Collect to Verify	51 mins.	40 mins.	22%
Chemistry Collect to Verify	68 mins.	58 mins.	14%

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PathWest/CP Comparisons

Section	Pre-Lean	Pilot	Post	%
Hematology Collect to Verify	59 mins.	41 mins.	36 mins.	39%
Coagulation Collect to Verify	51 mins.	40 mins.	39 mins.	24%
Chemistry Collect to Verify	68 mins.	58 mins.	58 mins.	14%

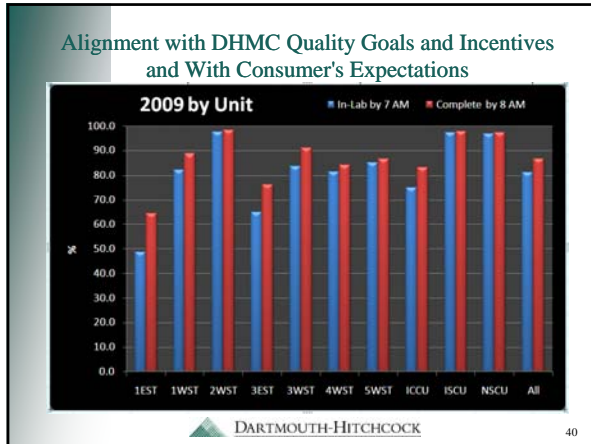
- Pilot efficiencies are improved or sustained
- Improvements (target compliance) greatest for most streamlined analytical platforms
 - Consistent with pre-analytic focus of this study
- Further appreciable improvements likely to require downstream efficiencies

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Sustained TAT Improvement

August 2009 In-Lab to Verify Times

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- ### Observational Payoffs Beyond Process Analysis and Data Collection
- Training
 - Safety
 - Quality
 - Supply chain (\$150,000 per year)
 - Standardization
 - Continued
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- ### Standardization
- Establish and require standard processes and work site in order to:
 - Minimize variation in quality
 - Minimize variation in supply chain
 - Allow interchangeable staffing
 - Standardize/Optimize work site
 - Sort, Set in Order, Shine, Standardize, and Sustain (5S)
 - Remove visual noise (effective communication)
 - Develop and maintain effective inventory control
 - Establish exact standards for training, competency, and performance assessment
- DARTMOUTH-HITCHCOCK 42


Unfinished Business

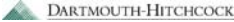
- Quality, consistency of metrics
 - LIS challenges
 - Standardization
- Maintain the gain
 - Watch for drift
 - But also reassess/tweak/optimize
 - Monitor, involve, **manage**
 - Keep measures in front of staff
 - Establish meaningful and timely signals for performance

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Next steps (Kaizen)

Without stable and standardized processes, you cannot have sustainable improvements



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Kaizen successes

- Upstream processes
 - Labeling (interdepartmental)
 - Standardization/accuracy
 - Add-ons (interdepartmental)
 - order reconciliation
 - Inpatient phlebotomy (interdepartmental)
 - Level loading/standardization
 - Outpatient phlebotomy (interdepartmental)
 - Resource allocation

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Kaizen successes

- Downstream processes
 - Automation workgroup (intradepartmental)
 - >20 issues resolved
 - Handoffs
 - Communication
 - Jurisdictional issues
 - Resource allocation
 - Effective continuous flow through analysis
 - Chemistry
 - Hematology


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Ongoing and imminent next steps

- Microbiology specimen processing LEAN review
- Inventory control/Supply Chain (Summer, 2009)
 - Phlebotomy, anatomic pathology, microbiology
- Evaluation of adjacent processes
 - Intradepartmental
 - eg. Analytical/automation
 - hours of service/maintenance schedules
 - Extradepartmental
 - eg. registration/engineering/clinics/units/EMR/outreach
 - Pneumatic tube task force
- Assessment of major laboratory sections
 - Feasibility - Return on Investment (Fall, 2009)
 - Chemistry, Hematology, Gross Lab, Cytology, Path Sign out
- Apply LEAN concepts as a filter for future initiatives

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