Sustaining Lean in Pathology and Laboratory Medicine Across the Health System: Lessons from Year 6 of The Henry Ford Production System

“Quality is doing it right when no one is looking.” -Henry Ford

Richard J Zarbo MD, Pathology & Laboratory Medicine, Henry Ford Health System, Detroit

LESSONS

Lesson #1

*It takes systems to integrate systems*

Lesson #2

*Systems don’t produce quality, people do!*
The Henry Ford Production System

* Henry Ford’s Vision
* Deming’s management
* Toyota’s worker empowered continuous improvement culture

Management System
Toyota in the House of Ford

Toyota Culture

“The process improvement tools and techniques, while important, are not the key for successfully transitioning from conventional manufacturing to LEAN manufacturing. The key is the culture – that supports and stimulates continuous growth and improvement.”

(J. Womack)
Organizational Culture

Toyota Production System

Stability of Manufacturing Processes

Philosophy
1. Customer first
2. People are the most valuable resource
3. Kaizen (continuous improvement)
4. Shop floor focus

....An Integrated System

LEAN = Deming (perfected by)
Deming Management

- Quality focus - customer requirements
- Quality control
- Measurement (Shewhart-Deming cycle PDCA)
- Knowledge of variation, process stability
- Value of worker, PDCA at worker level
- New focus and role of the leader/manager
- Continuous improvement
- Long term plan

DEMING’S 14 POINTS

CREATE CULTURE
Deming’s Way
14 Points for Management

1. Create constancy of purpose for improvement - customer focus
2. Adopt the new philosophy
3. Cease dependence on mass production
4. End the practice of awarding business on price alone
5. Constantly & forever improve systems of production & services
6. Institute modern methods of training on the job
7. Institute modern methods of supervision & leadership
8. Drive out fear
9. Break down barriers between departments
10. Eliminate numerical goals for workforce
11. Eliminate work standards & numerical quotas
12. Remove barriers to pride of workmanship
13. Institute a vigorous program of education & training for everyone
14. Create a structure in top management that will push every day on the above 13 points

LEAN = Management System
Results as Lean Evolves to Aligned Continuous Improvement

**With Philosophy**

**Without Philosophy**

I. Apply Tools
II. Management Led Lean
III. Aligned Continuous Improvement

**Maturity in Integrating Lean and Business Strategy**

From *The Toyota Way to Continuous Improvement* by Liker & Franz

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**Philosophy**

Henry Ford Production System
Philosophy That Promotes People

HENRY FORD PRODUCTION SYSTEM

VALUE
Quality, Cost, Time

The Henry Ford Way

- Respect for People
- Continuous Improvement

Management System
Human Development
Technical Tools
Quality Philosophy

Each patient & customer first
Motivated & trusted people solving problems in empowered teams
Continuous improvement from the level of the work
Assume nothing Go and see!
Never pass a defect

Stability

One Vision, Mission, Values

HENRY FORD PRODUCTION SYSTEM

- Best in Class
  - Every Life Deserves World-Class Laboratory Service
- Culture of continuous improvement
  - Relentlessly Pursuing Perfection
- Culture of worker empowerment for change
  - Never Pass a Defect
- Deming management principles
  - Our People Are Our Experts & Most Valuable Asset
- Lean work rules & principles
  - Variation and Poor Communication Are Our Enemies
“Relentlessly Pursuing Perfection”

Delivery of products & services should pursue the Ideal Target

Product or service that is produced

- **Defect Free** (goal is zero, meets customer expectation)
- **On demand** (supplied when you want it, in right version)
- **Delivered immediately** (now, no waiting)
- **One at a time** (single piece flow, batch size of 1)
- **Continuous flow** (no batches, queues)
- **No waste** (materials, labor, energy, other resources)
- **Safely for every employee**
  - Physically, emotionally, professionally

Macro Organizational System
Disparate Cultures of Henry Ford Labs

HENRY FORD HEALTH SYSTEM
Pathology & Laboratory Medicine
Service Line of Integrated Labs
Hub & Spoke Delivery Model

- 12 million tests/yr
- 780 staff supporting
- 5 Acute care hospitals
- 9 ERs
- 30 Clinics

Chimneys of Control

Vertical Management
Integration

- ONE leadership group
- ONE employed professional group
- Information systems
- Technical teams/Core support divisions
- Salary & contracts
- Position management, staffing
- Recruitment
- Test methods, contracts, supplies
- Testing sites
- Capital priority & approval
- Purchase & acquisitions
- Quality & service standards
- Policies & procedures
- ONE quality management plan
- Safety, education & competency

Horizontal Management

Central Core Labs, Pathology specialty expertise, oversight & shared resources
Dismantling Chimneys

One Group of 42 Senior Professional Staff

TURN-AROUND TIME (TAT)
Emergency Room TAT
CBC, Troponin, Lyte-7, PT, PTT

STAT TEST TAT
Chem, Heme, Coag, Urinalysis

CAP ACCREDITATION REQUIRED

FINANCIAL

Critical Value Reporting
Customer & Staff Satisfaction
Blood Culture Contamination
Cytology PAP Smear TAT
Cytology Non-Gyn TAT
Surgical Path TAT
Frozen Section TAT
Blood/Product Wastage

Henry Ford Production System
System Integration

The Henry Ford Way

Horizontal Integration & Management
Culture of Continuous Improvement
Engagement Everywhere by Workforce

INTEGRATE ONE SYSTEM OF CONTINUOUS IMPROVEMENT
Common, Continuous Problem Solving Culture

“Most people spend more time and energy going around problems than in trying to solve them.”

-Henry Ford

Henry Ford Production System

Lean
Empowered Workers
Transformed Culture
Continuous bottom up

Right
Management Style
Sporadic Kaizen Events

Management Style
Direct Top-down

Concepts & Tools
Partial Adoption

Passing Fad
“Let’s Outlast This Thing”

Light
SUCCESS
Degree of effort

Henry Ford Production System
Micro Organizational System

SPREADING CHANGE
Henry Ford Laboratories 2005-2011
Deep Lean Progression

- Lean Specialist
- Mandatory 8 hr Lean Education
- 2 Day Lean Training
- WBM hospital
- MAC hospital
- WAR hospital
- WYN hospital

Henry Ford Hospital
Hospital core and specialty laboratories

- Surgical
- Core Labs
- Lab support
- 26 Med Cnrs
- Immuno
- Cytology
- Microbiology
- Blood Bank

Quality Culture “Model Line”
Transformation Process

- Define vision, mission, values
- Deming management principles
- Toyota work rules & principles
- Create organizational structure for authorized change
- Identify group & team leaders by workstations
- Align in path of workflow for horizontal management

LEADER STRATEGY & MANAGEMENT DIRECTIVE

Physician, Administrator & Leaders 2-day Training by Department or Division or Value Stream

WORKER EMPOWERMENT

Team Member 1-day Training by Division or Department or Value Stream in close proximity to the “kick-off”

LEARN BY DOING

Establish reinforcing structures, leader & worker meetings, work station white boards, begin team bonding and problem solving, Initial 5S, defect & waste identification, rapid fix wins
A3 based process improvements, internal customer-supplier meetings, include external ‘suppliers’, employee recognition, ‘Share the Gain’ Meetings

SUSTAINING METRICS

Develop weekly & daily performance metrics & variation indicators

SYSTEMATIZE

Service Line or Hospital Implementation

HENRY FORD PRODUCTION SYSTEM

Continuous improvement & Learnings
In companies that have embraced Deming’s vision, management’s job is to ‘work on the system’ to achieve continual product and process improvement.

The Deming-style manager must—

- ensure a system’s consistency and reliability, by bringing level of variation in its operations within predictable limits, then by identifying opportunities for improvement, by enlisting the participation of every employee, and by giving subordinates the practical benefit of his experience and the help they need to chart improvement strategies.”

(A. Gabor)
STRUCTURE THAT SUPPORTS PEOPLE

QUALITY SYSTEM STRUCTURE
ORGANIZATION CHART
For Worker Driven Continuous Improvement

How is change authorized and made?

Find Your Role

Group Leader
Team Leader
Shared members
Workcell 1
Silo 1
Customer-Supplier Interaction

Group Leader
Team Leader
Workcell 2
Silo 2

Group Leader
Team Leader
Workcell 3
Silo 2

Group Leader
Team Leader
Workcell 4
Silo 3

Group Leader
Team Leader
Workcell 5
Silo 3

Work Product
EXPECTATION OF WORKERS

Redefine the Expectation of “Work”

Never Accept, Make or Pass a Defect

“It’s the work, not the man that manages.”
-Henry Ford
The Engaged Worker

Transform approach to work
- Not just showing up for work, but arriving to do the work better

Empowered workers who see their daily work in the context of-
- Continually learning
- Constantly communicating
- Making effective process improvements
- Designed and tested by scientific method

Empowered Personnel, Correcting One’s Own Errors, Accountable For Solving Problems in Teams & Creating Standard Work

EXPOSE DEFECTS
VISUAL WORKPLACE
BLAMELESS CULTURE
Visual Workplace “No Problem is a Problem”

<table>
<thead>
<tr>
<th>7 Wastes</th>
<th>5 Why's</th>
<th>4 Work Rules</th>
<th>Process</th>
<th>Leader</th>
</tr>
</thead>
</table>

Capture Daily Defects

1. Wrong patient identification
2. Ran out of gloves - size medium
3. Not enough specimen collected for lab test

Daily Resolution of Defects

- Rapid (Defects corrected on the spot)
- A3 (PDCA analysis and customer-supplier involvement)

Communication & Education

All shifts
(New policy, standard work, hours, competency, quality tool)

SYSTEMATIC PROCESS to FIX DEFECTS
The Process of Process Improvement

HENRY FORD PRODUCTION SYSTEM

Identify Defect

Share the Gain Learnings
policy, procedure, document control

Standard Work, Connections, Pathways

Team Leader Facilitation

Customer-Supplier Communication at level of work

Ongoing PDCA Resolution

PDCA-A3 Resolution

Daily Resolution

Rapid Fix

HENRY FORD PRODUCTION SYSTEM

SYSTEMATIC WORK RULES FROM TPS
Standardization is the Cure
-Observe & Reinforce-
Systematic Work Rules

Variation is the *Enemy* of Quality

1. Activities
2. Connections
3. Pathways
4. Method of Improvement

“Today’s standardization, instead of being a barricade against improvement, is the necessary foundation on which tomorrow’s improvement will be based.”

— Henry Ford


WORKER KAIZEN SOLUTIONS
Continual Improvements Toward Goal

<table>
<thead>
<tr>
<th>% BNP</th>
<th>TATs &lt; 45'</th>
<th>TATs &lt; 60'</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>79</td>
<td>80</td>
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<tr>
<td>Red Rack</td>
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<td>84</td>
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<td>Autovalidation</td>
<td>85</td>
<td>84</td>
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<tr>
<td>Rocker Recliner</td>
<td>91</td>
<td>84</td>
</tr>
<tr>
<td>Unique Tubing</td>
<td>95</td>
<td>84</td>
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BNP: B-natriuretic peptide

Repetitive PDCA Cycles

LEVERAGING PRODUCTIVITY OF TEAMS
TEAMWORK OUTCOME

Total Process Improvements
Pathology & Laboratory Medicine Service Line

<table>
<thead>
<tr>
<th>Year</th>
<th>HFH</th>
<th>Empowered Work Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>536</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>1128</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>1392</td>
<td>3 hospitals</td>
</tr>
<tr>
<td>2011</td>
<td>900</td>
<td>4 hospitals</td>
</tr>
</tbody>
</table>

2011 3 quarters
Hoshin Kanri Management Model

- Hoshin Kanri - the 'What is'
- TQM - the 'How to'

Policy Control (PDCA)
Feedback of results of improvement activities

Policy Development
Development of KPIs & Business-wide Program

Total Quality
Gap analysis & project by project improvement deployed to all levels

Policy Deployment
KPIs redefined & cascaded to all levels

Long Range Strategic Planning

<table>
<thead>
<tr>
<th>Service Line Need</th>
<th>HFH</th>
<th>HFMG</th>
<th>WBLM</th>
<th>MAC WAR</th>
<th>WYAN Brownstown</th>
<th>MAC CL TWP</th>
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<tbody>
<tr>
<td>Stat Labs</td>
<td>9</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<td>Blood Banks</td>
<td>6</td>
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<td>1</td>
<td>1</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Hoshin Strategic Planning

Implementation Teams
- LTO/Managers
- Technical Teams
- Task Forces
- Quality Teams

Executive Leadership
- Office of the Chair

Senior & Middle Leadership
- Hospital Chiefs & Lab Administrators
- Core Lab Division Heads
- Lab Technical Operations (LTO) Managers

Hoshin Plan
- Strategies
- Tactics
- Resources

Action Schedule

Vision Objectives

Goals

Review

Measures

Sustaining Systems
Tactics That Sustain a New Work Culture

- **GOAL SETTING**
  - Hoshin kanri strategic planning and goal setting
  - Quality goals identified, prioritized & pushed to level of worker

- **PEOPLE ROLES & RESPONSIBILITIES**
  - Identified workstation teams and leaders
  - Employees in charge of own jobs, design standardized work

- **METRICS**
  - Expect metrics of reliability & consistency in each workstation

- **COLLABORATION CULTURE**
  - Promote horizontal cooperation, customer-supplier, team focus

- **MANDATORY EDUCATION & RE-EDUCATION**
  - Include competency assessment in CQI for all workers

- **LEADER FACILITATED MEETINGS**
  - Expect routine leader & worker meetings, no exceptions

- **PERSONAL ACCOUNTABILITY FOR PROGRESS**
  - Visual trackers of daily defects and improvements
  - Monthly worker presentations of their improvements
  - Performance evaluations leaders & workers, include behaviors

- **PUBLIC PRESENTATION & RECOGNITION EVENTS**

CULTURE SUCCESS
**Employee Engagement**

<table>
<thead>
<tr>
<th>Question</th>
<th>2010</th>
<th>2008</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall satisfaction</td>
<td>4.46</td>
<td>3.56</td>
<td>0.90</td>
</tr>
<tr>
<td>I know what is expected of me at work</td>
<td>4.75</td>
<td>4.56</td>
<td>0.19</td>
</tr>
<tr>
<td>I have the materials &amp; equipment I need to do my work right</td>
<td>4.55</td>
<td>4.11</td>
<td>0.44</td>
</tr>
<tr>
<td>At work I have the opportunity to do what I do best everyday</td>
<td>4.45</td>
<td>3.74</td>
<td>0.71</td>
</tr>
<tr>
<td>In the last 7 days, I have received recognition or praise for doing good work</td>
<td>4.05</td>
<td>2.81</td>
<td>1.24</td>
</tr>
<tr>
<td>My supervisor or someone at work, seems to care about me as a person</td>
<td>4.33</td>
<td>3.81</td>
<td>0.52</td>
</tr>
<tr>
<td>There is someone at work who encourages my development</td>
<td>4.30</td>
<td>3.56</td>
<td>0.74</td>
</tr>
<tr>
<td>At work, my opinions seem to count</td>
<td>4.15</td>
<td>3.41</td>
<td>0.74</td>
</tr>
<tr>
<td>The mission or purpose of my company makes me feel my job is important</td>
<td>4.73</td>
<td>4.19</td>
<td>0.54</td>
</tr>
<tr>
<td>My associates or fellow employees are committed to doing quality work</td>
<td>4.36</td>
<td>3.65</td>
<td>0.71</td>
</tr>
<tr>
<td>I have a best friend at work</td>
<td>4.43</td>
<td>3.41</td>
<td>1.02</td>
</tr>
<tr>
<td>In the last 6 months, someone at work has talked to me about my progress</td>
<td>4.41</td>
<td>3.56</td>
<td>0.85</td>
</tr>
</tbody>
</table>

**Overall Cost Improvement**

- 4 acute care hospitals and 26 regional medical centers
- Total Operating Expense
- Cost per Unit of All Service

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Operating Expense</th>
<th>Cost per Unit of All Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$7.72</td>
<td>$7.30</td>
</tr>
<tr>
<td>2009</td>
<td>$7.30</td>
<td>$7.50</td>
</tr>
<tr>
<td>2010</td>
<td>$7.30</td>
<td>$7.50</td>
</tr>
</tbody>
</table>

Stable salaries, increases in blood products & referred tests. Outreach expenses added to each site without revenues. Opened 4 new medical center laboratories. Increased professional staff.
The real challenge is to expand beyond understanding Lean as a set of tools, and more aggressively pursuing an understanding of the comprehensive approach to managing organizations so they are capable of self-diagnosis, learning, and relentless internally generated improvement and innovation.

- Steven Spear 2010

As Leader, this is your JOB #1

"Our system of management is not a system at all; it consists of planning the methods of doing the work as well as the work." - Henry Ford
Lean Deployment Phase I – Applying & Teaching Tools

Characteristics:
• Beginning of Lean Activity
• Focus on teaching and using the tools
• Activity is “Event” based (e.g., kaizen events) or “Project” based (e.g., kaikaku)
• Activity is lean “expert” driven and directed (External)
• Focus: Fix processes to demonstrate results

Warning: This phase by itself is not self sustaining. Entropy Will Set in Degrading to a Lean Facade!

Modified version of figure by David Meier. From The Toyota Way to Continuous Improvement by Liker & Franz
Lean Deployment Phase II – Management-Led Lean

Characteristics:
• Local ownership of lean by managers of the core operations
• Evidence of lean thinking in middle management
• Periodic adjustment by middle and senior management (with staff expert support)
• Activity Driven by local leader (takes responsibility)
• Focus: Involve Middle Managers in Improvement

Warning: Management Led Lean can arrest entropy, but expect episodic improvement

Modified version of figure by David Meier. From The Toyota Way to Continuous Improvement by Liker & Franz

Lean Deployment Phase III – Aligned Continuous Improvement

Characteristics:
• Local ownership of lean by team members and leaders
• Clear evidence of lean thinking in work groups
• Activity is continuous (team & individual focus)
• Activity is aligned with business goals (hoshin kanri)
• Leadership chain responsible for kaizen & coach kaizen
• Focus: Achieve business goals while building Continuous improvement culture top to bottom

Warning: This is an ideal vision you will never fully achieve and requires a life-long commitment!

Modified version of figure by David Meier. From The Toyota Way to Continuous Improvement by Liker & Franz
Creating the HFPS Lean Enterprise

Keys to Success
- **Vision**
  - Top down & bottom up pursuit zero defects
- **Philosophy & Management System**
  - Continuous improvement, customer & shop floor focus, people development & empowerment
- **Leaders own it or fail**
- **Structure for team-driven change**
- **Education and more education**
- **Metrics**
- **Meetings, all levels**
- **Aligned strategies and priorities**
- **Reinforcers**

Future

“If everyone is moving forward together, then success takes care of itself.”
- Henry Ford

“Learning is not compulsory, neither is survival”
- W. Edwards Deming

www.HenryFord.com/pathology
www.HenryFord.com/pathology

- Henry Ford Production System
- 2 day LEAN Training Courses
- 14 hours CME
  - Nov 11-12, 2011
  - Feb 16-17, 2012
  - April 11-12
  - June 21-22
  - Aug 2-3
  - Oct 11-12

We know from the changes that have already been brought about that far greater changes are to come, and that therefore we are not performing a single operation as well as it ought to be performed. — Henry Ford

LEAN = a different way of working
References


Transforming to a Quality Culture
The Henry Ford Production System
Richard J Zarbo, MD, DMD, and Rita D’Angelo, MS, ASQ, CQE, SSBB
American Journal of Clinical Pathology 2006;126:Suppl S21-S29