Living the Future of Lab Testing Today:
How Henry Ford Health’s Clinical Labs and Pathology Department are Delivering More Value to Clinicians and Patients

Richard Zarbo, MD, DMD
2016 Lab Quality Confab
New Orleans, LA October 18, 2016
“An important obstacle to continuous process improvement is the supposition that improvement of quality and productivity is accomplished suddenly by affirmation of faith.”

W. Edwards Deming
The “New Religion”

"Opportunity is missed by most people because it comes dressed in overalls and looks like work."

“There are no rules around here- we are trying to accomplish something”

Thomas Edison
Key to achieving world class expertise—practicing a specific task the correct way, for a total of **10,000 hours**
or 20 hours of work a week for **10 years**
Deming Influence

W. Edwards Deming
Out of the Crisis

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"It’s the work, not the man that manages."

"The business of management is to manage. The thing to be managed is the work."

Henry Ford
Progression of Integrated Business Systems to Support Lean & ISO Quality Culture

- **2005** CLIA’ 88: Federally mandated laboratory quality standards
- **2006** LEAN
- **2007-2010** Systematize: Educate & Train LEAN System-wide & Focus on Metrics
- **2010-2013** Systematize: Build System-wide ISO Education, Systems & Electronic Document Standardization
- **2013-2015** Systematize: Daily Management System, Deviation Management System, Internal Audit System
- **2015-2017** Aligned Goals: Policy Deployment, Strategic Planning

- ISO 15189: Voluntary quality accreditation
- Deming Management: Toyota Production System, Henry Ford focus on efficiency & waste elimination

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“A bad system will beat a good person every time.”

W. Edwards Deming
Focus on Quality Management System

Leadership defined organizational structure, procedures, processes and resources created to **systematically** implement quality management with intent to:

• Serve as the system to **proactively achieve total quality management** in all aspects of laboratory practice

• **Manage and monitor activities** to address quality standards

• **Build quality** into the laboratory's processes

• Provide **ongoing assessment** of laboratory performance

• Implement **continuous quality improvements**

• **Consistently achieve** organizational **quality goals**
In short- a framework of processes and procedures structured to:

Ensure that people do the right and expected thing in performing tasks consistently

1. Fulfill customer expectations

2. Fulfill regulatory expectations

3. Continually seek improvement
Michel’s Value Pyramid

- **World-class by benchmark**
- **Restless innovation and improvement**
- **Customer Value Focus**
- **Deliver value outside lab as perceived by stakeholders**
- **Standardization, Waste Reduction, Problem Solving**
- **Lean/ISO Continuous Improvement Culture**
- **Regulatory Standards**
- **Quality Control & Assurance Culture**
LEVEL 1

Achieve normalcy & predicatability

Basic Accreditation

Regulatory Standards

Quality Control & Assurance Culture
Ground Floor View

“The only things that evolve by themselves in an organization are disorder, friction and malperformance”

Peter F. Drucker
LEVEL 2

Establish & meet standards of value

Lean/ISO

Standardization, Waste Reduction, Problem Solving

Lean/ISO Continuous Improvement Culture

Basic Accreditation
Transformation Begins Here

“Quality starts in the Boardroom”

W. Edwards Deming
Improvement by Strategic Plan

Leadership
Policy Deployment
Strategic Planning

Executive Office

Goal = Culture Change

Manager
Supervisor

Staff

PDCA Problem Solving

Daily Management

Gemba

Plan Do Check Act

0% Lean Goal Achievement 100%
Lean with ISO 15189

Pathology and Laboratory Medicine
Henry Ford Health System

Henry Ford Production System

Lean Culture
Respect for People
Continuous Improvement
Individual Accountability
Standardization

Employee Empowerment & Engagement

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Lean with ISO 15189

Pathology and Laboratory Medicine
Henry Ford Health System

Henry Ford Production System

Lean Culture
- Respect for People
- Continuous Improvement
- Individual Accountability
- Standardization

ISO Culture
- Develop Leadership
- Disciplined Management
- Management Systems
- Consistent Execution

Employee Empowerment & Engagement
Henry Ford Production System
Integrated Systems Achieve Culture of Continuous Improvement

1. Tools of Improvement
   - Standard Work, Connections, Pathways
   - 5S
   - Visual workplace
   - Continuous flow
   - Pull production
   - Kanban
   - Just in Time
   - Load leveling
   - Batch size
   - Mistake proof

2. Cultural Philosophy
   - Customer 1st
   - Continually develop your most valuable resource, your PEOPLE
   - Continuous improvement
   - From the level of the work
   - Blameless management

3. Management SubSystems
   - Hoshin Planning/Policy deployment
   - Team leader system
   - Improvement management- PDCA (kata)
   - Coaching and human development (kata)
   - Deviation management
   - Daily management
   - Document management
   - Audit system
   - Management review system
   - Quality Management System
“To successfully respond to the myriad of changes that shake the world, transformation into a new style of management is required.

The route to take is what I call profound knowledge - knowledge for leadership of transformation.”

W. Edwards Deming
HFPS Key Cultural Principles

• Lead with *Humility*
• Respect every individual
• Develop people to be proactive (action plans) and reactive (problem solving)
• Empower and engage everyone
• Integrate improvement with work in a blame-free culture
• Assure quality at the source - never accept, make or pass a defect
• Rely on data and facts and direct observation, not opinion
• Standardize and stabilize processes
• Assure a safe work environment
• Relentlessly seek perfection
"If you can’t describe what you are doing as a process, you don’t know what you are doing."

W. Edwards Deming
The HFPS Way Forward

• Lean continuous improvement begins with leadership and is owned by managers
• Engage and empower your people to solve problems at the level of the work
• Reduce work variation & waste by standardizing activities, connections and pathways
• Rely on organizational structure and management subsystems to drive continuous change
• Form core teams with strong team leaders and members along the path of workflow
• Break down barriers between silos of control so improvements can occur horizontally
• Foster regular customer-supplier communications within and between work cells
• Integrate people, process, tools, and technology that support the new manner of work
• Implement visual management, with posted daily metrics of value for each work unit reflecting opportunities for change or stability of the process
• Leverage PDCA way of thinking as the operational engine of continual improvement
People Waste

“The greatest waste in America is failure to use the abilities of people.”

W. Edwards Deming
Toyota’s “Lean” Production System

Value
High Quality, Low Cost, Shorten Time

The System

Just-in-Time
Pull System
Produce What is Needed, When Needed, in Quantity Needed
One Piece Flow
Continuous Flow
Eliminate Man, Machine, Material, Method Problems Impacting Flow

Build in Quality (Jidoka)
Stop & Notify Abnormalities
Immediate Quality Feedback
Defects Visible at Source
Call for Help. Quick Action to Fix
Countermeasures to Not Pass Defect
More Effective Use Human Resources

The People

Production Leveling (Heijunka)

Standard Work

Continuous Improvement (Kaizen PDCA Cycles)

Stability
“In God we trust.
All others bring data.”

W. Edwards Deming
Why so difficult?

<table>
<thead>
<tr>
<th>FAST</th>
<th>SLOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>System 1</td>
<td>System 2</td>
</tr>
<tr>
<td>Fast</td>
<td>Slow</td>
</tr>
<tr>
<td>Parallel</td>
<td>Serial</td>
</tr>
<tr>
<td>Automatic</td>
<td>Controlled</td>
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<tr>
<td>Effortless</td>
<td>Effortful</td>
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<tr>
<td>Associative</td>
<td>Rule-governed</td>
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<tr>
<td>Slow Learning</td>
<td>Flexible</td>
</tr>
<tr>
<td>Emotional</td>
<td>Neutral</td>
</tr>
</tbody>
</table>
Ownership

“Quality is everyone’s responsibility.”

W. Edwards Deming
Systems Facilitate Continuous Improvements from Level of the Bench Work

Ongoing PDCA Continuous Improvement

- Identify Defects, Waste, Non-Conformances
- Quality Begins Here
- Daily Resolution
- Daily Countermeasure
- PDCA-A3 Resolution
- Customer-Supplier Communication at level of work
- Team Leader Facilitation
- Standard Work, Connections, Pathways
- policy, procedure, document control
- Share the Gain Learnings
- Test to Eliminate problem
- Process Changes
- People Changes
- Document Changes
- Coaching & Development Systems
- Document Management System
- Team Leader System
- Development System
- Internal & External Audit Systems
- Assess Outcomes, Corrective & Preventive Actions

Quick Fixes
Deviation Management System
Daily Management System
Improvement Management
Root Causes
Data-driven Change proposals

The many
The few critical

Quality Begins Here

Root Causes

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Knowledge is Powerful

“Information is not knowledge. Let’s not confuse the two.”

W. Edwards Deming
Improvement from Knowledge

Deviation Management

Plan
Do
Check
Act

PDCA Problem Solving

Gemba

Daily Management

0% Daily Goal Achievement 100%

Identify All Non-Conformances from Expectation

RCA, CAPA

Resolve the Critical Few

All Worker Gemba Input

Daily Goal Achievement

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DEVIATION
MANAGEMENT
Manage by Measure

“You can’t manage what you don’t measure.”

W. Edwards Deming
Q: What is 0.125% of 40 million lab tests performed?

Answer = 50,000 per year
Does that mean 99.875% of the work is without defect

NO
Deviation Management

process => human or machine => product or service

- Deviation from standard
- Defective work product

Anything having to do with a process that can be described as-

• defective, in non-ideal or perfect form,
• not right the first time, or
• not following policy or procedure (root cause)
A Structured Management System

- Created by user consensus, System wide quality technical team
- Manager-Supervisor owned process
- Key aspect of managers’ standard work, weekly, monthly
- Paper based input documented at Gemba by all 720 employees
- Excel spreadsheet with logic-pivot tables, located on shared drive
- System wide standardization of:
  - ISO compliant process for defect identification, documentation, tracking and trending
  - Classification of defects (taxonomy of 260 types)
  - Documentation of root causes, corrective and preventive actions
  - Elimination by PDCA based resolution, documentation attached to spreadsheet
- System wide analysis by Quality Specialists
- Priority defects reviewed by System Lab Quality Management Committee
- Platform for System-wide standardized resolution of common deviations
#125 types in 2014
#260 in 2016 and growing
PALM 2015 Deviation Management
52,971 Deviations

System-wide Standardization
All Sites Use Same System
Deviation Classified by Test Cycle Phases

2015 Total Deviations = 52,971

Over 90% of problems are handed to you (pre-analytic)
Total Defects for 2015 = 52,971
Top 15 defects account for 79% of all defects = 41,846

Time = $$
Redraw = dissatisfaction
Integrity = safety

Engage & Standardize the Supplier
LEVEL 3
Deliver value that Exceeds expectations

Customer Value Focus
Deliver value outside lab as perceived by stakeholders
Cost of Failures

“No one knows the cost of a defective product – don’t tell me you do.

You know the cost of replacing it, but not the cost of a dissatisfied customer.”

W. Edwards Deming
Pathology & Laboratory Medicine- All for You

80% Faster OPD Lab Test Result Times since 2008
- 98% of Same Day Tests by 6AM
- 90% of Same Day Tests by Midnight vs. 50%
- Epic MyChart test results to patient within 4 hours of OPD visit
- Faster Critical Value notification and timely clinical intervention

55% Lean Outreach Revenue Growth, last 24 months
- >$2M in new Net Revenue

50% Faster IPD Lab Test Result Times since 2008
- 90% of ER Tests now 30-35 min vs. 90 minutes
- 95% of ER Troponins now in 35 min vs. 70 minutes
- 90% Stats in now 45 min vs. 90 minutes

97% Pathology O.R. Order Accuracy Post Epic in 2014
- Error reduction in 1st 6 months

64% Increased Phlebotomy Patient Satisfaction since 2015
- 16 draw sites
- Satisfaction rating overall mean 4.8 out of 5
- 10 of 16 sites scoring 5.0
- >600,000 annual phlebotomies

33% Reduced Phlebotomy Wait Times Since 2014
- Mean wait time = 7 minutes
- Best performer mean time = 3 minutes
- Worst performer mean time = 14 minutes
But in the end, value boils down to $$
Faster Micro-organism Identification
Melding New Technologies with Lean Process

Advances in HFHS Microbiology testing using new technologies to identify micro-organisms

• Bacteria & Yeast- Laser Desorption Ionization-Time of Flight (MALDI-TOF)
• Candida sepsis- PCR, nanoparticle hybridization and T2 magnetic resonance signaling

Stakeholder value (V-metrics)

• Faster for caregivers
  • Decision making while in ER
  • Reduced use of inpatient and ICU beds to isolate while waiting for test results

• Safer for patients
  • Lower mortality
  • More immediate and appropriate interventions

• Cost effective for hospitals and payers
  • ICU length of stay
  • Appropriate use, overuse and under use of therapies
Faster Micro-organism Identification Maldi-TOF

- Bacterial results improved to 1 day from 2.2 days (55%)
- Yeast results improved to 1.4 days from 4 days (65%)
- Decrease LOS for IPD Sepsis
- Annual LOS savings:
  - Yeast & Gram Pos. bacterial sepsis: $3,230,437
  - Gram Neg. sepsis: $2,552,850
  - Total: $5,783,287
Rapid differentiation of pathogenic *Staphylococcus aureus* (coagulase positive) from blood culture contaminant coagulase negative *Staphylococci* may decrease hospital costs $4000-$6,100/patient (Forrest et al. AAC, 2008, Clin Perform Qual Health Care, 1998)

Approx. 924 patients/year with coagulase negative positive blood cultures at HFH

Reduced **unnecessary antibiotic usage** and **reduced length of stay** in a significant number of patients with coagulase negative positive blood cultures

**Annual projected $$ savings**

$610,000
MALDI Summary

- Rapid ID ICU LOS reductions: $5,783,287 per year
- Reagent savings per year: $11,212
- Rapid ID of *S. aureus* from contaminants in blood: $610,000.

Annual overall $$ savings

$6,404,499
T2 Candida: Direct from Whole Blood

- Type of Specimen: Whole Blood
- DNA extraction: No
- Sensitivity: 91.1%
- Specificity: 99.4%
- Time to Result: 3-5 hours
- Number of *Candida* Species Detected: 5
Rapid Whole Blood ID Candida Sepsis

- Candidemia mortality 40% despite antifungal therapy
- Mortality triples after 12 hours delay
- Blood culture gold standard takes 1-3 days 😞 T2 detection & speciation = 3-5 hours
- HFH annual send-out cost fungal antigen testing = $244,000, eliminated

- Candida sepsis episode (1997) = $44,536 per patient
- ICU LOS reduced from 15 to 8 days when rapid identification methods are combined with antimicrobial stewardship (Huang et al. 2013)

- Reduce 1 day ICU LOS + reduced antifungal usage = $564,000 annual savings
- Minus cost T2 testing $480,000

Overall annual $$ savings $328,000
LEVEL 4

Use benchmarks to Achieve Best-in-Class

1. Restless innovation and improvement
2. World-class by benchmark

Basic Accreditation

Lean/ISO

Value
Recognition of Culture

“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
Danaher Business System

International Center of Excellence

Pathology and Laboratory Medicine

CAP ISO 15189 Center of Excellence and Learning
**CAP LAP Citation Trends for PALM**

**2009-2016**

*In 2013 Leadership of 12 labs shifted from Lab Managed to Clinic Managed with EPIC roll out

*Systemic citations noted (GEN .48500 @9 sites, GEN .54400 @ 4 sites, COM .01700 @5 sites, and COM .30350 @ 6 sites)*

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<thead>
<tr>
<th>Hospital Type</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
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<tr>
<td>Main Hospital</td>
<td>77%</td>
<td>25%</td>
<td>89%</td>
<td>63%</td>
<td>25%</td>
<td>69%</td>
<td>50%</td>
<td>8%</td>
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<td>Reduction 2010-2016</td>
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<td>Community Hospital #1</td>
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<td>25</td>
<td>29</td>
<td>24</td>
<td>9</td>
<td>8</td>
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<td>Reduction 2010-2015</td>
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Self praise is No Praise.

Because in the final analysis, to those who control your fate, you are a COST CENTER.
Lab Cost per Unit of Service

2016 National Peer Laboratory Benchmarking

Henry Ford Health System

Peer Comparison Group Hospital Laboratory Systems

* Cost = Labor + Agency Labor + Non Labor + Corporate
Someone Will Always Be…

Prettier
Someone Will Always Be…

Smarter
Someone Will Always Be...

Faster
Someone Will Always Be…

Cheaper

SHOP AROUND...GET THE BEST PRICES YOU CAN FIND...THEN GO TO CRAZY EDDIE AND HE'LL BEAT 'EM.

THE GUARANTEED LOWEST PRICES ON AUDIO, VIDEO, ANYTHING AND EVERYTHING IN HOME ENTERTAINMENT!
Someone Will Always Be That…

But not

High

Value to

Stakeholders

Dissatisfied with status quo
Anticipating customer needs
Creative in problem solving
Can do and will do mentality
Team-based successes
Because this is what we do!
Automation at Henry Ford

Just how BIG is it?
159 feet long
Most comprehensive automation in US

53 yard field goal
8 feet taller than Statue of Liberty
Automation with the “Human Touch”

Technology infused with what humans do better through our Lean problem solving culture is improved!
“If you don’t understand how to run an efficient operation, new machinery will just give you new problems of operation and maintenance.

The sure way to increase productivity is to better administrate man and machine.”

W. Edwards Deming
Our Approach to Automation

Process Automation - Machines doing work at the Gemba previously done by people

The Advantage - Machines increase standardization, capacity, productivity and economics of the process

Lean - Engaged people continuously solving work problems from the level of the Gemba

The Advantage – Constantly learning from problems, parsing unique differences and improving the process
3P - Production Preparation Process

An event-driven process for developing a new product concurrently with the operation (process) that will produce it, by the people who will interact with it
“The thing is to keep everything in motion and take the work to the man and not the man to the work.”

- Henry Ford
### 51 Days of Kaizens Over 2 Years

<table>
<thead>
<tr>
<th>Date</th>
<th>Duration</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>2014</strong></td>
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<tr>
<td><strong>October 28, 2014</strong></td>
<td>1 day</td>
<td>3P modeling and design of automation layout, sample delivery, metrics (current vs future process steps, load leveling strategies, staffing vs. volume)</td>
</tr>
<tr>
<td><strong>January 12-15, 2015</strong></td>
<td>4 days</td>
<td>Revise automated instrument locations &amp; outlets Chem vs. Heme/Coag to optimize manual stations, cross coverage, upfront processing, sendout testing</td>
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<tr>
<td><strong>January 28-29, 2015</strong></td>
<td>2 days</td>
<td>External site visit OSU</td>
</tr>
<tr>
<td><strong>March 10-13, 2015</strong></td>
<td>4 days</td>
<td>Redesign manual workstations to reduce motion, specimen transport, touch points, lead and cycle times in the flow of specimens from receipt to testing area</td>
</tr>
<tr>
<td><strong>April 28- May 1, 2015</strong></td>
<td>4 days</td>
<td>Reduce touches points to line for cooler specimens, redesign handoff &amp; tracking from Specimen Receipt to Cytology and Serology, reduce specimen hold time after testing and devise validation plan for new UA and Heme analyzers</td>
</tr>
<tr>
<td><strong>July 14-17, 2015</strong></td>
<td>4 days</td>
<td>Design just-in-time reagent inventory &amp; storage requirements for Instruments &amp; manual testing, reduce specimen touches from Specimen Receipt to Micro/ Serology</td>
</tr>
<tr>
<td><strong>August 19-21, 2015</strong></td>
<td>3 days</td>
<td>Develop and try-storm Lean designs for Specimen Receipt and Delivery area</td>
</tr>
<tr>
<td><strong>October 6-8, 2015</strong></td>
<td>3 days</td>
<td>Finalize Lean design for Specimen Receipt and Delivery area</td>
</tr>
<tr>
<td><strong>2015</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January 13-15, 2016</strong></td>
<td>3 days</td>
<td>Design processes to support installation of automated line and achieve continuous flow of specimens from delivery to Core Lab to respective testing sites</td>
</tr>
<tr>
<td><strong>April 26-29, 2016</strong></td>
<td>4 days</td>
<td>Design processes to support the outlets - aliquots, sendouts, manual testing in Heme/Coag, Chem, Wets, UA  and specimens sent to Micro/Serology/HLA</td>
</tr>
<tr>
<td><strong>June 14-16, 2016</strong></td>
<td>3 days</td>
<td>Design reporting by Client Services rather than bench techs to Medical Centers for defective/inadequate samples by 12 noon next business day, Design notification of Core Lab critical values by Client Services.</td>
</tr>
<tr>
<td><strong>August 16-19, 2016</strong></td>
<td>4 days</td>
<td>Design processes to support downtime of Power Express and Automate to continue to achieve ER TAT of &lt;30min for Heme, Coag, UA, Lyt7 and CTNI</td>
</tr>
<tr>
<td><strong>September 13-16, 2016</strong></td>
<td>4 days</td>
<td>Standardize and optimize Remisol for Chemistry, Heme and Coag. Design specimen delivery rolling band conveyer to inlet.</td>
</tr>
<tr>
<td><strong>November 7-18, 2016</strong></td>
<td>8 days</td>
<td>Line Go-Live</td>
</tr>
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</table>
Kaizen Fueled Change

Action Items


• 141 action items
• 101 complete (72%)
• 40 open
  – 7: open (past due)
  – 11: upcoming due date
  – 22: new as of August 19th
# Motion Reduction Kaizen

69 FTE’s throughout 24 hours

<table>
<thead>
<tr>
<th>Motion</th>
<th>Before Automation</th>
<th>After Automation</th>
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</thead>
<tbody>
<tr>
<td>Steps</td>
<td>72,405</td>
<td>27,051</td>
</tr>
<tr>
<td>Miles</td>
<td>41.1</td>
<td>15.4</td>
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<tr>
<td>Time in Motion</td>
<td>20.1 hours</td>
<td>7.5 hours</td>
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Motion Reduction Kaizen

69 FTE’s throughout 24 hours

<table>
<thead>
<tr>
<th>Motion</th>
<th>Before Automation</th>
<th>After Automation</th>
<th>63% Savings</th>
</tr>
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<tbody>
<tr>
<td>Steps</td>
<td>72,405</td>
<td>27,051</td>
<td>45,345 steps</td>
</tr>
<tr>
<td>Miles</td>
<td>41.1</td>
<td>15.4</td>
<td>25.8 miles</td>
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<tr>
<td>Time in Motion</td>
<td>20.1 hours</td>
<td>7.5 hours</td>
<td>12.6 hours</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>=~1.5 FTE</td>
</tr>
</tbody>
</table>

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## Specimen Handling “Touches” Kaizen

<table>
<thead>
<tr>
<th></th>
<th># Touches Barcode Ready</th>
<th># Touches Non-Barcode Ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Automation-Hematology</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Post-Automation-Hematology</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td><strong>Improvement</strong></td>
<td><strong>92%</strong></td>
<td><strong>78%</strong></td>
</tr>
<tr>
<td>Pre-Automation-Basic Chemistry</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Post-Automation-Basic Chemistry</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td><strong>Improvement</strong></td>
<td><strong>81%</strong></td>
<td><strong>81%</strong></td>
</tr>
<tr>
<td>Pre-Automation Basic Chemistry</td>
<td>34</td>
<td>36</td>
</tr>
<tr>
<td>Shared between 2 analyzers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Automation Basic Chemistry</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Shared between 2 analyzers</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Improvement</strong></td>
<td><strong>94%</strong></td>
<td><strong>83%</strong></td>
</tr>
</tbody>
</table>

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1. Culture of people empowerment & structures that authorize action and accountability & proficiency in tools that solve problems

2. Minimal “touches”

3. Real-time metrics related to the “line” to promote human interaction and problem solving

4. Authority to standardize the “suppliers” to eliminate problems at the source representing over 90% of quality defects
Essentially, many of the leading laboratories around the world all have access to the same technology and hardware.

Based on our laboratory culture, we strive to be different, to achieve higher levels of performance for our clinicians.

Because it’s more than a lab test, it’s a patient waiting for a medical decision.
BENEFIT OF LEAN MANAGEMENT
“We get brilliant results from average people managing brilliant processes—while our competitors get average or worse results from brilliant people managing broken processes.”

Fujio Cho
Honorary Chairman
Toyota Motor Corp
"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