“Cart” Off the Savings with Lean

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Objectives

• Brief overview of ASPHL TB laboratory
• Brief overview of Lean
• Review TB Lean Cart project
• Summarize improvements and savings to date
Contributors

Yvette Vergnetti, BS, MT (ASCP)
– Alaska State Public Health Laboratory, Mycobacteriology Department Lead

Elizabeth Turner, BS
– Public Health Microbiologist

Robin VanDeGutche, BS, MT (ASCP)
– Public Health Microbiologist

Rojelio Viloria, BS, MT (ASCP)
– Public Health Microbiologist
ASPHL Mycobacteriology Department

• Only full service Mycobacteriology laboratory in Alaska
  – Culture, identification, susceptibility, molecular
• Process 4,000-5,000 specimens/year
  ~2,000 patients/year
• 2 full time microbiologists
Alaska TB Incidence, 2012–2016

2nd highest in US (2016)
What is Lean?

• A leadership approach
• A management philosophy
• A methodology

• That results in:
  – Decreased waste, cost, and time
  – Increased quality and capacity potential
  – High levels of worker involvement and ownership
“Low Tech” Approach

• Intense focus on eliminating ALL waste
• Maximize productivity and efficiency of existing processes, people and systems
  – Creativity before capital
• Optimize before automating

• Pursue continuous improvement through the involvement of everyone
That sounds great!

...but where/how do you start?
Initial Challenges

• Buy-in
• Culture Shift
• Resistance to change
  – “It works the way it is”
  – “It’ll take too long”
• Belief that it would make a difference/indifference
  – “We’ve tried this all before”
  – “How long do we need to do it for?”
• Needed small wins to start
What is the “Problem”?  

• Frustration among staff  

• Common complaint or irritation  

• “I wish we could change __________”  

• “It takes forever to do __________”
The Cart Project

- Processor would load a cart and/or hand carry supplies into the processing room
- Occasionally, something is forgotten
- Causes frustration and delays for staff

What if we “designed” the top of the cart to fit all of the supplies in a single trip?
Collect Metrics

Trips to take supplies in: 3 trips (90 sec/trip)
Forgotten supply = 1 extra trip
Frequency of forgotten supply = 2.5x/week
Design, feedback, training

- Samples
- Woodsticks
- NPC 67
- Buffer
- PANTA
- Culture Basket
- Slide Rack
- Slides
- MGIT
- NacPac Red
- MGIT
Evaluate

- Pros/cons?
- Staff experienced immediate improvement
- Kept the design in use
  - Mapped out an additional cart

Total time spent = 4 hours
Cart Savings

- 3 trips (90 sec x 3)
  270 sec/run

- 1 trip (45 sec)
  45 sec/run

Savings = 225 sec/run

249 runs/year:
- 12.45 hours/year OR 1.6 workdays
- With “rework” = 1.9 days + $17.16 PPE
GeneXpert Savings

LDT TB PCR
- No resistance markers
- Labor intensive
  - 4 hrs (3 hrs)
- Frequent repeats
  - 1x per week

GeneXpert
- Rifampin resistance
- Walk away assay
  - 2.5 hrs (45 min)
- 1 repeat
- Sputum only

429 hours/year OR 57.2 workdays
23% of an FTE
BSL-3 Anteroom

All staff like the new set up and no longer need to leave the BSL-3 area for essentials

Saves staff 205.3 feet per trip (3x/week)

= 6.1 miles/year (3.9 hours/year)
Increase LIMS TB Label Info

- Problem:
  - Minimal information on LIMS label
  - Once separated from requisition, hard to determine sample type

<table>
<thead>
<tr>
<th>Current State</th>
<th>Future State</th>
<th>Actual End</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affix &quot;before&quot; label</td>
<td>Sketch &quot;ideal&quot; label</td>
<td>Affix final label design and list two letter codes</td>
</tr>
</tbody>
</table>
## Expiration Tracking

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11/6/14</td>
<td>EXPIRED</td>
<td>2 weeks</td>
<td>1 month</td>
<td>&gt;1 month</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Vendor</th>
<th>Catalog no.</th>
<th>Expires</th>
<th>Days to Expiration</th>
<th>Qty on hand</th>
<th>Reorder when this Qty left</th>
<th>Order Qty Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSB w/glycerol</td>
<td>In-house</td>
<td>-</td>
<td>1/28/15</td>
<td>83</td>
<td>1 batch</td>
<td>10 ea</td>
<td>1 batch</td>
</tr>
<tr>
<td>Cefoxitin 30 ug Discs-Remel (50 disks/cartridge)</td>
<td>VWR</td>
<td>90002-370</td>
<td>7/31/15</td>
<td>267</td>
<td>1pk</td>
<td>1 pk</td>
<td>1 pk 50</td>
</tr>
<tr>
<td>Cefinase Discs (Beta-lactamase 90002-462) (50 disc)</td>
<td>VWR</td>
<td>90002-462</td>
<td>6/30/15</td>
<td>236</td>
<td>1</td>
<td>5 ea</td>
<td>1pk</td>
</tr>
<tr>
<td>Oxoid S. dysenteriae Antisera Polyclonal A</td>
<td>Fisher</td>
<td>OXDK210012</td>
<td>11/30/14</td>
<td>24</td>
<td>1</td>
<td>As exp</td>
<td>1</td>
</tr>
<tr>
<td>Oxoid S. flexneri Antisera Polyclonal B</td>
<td>Fisher</td>
<td>OXDK210036</td>
<td>9/30/16</td>
<td>694</td>
<td>1</td>
<td>As exp</td>
<td>1</td>
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<tr>
<td>Oxoid S. boydii Antisera Polyclonal C</td>
<td>Fisher</td>
<td>OXDK210043</td>
<td>11/30/14</td>
<td>24</td>
<td>1</td>
<td>As exp</td>
<td>1</td>
</tr>
<tr>
<td>Oxoid S. somnii Antisera Polyclonal D</td>
<td>Fisher</td>
<td>OXDK210081</td>
<td>5/31/15</td>
<td>206</td>
<td>1</td>
<td>As exp</td>
<td>1</td>
</tr>
<tr>
<td>Salmonella antiserum Poly A-I + Vi 3mL vial</td>
<td>Cederlane</td>
<td>44807(55)</td>
<td>9/30/16</td>
<td>694</td>
<td>1.5</td>
<td>1/3</td>
<td>1</td>
</tr>
<tr>
<td>Hardy Ninhydrin reagent</td>
<td>VWR</td>
<td>89407-768</td>
<td>11/1/14</td>
<td>-5</td>
<td>1/2</td>
<td>1/3</td>
<td>1</td>
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<tr>
<td>Prolex E. coli O157 Latex Reagent Kit</td>
<td>Fisher</td>
<td>22-289-139</td>
<td>9/30/15</td>
<td>328</td>
<td>1</td>
<td>1/3</td>
<td>1</td>
</tr>
<tr>
<td>Vibrio cholerae Antisera Set (1 polyvalent, 2 monovalent)</td>
<td>Fisher</td>
<td>R679817</td>
<td>4/30/15</td>
<td>175</td>
<td>1</td>
<td>As exp</td>
<td>1</td>
</tr>
<tr>
<td>Mendian merIfluor cryptosporidium/giardia test kit</td>
<td>VWR</td>
<td>15205-012</td>
<td>2/21/15</td>
<td>107</td>
<td>20 tests</td>
<td>10 tests</td>
<td>1 kit</td>
</tr>
<tr>
<td>Premier EHEC</td>
<td>Fisher</td>
<td>23-044894</td>
<td>10/7/15</td>
<td>335</td>
<td>20 tests</td>
<td>10 tests</td>
<td>1 kit</td>
</tr>
</tbody>
</table>

- Reduced testing delays due to expired reagents and running unplanned QC tests
- Improved inventory list for Bacteriology Department
  - Reduced the amount of media being expired out before use
Other Projects

- Lab requisition reorganization
  - 2.76 days/year (50% reduction)
- Records retention labeling
  - 3 hours saved (87% reduction)
- Specimen label design
  - Handwritten error elimination
- Requisition routing (within the lab)
  - 23.5 miles/year carrying requisitions saved (1.9 days/yr)
- Accessioning workflow and inventory management
- Standardization of various other workflows
- Identification of areas in need of revision or updating
Lean Impacts on TB Testing

- Increased processing to 2x/day
- Implemented a weekly reading of all cultures
- Developed a MAC PCR assay
- Used Lean projects to quantifiably demonstrate good resource stewardship
  – Received funding for the GeneXpert
Staff Reactions

“Learn what others are doing – see the most efficient way”

“I like that everyone participating has a voice/suggestions”

“If you don’t have someone to consistently push LEAN projects it doesn’t move forward with new projects”

“I like that standard work can be changed/updated without procedures having to be re-written”

“I wish more people in the lab would take the initiative and start their own LEAN projects”
Thank you!

Jennifer Eastman, PhD
Clinical Microbiology Manager
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TB Incubator Reorganization

Savings = 2.41 hrs/year

27% reduction in time spent cleaning incubator
## 5S Savings

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Price/Unit Ordered</th>
<th>Qty (based)</th>
<th>Total</th>
<th>To:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Covers Lab Coats</td>
<td>$233.89</td>
<td>7.00</td>
<td>$1,637.23</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>10ul Loops, light blue</td>
<td>$55.45</td>
<td>3.00</td>
<td>$166.35</td>
<td>Bacti</td>
</tr>
<tr>
<td>10ul Loops, yellow</td>
<td>$40.06</td>
<td>0.06</td>
<td>$2.40</td>
<td>Bacti</td>
</tr>
<tr>
<td>Disposable Sclpel, 1 box</td>
<td>$54.73</td>
<td>1.00</td>
<td>$54.73</td>
<td>TB</td>
</tr>
<tr>
<td>Superfrost Slides</td>
<td>$288.65</td>
<td>0.90</td>
<td>$259.95</td>
<td>TB</td>
</tr>
<tr>
<td>Slide covers</td>
<td>$9.97</td>
<td>1.00</td>
<td>$9.97</td>
<td>Bacti</td>
</tr>
<tr>
<td>Sight Saver Cleaning Solution</td>
<td>$81.27</td>
<td>0.25</td>
<td>$20.32</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>Scotch Tape (in plastic dispenser)</td>
<td>$2.89</td>
<td>14.45</td>
<td>$41.76</td>
<td>Front Office</td>
</tr>
<tr>
<td>Labeling Tape</td>
<td>$14.60</td>
<td>0.27</td>
<td>$3.98</td>
<td>Bacti</td>
</tr>
<tr>
<td>100-1000ul pipette tips</td>
<td>$66.50</td>
<td>0.13</td>
<td>$8.31</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>595 Filter paper</td>
<td>$15.79</td>
<td>1.00</td>
<td>$15.79</td>
<td>Store Room - General Use</td>
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<tr>
<td>Microscope slide box</td>
<td>$4.83</td>
<td>1.00</td>
<td>$4.83</td>
<td>TB</td>
</tr>
<tr>
<td>Lens Paper, 8x12</td>
<td>$40.81</td>
<td>0.08</td>
<td>$3.40</td>
<td>Bacti</td>
</tr>
<tr>
<td>Timer,</td>
<td>$20.17</td>
<td>7.00</td>
<td>$141.19</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>Bleach (chlorox)</td>
<td>$13.30</td>
<td>0.50</td>
<td>$6.65</td>
<td>Apta+</td>
</tr>
<tr>
<td>Ammonia</td>
<td>$39.35</td>
<td>0.04</td>
<td>$1.57</td>
<td>Molecular</td>
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<td>C Fold paper towels</td>
<td>$44.10</td>
<td>0.10</td>
<td>$4.41</td>
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<td>Wypall</td>
<td>$94.99</td>
<td>0.11</td>
<td>$10.55</td>
<td>Store Room - General Use</td>
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<tr>
<td>Unwire Rack, 10mm (Full)</td>
<td>$128.96</td>
<td>0.75</td>
<td>$96.72</td>
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<tr>
<td>Unwire Rack, 10mm (Half)</td>
<td>$97.00</td>
<td>0.13</td>
<td>$12.31</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>Unwire Rack, 20mm and 25mm (P)</td>
<td>$128.96</td>
<td>0.63</td>
<td>$80.60</td>
<td>Store Room - General Use</td>
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<tr>
<td>12*24 Biohazard Bags</td>
<td>$67.88</td>
<td>0.25</td>
<td>$16.97</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>Disposable transfer pipettes</td>
<td>$13.61</td>
<td>0.40</td>
<td>$5.44</td>
<td>TB</td>
</tr>
<tr>
<td>Ziploc gallon bags</td>
<td>$8.64</td>
<td>2.00</td>
<td>$17.28</td>
<td>Store Room - General Use</td>
</tr>
<tr>
<td>Small Brown Paper bags</td>
<td>$19.50</td>
<td>0.20</td>
<td>$3.90</td>
<td>TB</td>
</tr>
<tr>
<td>Biohazard Bags, 38x48</td>
<td>$238.94</td>
<td>0.02</td>
<td>$4.78</td>
<td>TB</td>
</tr>
<tr>
<td>10ML Syringe</td>
<td>$17.65</td>
<td>1.00</td>
<td>$17.65</td>
<td>BT</td>
</tr>
<tr>
<td>Pencils</td>
<td>$2.89</td>
<td>3.00</td>
<td>$8.67</td>
<td>Front Office</td>
</tr>
<tr>
<td>Sharpsles</td>
<td>$6.79</td>
<td>0.42</td>
<td>$2.83</td>
<td>Front Office</td>
</tr>
<tr>
<td>Pens</td>
<td>$13.99</td>
<td>0.50</td>
<td>$7.00</td>
<td>Front Office</td>
</tr>
<tr>
<td>Tape Dispenser</td>
<td>$4.29</td>
<td>3.00</td>
<td>$12.87</td>
<td>Front Office</td>
</tr>
<tr>
<td>Scotch tape (no plastic dispenser)</td>
<td>$22.99</td>
<td>0.30</td>
<td>$6.89</td>
<td>Front Office</td>
</tr>
<tr>
<td>Scissors</td>
<td>$9.88</td>
<td>1.00</td>
<td>$9.88</td>
<td>Front Office</td>
</tr>
<tr>
<td>Duct tape (silver)</td>
<td>$48.99</td>
<td>0.53</td>
<td>$16.33</td>
<td>Front Office</td>
</tr>
<tr>
<td>Duct tape (yellow)</td>
<td>$39.99</td>
<td>0.53</td>
<td>$15.33</td>
<td>Front Office</td>
</tr>
<tr>
<td>Binder clips, small</td>
<td>$9.49</td>
<td>0.03</td>
<td>$0.33</td>
<td>Front Office</td>
</tr>
<tr>
<td>Post it, Small</td>
<td>$12.79</td>
<td>0.08</td>
<td>$1.07</td>
<td>Front Office</td>
</tr>
<tr>
<td>Post it, large</td>
<td>$7.99</td>
<td>0.33</td>
<td>$2.66</td>
<td>Front Office</td>
</tr>
<tr>
<td>9V battery</td>
<td>$10.99</td>
<td>0.50</td>
<td>$5.47</td>
<td>Front Office</td>
</tr>
<tr>
<td>Packing Tape Dispenser</td>
<td>$19.79</td>
<td>1.00</td>
<td>$19.79</td>
<td>Front Office</td>
</tr>
<tr>
<td>Packing Tape Roll</td>
<td>$35.99</td>
<td>0.17</td>
<td>$6.05</td>
<td>Front Office</td>
</tr>
<tr>
<td>Kleenex</td>
<td>$60.66</td>
<td>0.17</td>
<td>$10.15</td>
<td>Front Office</td>
</tr>
</tbody>
</table>

**Total:** $1,848.75

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*Note: The table above lists various items and their respective prices, quantities, and departments they are allocated to. The total savings achieved through 5S initiatives are highlighted.*
Standardize glove orders

• Problem:
  – Two types of gloves in BSL-2 laboratory
    • A – Best price (complaints about durability)
    • B – More expensive

• Attended vendor product show
  – Piloted samples of “next step up” Type A gloves

Switch to a single glove type in BSL-2
• Savings of 41% (short cuff) & 48% for BSL-3 (long cuff)
Fiscal YTD = $1,137 (27 cases)
What is LEAN?
An Overview
8 Types of Waste

• People, Quantity, Quality
What creates waste?

- Distance
- Transportation delays
- Poor maintenance
- Lack of standard work or training
- Poor communication and/or organization
- Supply quantity/quality
- Ineffective performance measurements
- Poor planning or scheduling
Value Added vs. Non-Value Added

• Value added:
  – Transforms the product in some way that meets the customer’s requirements (and has not been previously attempted)

• Non-Value added:
  – Does not transform the product
  – Does not lead to fulfilling a Customer requirement
  – Reworks a previous mistake or misunderstanding
What is a “Kaizen”?

Kai = small continuous change
Zen = ongoing change for the better

• Structured, focused, coached, and required activity to get every employee to participate in improving the quality and efficiency of their day to day processes

• Not a suggestion box program
Basics of a Kaizen

- Reject the current situation
- Keep an open mind to change
- Positive attitude
- Mutual respect
- Make problems visible
- No dumb questions or ideas
- Take action over excuses
- Small progress rather than radical restructuring
Leadership is Essential

• For greatest success, buy-in at all levels is needed
• Communication is key
• Create an environment of leadership throughout the workforce
  – Provide structure
  – Develop project teams
Where to Begin

Know your metrics!

What do you want to improve?
What do you need to measure to track improvement?

Post metrics publicly for all applicable staff
LEAN Daily Management System (LDMS)

5 Components:

1) Daily work group meetings
2) Work group Primary Visual Display (PVD)
3) Kaizen improvement system
4) Assessment and improvement plan
5) Short interval coaching/metrics tracking
LEAN Tools

• Kaizen
• Blitz
• Standard Work
• 5S activities
• 20 Keys
• Value Stream Map
• RACI Charts
• Inventory Management
• Spaghetti Diagrams