Blending Lean and New Automation Solutions in Cytology to Improve Quality, Cut TAT, and Reduce Cost

Lab Quality Confab
October 2014
WHO?

BD MPD Program™
Measure, Predict, Deliver

European LEAN Specialist
since 2013

BD Totalys™ System

BD

Six Sigma
Black Belt
2009- 2010

SIEMENS

Workflow Consulting
2004 -2013

LEAN Certified
2008

THE LEAN ENTERPRISE ACADEMY

WHO?
Objectives

- Current trends in Cytology
- Solutions: MPD Approach & innovative Technology
- The method, tools and why
- Real life examples, data & outcomes
Current Trends in Cytology

• Centralization of Cervical Cancer screening
  – Regional models
  – Private / Public collaboration's
  – Development of national screening programs
• Testing paradigm change
  – Moving towards HPV primary screening
• Focus on Quality
  – ISO accreditation
• Shrinking Budgets
  – Need to do more with less
Approach – MPD

Plan

Do

Check

Act
MPD Approach - Objectives

Achieving Optimal Goals

Current Configuration
- Old Equip
- Current Process
- Original Time

Equipment Replaced
- New Equip
- Current Process
- Minor Improvement

New Process Only
- Old Equip
- New Process
- Major Improvement

New Process & Equipment
- New Equip
- New Process
- Optimized Improvement

BD Totalys™ System

\[ \text{Old Equip} \rightarrow \text{Current Process} \rightarrow \text{Original Time} \]

\[ \text{New Equip} \rightarrow \text{Current Process} \rightarrow \text{Minor Improvement} \]

\[ \text{Old Equip} \rightarrow \text{New Process} \rightarrow \text{Major Improvement} \]

\[ \text{New Equip} \rightarrow \text{New Process} \rightarrow \text{Optimized Improvement} \]

BD MPD™ Program

Measure, Predict, Deliver

BD Totalys™ System

= Total Waste Reduced by Improvements

Lean says “New equipment and products need new processes”
Front End automation in Cytology

Empowering Laboratories to Deliver Actionable Results to Clinicians Today and in the Future
Walk Away Solutions in Molecular

Empowering Laboratories to Deliver Actionable Results to Clinicians Today and in the Future
Vision – Reasons for change

- **Strategy**
  - Why – drivers for change
  - Where – what’s the Vision
  - Goals – Critical success Factors

- **External influences**
  - National targets
  - Testing paradigms

- **Internal influences**
  - Financial
  - Resources
Go to the Gemba

• Walk the pathway
  – Flow, Waste & Over Burden
  – Establish areas of opportunity
  – Identify best practice
• Map the process
  – Hands on Time (HOT)
  – Walk Away Time (WAT)
  – Wait time ▲
• Resource information
People - engagement

- Education and alignment workshops
  - Expectation management
  - Project planning
  - System and Methodology
  - Lean Thinking and Tools
- Site preparation
  - Lab Layout
  - IT infrastructure changes
- Extended Value Stream
  - clinician outreach
  - Sample taker training
Current and Future – Shared understanding

- Current state
  - Flow, Waste, Burden
  - Best Practice
  - Opportunities
  - Resource utilization

- Future state
  - Ideal process
  - Gap analysis
    - Process
    - IT
  - Work Flow / Process Simulation
  - Lab Layout
  - ROI and Resource utilization

A base line for CI

BD Totalys™ System
Current and Future – Management & monitor

- Key Performance indicators.
  - Customer focused
  - Real time
  - Simple and relevant

- Visible.
  - Process cockpits
  - Focus of daily huddle
  - Drives engagement
Common opportunities

- Poor Flow
- Rework
- No Standard work – outdated policies
- Manual Tracking / Chain of Custody
- Low productivity
- Poor use of resources
HOT: Hands-On Time
WAT: Walk-Away Time
WT: Wait Time = Time where samples wait for a process step to be performed
CT: Cycle Time = HOT + WAT
TAT: Turn Around Time = CT + WT

Example VSM – pre implementation Conventional Cytology
Example VSM – post implementation LBC Cytology

HOT: Hands-On Time
WAT: Walk-Away Time
WT: Wait Time = Time where samples wait for a process step to be performed
CT: Cycle Time = HOT + WAT
TAT: Turn Around Time = CT + WT

TAT = 166572 sec = 2776.20 mins = 46.3 hrs
CT = 108972 sec = 1816.20 mins = 30.3 hrs
Current State April 2014
Analysis

Cycle Time Comparison

CT for a batch of 48

BD Totalys™ System
Resource Utilization comparison SurePath / Totalys process – Process Simulation

Simulation assumes ideal future state processes, use of No Further Review and current % of resource availability.
Cost Per Test Calculation

<table>
<thead>
<tr>
<th>Current</th>
<th>Lab 1</th>
<th>Lab 2</th>
<th>Lab 3</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTES</td>
<td>€ 97,230.00</td>
<td>€ 78,758.00</td>
<td>€ 37,376.00</td>
<td>€ 213,364.00</td>
</tr>
<tr>
<td>Consumables</td>
<td>€ 38,667.00</td>
<td>€ 39,749.00</td>
<td>€ 48,360.00</td>
<td>€ 126,776.00</td>
</tr>
<tr>
<td>Transport</td>
<td>€ 24,700.00</td>
<td>€ 24,700.00</td>
<td>€ 19,500.00</td>
<td>€ 68,900.00</td>
</tr>
<tr>
<td>Totals</td>
<td>€ 160,597.00</td>
<td>€ 143,207.00</td>
<td>€ 105,236.00</td>
<td>€ 409,040.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Future</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FTES</td>
<td>€ 25,336.00</td>
<td>€ 31,824.00</td>
<td>€ 16,628.00</td>
<td>€ 73,788.00</td>
</tr>
<tr>
<td>Consumables</td>
<td>€ 96,302.00</td>
<td>€ 96,302.00</td>
<td>€ 55,559.00</td>
<td>€ 248,163.00</td>
</tr>
<tr>
<td>Transport</td>
<td>€ 24,700.00</td>
<td>€ 24,700.00</td>
<td>€ 19,500.00</td>
<td>€ 68,900.00</td>
</tr>
<tr>
<td>Totals</td>
<td>€ 146,338.00</td>
<td>€ 152,826.00</td>
<td>€ 91,687.00</td>
<td>€ 390,851.00</td>
</tr>
</tbody>
</table>

Indicative Cost Per Test
Current € 6.11
Future € 5.83

Cost per test across the network

EXAMPLE
3 laboratories centralizing Cytology sample preparation and slide production on to one site

BD Totalys™ System
Standard Batch Size implemented

Standard Batch Size of 48 implemented throughout entire process.

The whole process is managed by 2 people. One of them is a Cyto screener and has enough walk away time to screen slides in the afternoons.

These work together receiving, accessioning and data entry a single batch to insure that there is a batch available for processing when the previous batch is completed.
Visual management implemented

MultiProcessor and SlidePrep trays identified with a coloured dot to enable easy management of vials and slides throughout the process.

HPV samples identified with a yellow spot on lid. Easy to identify and pull out after processing.
Single piece flow in data accessioning

Accessions the sample, completes data entry, labels the vial and C-Tube, and print the slide for each request.

places the vial, C-Tube and slide in the appropriate tray before moving on to the next request
Ergonomic Workstation layout

The workstation has been designed so that the whole task can be done easily with everything required to complete the activity easily accessible.

The MutiProcessor tray holder places the tray at the ideal height to place vial and C-tube in the tray without reaching or bending over.
Outcomes

Improvement examples

- Cytology process moved to one site reducing process complexity and the need to transport slides through the network
  - Tripling annual sample volume from 20,000 to 60,000 samples a year
- Additional volume process with no increase in resources – 1.5 FTE/WTE
- Reduction
- Reducing the time to result to comply with national guidelines
  - Improved time to result. Cytology turn around times (TAT) – 51.19% reduction in TAT 94.85hrs to 46.3hrs
  - Reduction in process cycle times by 39.22% - 49.85hrs to 30.3hrs
  - Meeting national turn around guidelines of 10 days from receipt – Current TAT <=7 days.
- 72% reduction of unsatisfactory results. That meant going from an unsatisfactory rate of 4.4% with conventional pap smears to less than 1.5% with SurePath Liquid Based Cytology.
Outcomes cont.

• A number of best practices have been implemented including
  – Visual management of the MultiProcessor and SlidePrep
  – Single piece flow in sample accessioning and data entry
  – Visual management of HPV samples for easy identification and further testing.
  – Ergonomic workstation layouts

• Key performance indicators posted in LEAN boards – display data as close to real time e.g. Daily / Weekly.
  – Encourage engagement in the process
  – Identify issues before they escalate