Automating the Cytology Laboratory: How to Best Combine Lean and Automated Systems

Tuesday, November 6, 2012
Purpose:

To provide both lab personnel and process improvement auditors practical advice to take back to their laboratory so that they may integrate Lean into Cytology.

Objectives:

- Understand the historical barriers to Lean adoption involving Cytology departments.
- Understand the relative low use of true walk away automation in the Cytology lab.
- Describe inspection points on where to use Lean tools in the Cytology process.
Deliverables:

By the end of the session you will have **four** specific areas where you can inspect your own Cytology lab to make process improvements around Automation via Lean:

- Inspection points:
  - “15 puzzle”
  - Do they have what they need?
  - Batch sizes and Math
  - Same wastes, different look.
- Putting it all together
“What if you could prep an extra folder of 20 slides sooner at no additional cost?”
Why has Cytology not been “Leaned” by now?

Understanding the barriers to Lean adoption in Cytology departments.
“If you do what you always did, you get what you always got.”

- Anonymous
Lean simplified:

Lean is centered on preserving value with less work.
Cytology is a manual process in varying degrees...

- Manual accessioning or ordering
  - Barcoding technology has improved this step
- Some labs Manual stain their GYN, Non GYN, or Both
  - Automated stainer
- Manual coverslipping despite the lab volume
  - Automated coverslippers
- Manual screening and evaluation
  - Pap test Imaging systems
- Manual QC
- A lot of Shared specimens with Molecular

There is no “Black Box” instrument which does all testing (Pap, HPV, CT/GC) without human intervention
Challenges

• Cytology
  – Multiple workcells in the process
    • Receive, accession, (make slide), stain slide, coverslip, screen
    • mostly manual but can have differing levels of automation
  – Mix of small and large batches, Waiting waste most often seen, non-critical value with sharp expectations for TAT, “excessive rechecking”, footprint and workflow inefficiency, etc.

• Molecular
  – “Recipe” driven process to get results
  – usually has large batches testing, manual steps with a mix of automation, operator dependent results (defects), on-off automation, redundancies in the process, footprint and workflow inefficiency, etc.

• Unchecked - Cytology and Molecular together can be nightmare!
What is the Value of Lean for both your Cytology and Molecular labs?

• Make the job **easier**
• Better **service** between your internal customers
• Become more **efficient**
• Improve your **quality**
• **Reduce** errors
• **Prepare** for volume fluctuations
• **Save** you money
• Complete the reporting **faster**
• Make the job **safer**
• **Maximize** Automation
• Increase case **capacity**
• Make your physician **customers** happier
5S

• **Observe** before you 5S

• Gain input and feedback from the **staff** FIRST!
  – The 8\(^{\text{th}}\) Waste!!
  – Make the staff the **central** part of the process
  – Labs too often have good intentions, but poor **deployment** of 5S
  – Drift happens because the staff is **not bought in**.
  – The “do-ers” **know** the job better than anyone.
  – The “do-ers” have great **ideas**!!

• Many times the key items to move in a 5S are NOT directly next to the targeted spot
  – Observation can lead to **linking** “Sort & Set” moves together
  – Allows your staff to **build** workcells and incorporate Point Of Use Storage, workflow, and inventory controls.
Point of Use Storage

Do they have what they need?
“A table, a chair, a bowl of fruit and a violin; what else does a man need to be happy?.”

- Albert Einstein
Point Of Use Storage

Simply Put: storing what you need where you need it
- It’s usually integrated into the S3 Set phase of 5S.

Examples:
- Putting your phone on your office desk.
- Having the towel rack near the sink/tub.
- Placing the laundry soap near the washing machine.
- Storing mugs, coffee beans, coffee grinder, filters, sweeteners, and powdered creamer at the coffee maker.

Pretty obvious stuff, right???
## Smart Placement

<table>
<thead>
<tr>
<th>Item</th>
<th>Where to locate it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Items which you use constantly - daily</td>
<td>Keep them at the work site or on your person</td>
</tr>
<tr>
<td>Items which you use often – at least once a week</td>
<td>Keep them within easy reach</td>
</tr>
<tr>
<td>Items which you use occasionally – at least once a month</td>
<td>Store them in a central location near your work area</td>
</tr>
<tr>
<td>Items which you need but only from time to time – every few months</td>
<td>Store them in a central location at a distance from your work area</td>
</tr>
<tr>
<td>Items which you have not used in six months</td>
<td>Consider moving them to the red tag location</td>
</tr>
</tbody>
</table>
Continuous Flow
Batch sizes and a lot of Math
“Innovation comes from the producer, not from the customer.

~ W. Edwards Deming
Determining Batch Sizes

• Set attainable and realistic batch sizes for the environment

• Based upon:
  – TAT goals
  – Arrival patterns
  – Instrument cycle times
  – Capacity of instruments, racks and trays
  – Travel distances
  – Staffing & resources
  – Kits and testing configurations
Masters course: Optimal batch size

- What’s the time needed to complete a batch at each workcell in the process in the current batch size?
- Calculate the takt time?
- What effect does lowering/raising your batch size do at each step of the process?
- Is there a common number you can carry through all of the workcells?
- What’s the volume of cases you have to do every hour of your work day? Should you adjust your batch size because of this?
- Is there a minimum amount of tests that need to be run to maintain batch Return On Investment (ROI)?
The Wastes of Lean
“The most dangerous kind of waste is the waste we do not recognize.”

~Shigeo Shingo
“WHY DOES IT TAKE A WEEK TO GET THE RESULTS?”
- Your Clinicians
90-95% of the process is Waste

Vial picked up by courier
Order Entry
Create slide from Vial
CT Screen
Path Result
Pap Collected
Waste
Result to Dr.
The (Eight) Wastes of Lean

- Defects
- Overproduction
- Waiting
- Not Utilizing Talent
- Travel
- Inventory
- Motion
- Excess Processing
Putting it all together
One case study all the way through...
Lab Manager:

“What if you could prep an extra folder of 20 slides sooner at no additional cost?”
Work in Progress (WIP) report

- **At the beginning of Tuesday:**
  - there were 54 vials accessioned and not processed
  - There were 67 cases prepped onto glass slides and not stained
  - Stainer/coverslipper was empty
  - Imager had imaged 120 slides (6 cassettes of 20)

- **At the beginning of Wednesday:**
  - there were 21 vials accessioned and not processed
  - There were 74 cases prepped onto glass slides and not stained
  - at 9am when the T2 operator had arrived to work she was 163 vials behind the accession station
    - she started the T2’s when it was at 197 due to HPV’s, slide stain QC, etc
    - Stainer/coverslipper was empty
    - Imager had imaged 120 slides (6 cassettes of 20)
Workflow opportunities

• Modifying prep staff daily duties to meet the goals and needs of the business and (more importantly) the workcell
  – What does the staff do when one prep station is way ahead of the other (accessioning vs. T2)?
  – Is the focus for the prep staff to get out the NG’s or the TPPT?
  – Is it the same answer when you go after new business opportunities?
  – Does the daily workflow sheets reflect this?

• Apply “Pull” and not “Push” manufacturing
  – Kanbans
  – Hourly workload
A Manager’s role in bringing Lean in a lab:

- Find the balance between helping and enabling
- Do not try to get people to think like you do
- Allow people to truly come up with their own ideas.
  - The 8th Waste
  - Ops Mgmt team need to provide resources and remove roadblocks.
  - Ask questions to stimulate creative thinking
  - Encourage lots of little, creative ideas
  - Support and recognize Lean behavior
  - Take responsibility to change current behavior in ourselves

- Develop a workforce of problem solvers
  - Lean is not just about doing what is possible
  - Lean is about doing what has not been done before

- Institute a non-blaming culture to celebrate the problems
Conclusions

• Lean concepts have been proven in the CLINICAL laboratory environment and CYTOLOGY/AP industry adoption is growing

• Lean can be used to increase efficiencies, reduce costs, and improve client satisfaction... even in Cytology

• You have four specific areas where you can inspect your own Cytology lab to make process improvements via Lean.
  – “15 puzzle”
  – Do they have what they need?
  – Batch sizes and Math
  – Same wastes, different look.
THANK YOU!

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