What Does Lean Surgical Pathology Look Like?

The way it was is!

Identify the Goal

Articulate the Vision & Means & Goals

- All specimens from any Operating Room or client within are transported, grossed and processed within the day of surgery at Core AP Lab
- Continuous flow processing for Biopsies & Large Specimens using Lean processes with short cycle times
- 80% of all Biopsy reports within 2 days & all Large specimens reports in 3 days

Educate the Leaders & Teams

How Do You Get There?

Management system
- That mines creativity of people, educated and structured to contribute to improving the work daily

PDCA (Plan Do Check Act)-based
- Customer focused continuous improvements

Continual work redesign (to achieve):
- Continuous flow
- With minimal waste,
- Defined connections, &
- Defined pathways
Know What is Ideal Work

Focus teams on Eliminating the Wastes

Structure the Teams

Strive for the IDEAL Condition

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

Physical, emotional, professional

LEAN Tools to Improve Workflow
- Standard work
- Mistake proofing
- Batch size reduction
- Level load
- Work simplification, posted job aides
- Visual displays, controls & color coding
- White boards, Deviation Management Process, Daily Management Boards
- Kanban inventory and production signals
- “Stop the line” (Specimen labeling and acceptability rehabilitation process)

Surgical Pathology Path of Workflow

START
Human Tissue

PATHOLOGY WORK STATIONS

Diagnostic Report

END

Residents

Pathologist interpretation

Surgery → Specimen delivery

Specimen accession → Gross section

Paraffin embedding → Slide cutting → Slide staining → Slide label & delivery

Report generation & delivery

Resident
Identify the Defects

Survey Defects Work In-Process

Pooh quality of service or product that makes you:

• Stop your work
• Reject it
• Return it to sender
• Delay your work to fix it yourself
• Not pleased, could be better

= variation = bad
= poor quality

Defect Board- Make Defects & Resolution Visible

Lean Principle- Start with Work Simplification

"Every well thought-out process is simple."

-- Henry Ford

Simplify

Rid Un-needed

Process Steps

Transition to Paperless Barcoded Workflow in AP

Process modified

Process eliminated

2004-5

2006-7

16 => 11 steps, 31% reduction
Simplify = Safer

Standardize Activities, Connections & Pathways

Safer Work Simplification Redesign

- 3 FTE Transcription
- 1.4 FTE Manual labeling
- 1.3 FTE Mis-ID corrections

Key Lean Process Changes 2004-2008
- Organized workflow, visual standard work, priority specimen streams

11/6/2014
Key Lean Process Changes 2004-2008
- Laboratory structural redesign, work cell design & standardization

Standard Work
- Linear flow
- U-shaped individual workcells

Standard Work
- Posted at work stations
- Written
- Visual
- Sequential
- Agreed

Barcode Standardized Work Processes
- This case is submitted in 3 specimen containers consisting of:
  - part A - sigmoid colon biopsy
  - part B - transverse colon biopsy
  - part C - stomach biopsy with standing preorder for Helicobacter pylori immunostain.

- Protocol driven information is reflected in the slide labels dictating 2 levels cut for each part.
- The stomach biopsy protocol, part C, calls for an additional 2 blanks slides to be cut, one for the immunostain & a 4th left unstained.

Barcode at production kiosks

Workplace Design Follows Standardization

Gross Lab Process Map - January 2006
- INITIAL STATE
- Baseline
- Volume 45,000
Designing Pull

Designing Pull for Histology Bottleneck

Time delay waiting for stainer rack to fill

- Reduce Batch Size from Cutter to Stainer
  - Goal: Level throughput
  - Rate limiting step: Stainer capacity = 60 slides every 20 mins.
  - Set auditory timer to signal pull of cut slides
  - To stainer every 20 minutes, regardless batch
  - Measure TAT from slide delivery to sign-out
  - End outcome measure = influence on Pathologist signout (global goal)

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Histology-Internal Specimen Pull Report TAT Outcome March 2006

Current: No time schedule for hand-off, wait for full rack of 40 slides
Change: Pull biopsies, via auditory timer, whenever cut slides are ready
Current time 8 per run, q 20 mins

SP Major Processes

- Biopsy/Label
- Transport
- Accession
- Tissue Gross Exam
- Processing
- Embedding
- Cutting
- Staining/Cover
- Case Collation
- Delivery
- Microscopic Exam
- Report Sign-out

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Production Kanban Cards- Visual Aids

- Decal placeholder card
  - To alert tech that block from case will be missing at cutting

- Re-embed card
  - Alerts embedder why block is melting on embedding center;
  - Has tech’s name so it can be returned for cutting

- Instrument status card
  - Alerts tech that solutions are not changed yet

Inventory Kanban Cards

Reorder Kanbans for Inventory

Continuous Flow
Lean Operational Efficiency

- Continuous flow goal
  - Centralized production for Accession, Gross, Histology, all Stains and Slide disbursement
- Operational challenges
  - Work simplification and mistake-proofing
    - Challenge: same-day metrics of successful production and defect resolution between hospitals
  - Load leveling
    - Challenge: match courier with specimen availability and workers with volumes of work around the clock
  - Batch size reduction
    - Challenge: rapid cycle processing of large specimens & biopsies

Lean = Minimal Batch Sizes & No Waiting

Common Challenges

Key Problems
- Core AP Lab operations
  - Specimen accession, gross exam, histology, IHC, molecular studies
  - Serving 4 hospitals up to 30 miles away
  - Specimen delivery efficiency
  - Production efficiency
  - Timeliness of slide production & return delivery
- Large specimen resections timely triage to Tumor Board presentations at 4 hospitals

In Search of a Batch

"All this waste adds up quickly. Here's where your bonus went!"

7 AM SP Core Lab- Accession & Gross

7 AM SP Core Lab- Histology
4 PM SP Core Lab- Level Load, Pull

3 of 6 stations working

Outbound hospital slides

Case triage station

courier

“pull” sort

accession

Promoting Technology

Continuous Flow Promoted by Technology

Small Batches, Rapid Cycle Times Promote Flow

SP Bottlenecks & Challenges

MoTown Motion- Continuous Flow

Histology Processing Flow

Bergamo Boulevard

Woodward Avenue

Conventional
Overnight processing
Large & Medium & Derm

Microwave
Same Day processing
Biopsies from previous day
and early same day Biopsies
in mornings

except Prostate and Breast
Histology Processing Flow

<table>
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<tr>
<th>Time</th>
<th>Convntnal LARGE</th>
<th>Overnight LARGE</th>
<th>Convntnal LARGE</th>
<th>Overnight LARGE</th>
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**LEON LESSON**

*New Technology*

“Your methods are formed by what you are trying to do; they do not determine your purpose. To my mind it is starting wrong to put methods ahead of purpose.”

– Henry Ford

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**Daily Management**

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**Surgical Pathology Work Leftover after 2nd Shift**

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<th>Accession – Gross - Histology</th>
<th>Cassettes left over</th>
<th>Slides left over</th>
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**Baseline Condition**

**Positive Outcome Condition**
Surgical Pathology
Work Leftover after 2nd Shift
Specimen Prioritization and Load Leveling Between 3 Workstations

Accession – Gross - Histology
- = cassettes left over
= = slides left over

April 2013
July 2013

Batch Size Reduction and Specimen Organization
1. Reduce community biopsies below 50
2. Reduce size clusters of rapid processing
3. Use gross of prostate biopsies for rapid and standard
4. Delight gross of dermatology for rapid and standard
5. Provide gross for dermatology and standard biopsies to end of workday
Day

Load Leveling via Standard Work Across Shifts of 3 Lab Sections
1. Accession all rapid biopsies before 9:30pm
2. Prioritize gross cutting of rapid processed biopsies
3. Deliver all biopsies to histology for processing before 10:15pm
4. Cut prostate biopsies early in shift, not at end
5. Defer gross of endometrial and breast core biopsies to end of shift
6. Log size and time of batches for histology notification of work coming
7. Dedicate only 1 evening histotech to embed blocks
8. 2nd histotech to flex time between embedding and cutting
9. Presort cut blocks by hospitals for day shift to expedite searching
10. 2nd shift to run only Rush special stains, kidneys, livers, transplant lungs

Creating Flow
= Faster

Owning the Value Stream
Removing Time to Increase Productivity
Aligned Path of Customers and Suppliers creating value
30–40% of work is waste, rework, redundancy
Who owns the value stream? CLIA director
Collaboration and partnerships, relentless focus on quality improvement

Owning the Value Stream
Removing Time to Increase Productivity
“What’s measured improves”
- Peter Drucker

Report amendments
- Mis-interpretation
- Mis-identification
- Specimen defects
- Clerical defects
- Critical result notification
- Client service calls
- Patient complaints

Quality management system/framework
Quality manager
"Time waste differs from material waste in that there can be no salvage. The easiest of all wastes, and the hardest to correct, is the waste of time, because wasted time does not litter the floor like wasted material."

– Henry Ford

"Nothing is particularly hard if you divide it into small jobs."

– Henry Ford