Streamlining the PATH Line: Onboarding Barcoding in Anatomic Pathology

By: Ary Franklin, HT(ASCP) & Carol Beth Taylor, MHS, PA/HTL(ASCP), GBLSS
In the beginning...

• Barcoding...
  – Who decides?
    • Not us!
  – What barcode system should we use?
    • Not our decision!
  – When do you decide that you need this?
    • When the dirty laundry stack is too high!
  – How should we implement it?
    • We’ll show you how!
  – Why do we need it?
Why???

We ALL have our dirty laundry!!
We just don’t like to talk about it...
What were *we* missing?

- **Patient Safety**
  - Labeling errors
    - From collection to microtomy

- **Process Standardization**
  - Everyone had their own way to do their job.
    - From collection to microtomy

What do we do???
In a Lab without Barcoding System…

You try to protect yourself, the institution & the patient by:

- “Safety Nets”
- Double Work
- If a mistake does happen, we all play the “Blame Game”
In a Lab without Barcoding System…

• “Safety Nets”
  – Checking blocks against slides
  – No same type of specimens back to back
  – Pre-printed worklists for each processor & at case assembly
  – Number of pieces in each block/special instructions entered in LIS
In a Lab without Barcoding System…

• Double Work
  – Slide labels were pre-printed before microtomy
  – Double labeling – Special Stains
  – Correcting errors at all 5 hand-offs
    • Accessioning to Grossing
    • Grossing to Embedding
    • Embedding to Microtomy
    • Microtomy to Assembly
    • Assembly to Diagnosis
In a Lab without Barcoding System...

• The “Blame Game”
  – Determining who/where the “error” occurred
  – HTs initialing each slide they cut
“If we introduced single piece flow protocols, barcode tracking and automation, and if we placed the power of improving the lab in the hands of our front-line employees, we knew we could improve laboratory efficiency and help preserve patient safety.”

—Robert Beissner, M.D., Ph.D., Pathologist and Chief, Section of Anatomic Pathology Informatics
The PO is signed, so now what?

Don’t be afraid to jump!!!
The PO is signed, so now what?

• Document a current “Snap-shot” of your lab practices
• Determine Go-Live Date
• Decide on a team and who will be your on-site team captain
• Develop a timeline to complete tasks pre Go-Live
• Become a Lean Lab
Lean Lab

• **LEAN** Methodology that focuses on eliminating waste (non-value added tasks) in a process/system while preserving value-added tasks (those the customer is willing to pay for).
  
  • **Red** – non-value added
  
  • **Yellow** – non-value added but required for process
  
  • **Green** – value added
Accessioning Workflow – Snapshot

11 Steps – 36% were waste & only 9% were value-added
Accessioning – Snapshot

Error Potential

- Multiple, opened, patient specimens scattered during the accessioning process
  
  **Double Work**
  
- Pre-assigning and pre-sorting specimen time **Safety Net**

Error Statistics

- *8 hours per day* of wasted time on pre-assignment and pre-sorting steps
  
  - 4.5 minutes/case
Grossing Workflow – Snapshot

14 Steps – 36% were waste & only 29% were value-added
Grossing – Snapshot

Error Potential

- Placing grossed tissue into the wrong patient’s cassette because verification is only as good as the person performing the task. “Blame Game”

- Creating inaccurate information on the histology logs (i.e. special instructions and tissue pieces). Safety Net

Error Statistics

- 45 minutes per day spent on correcting inaccurate information to histology logs. Double Work
Embedding Workflow – Snapshot

12 Steps – 50% were waste & only 17% were value-added

Open cassettes
Review & document on log
Take out tissue
Embed tissue in mold
Fill mold with paraffin
Place embedded cassette on cooler
Cassette sits on cooler
Scrape excess paraffin
Put blocks on tray
Transport trays to freezer
Blocks wait in freezer for slide labeling
Pick up & transport blocks to cutters

Baylor Scott & White Health
Embedding – Snapshot

Waste

- Approximately 45 minutes per day is spent correcting documentation on accurate number of tissue pieces. **Double Work**

- Significant sorting of cassettes based on colors to establish priority, with additional sorting to identify reading pathologist. **Double Work**

- Embedding log is used to determine pathologist assigned to case, review of special instructions, and to determine the correct number of tissue pieces. **Safety Net**
Labeling & Microtomy Workflow – Snapshot

17 Steps – 2/3 of this workflow was non-value added
Labeling & Microtomy – Snapshot

Error Potential

- Placing the wrong patient tissue on the labeled slide “Blame Game”
- Performing slide/block verification by looking at the last 2-3 numbers on the accession number only

Safety Net

- Lack of standardization in labeling practice

Error Statistics

- **Time required to correct errors:**
  - Minor errors: 2.5 hours
  - Risk Management errors: 3-4 days
Labeling & Microtomy – Snapshot (Continued)

Waste

• All slide labels are pre-printed from LIS prior to cutting. **Double Work**
  – Requires 84 minutes per day to print all required labels

• Additional time is required for slide initialing for tracking. **“Blame Game”**
  – 34 minutes per day across all staff (observed)

• Initialing every slide to identify who performed cutting. **“Blame Game”**
Case Assembly Workflow – Snapshot

14 Steps – 71% were waste & only 0% were value-added
Case Assembly – Snapshot

Error Potential
- Slides matched to block as a visual check the tissue was placed on the correct slide Safety Net

Waste
- Significant time spent matching stained slides to cut blocks  
  — 76 minutes per day
- Travel time and distance associated with transport to the pathologists office  
  — 5 minutes for every delivery with a minimum of 16 trips per day
“At that time, we didn’t have a tool that enabled us to protect our employees, our practice, our institutions and ultimately our patients. Now the Barcode System solution allows us to do just that.”

—Carol Beth Taylor, MHS, PA(ASCP), HTL(ASCP), Lead Pathology Assistant
Surviving the Obstacles is a Team Effort...

So you don’t….
Dealing with Change…

Journal Entry #1969: "Kubler-Ross Revisited…"

The 5 Stages of Grief (Over Dieting During the Holidays!)

1. Denial
   - Hey, pumpkins are vegetables, so eating pumpkin pie is the same as having a serving of vegetables, right?

2. Anger
   - Hey! I am not overweight! I’m under-weight!

3. Bargaining
   - I promise to lose weight tomorrow! Just stop going up! Stop!!

4. Depression
   - "Sigh" Damn, I have definitely become jumbo-sized.

5. Acceptance
   - Oh hell, just give me two servings of everything…
Pre Go-Live Obstacles

• Fostering “buy-in” from the all users
• LIS Interface & Testing
• Customization of the Software
• Purchase of Equipment?
• Installation of Required Equipment
  – Vendor
  – On-site IT
  – On-site Facilities/Maintenance
Go-Live Obstacles

• Accessioning Workflow
• Cassette Barcode Adjustments
• Case Assembly
• Deleted or Changed Orders (LIS specific)
• No Vendor Representative on site
• Expansion & “Fine-tuning” of:
  – Quality Issues
  – Special Instructions
  – Resolutions
Post Go-Live Obstacles

• Deleted or Changed Orders (LIS specific)
• Cassette barcode malfunctions
• Cryostats without microtomy barcode stations
• On-going training for new employees & staff
• Replacement parts after warranty expires
• Pathologists buy-in/training
• Archiving slides after case assembly
Accessioning Workflow – Current Snapshot

Previous: 11 steps with 36% waste & 9% value-added
Current: 7 steps with 43% waste & 29% value-added

Specimen drop off
Verify specimen receipt without opening bag
Place verified bags into bins
Scan patient info. in LIS
Apply LIS driven barcode label to container & paper work
Align LIS printed cassettes with specimen
Ready for gross area
Accessioning – Current Snapshot

Error Potential DECREASED with barcoding technology!

• No pre-analytic sorting or queuing necessary with barcoding technology

• Realization that all the “safety-nets” in the process were non-value added and were unnecessary and ELIMINATED!

Error Statistics GONE!

• 0 switched cases since go-live

Waste Completely Eliminated!
“It was amazing to watch everyone figure it out for themselves. Most saw on day one where they could eliminate checklists, but the next day, light bulbs really went off when the calls with questions from histology went away.”

—Carol Beth Taylor, MHS, PA(ASCP), HTL(ASCP), Lead Pathology Assistant
Grossing Workflow – Current Snapshot

Previous: 14 steps with 36% waste & 29% value-added
Current: 13 steps with 23% waste & 54% value-added

1. Specimen queued for grossing
2. Scan badge to ID blocks
3. Scan bottle and verify requisition match.
4. Remove tissue from container
5. Measure & enter notes to dictation
6. Add dye to mark margins
7. Section tissue as required
8. Place tissue in cassettes.
9. Add special instruction, tissue pieces, and scan cassettes into Barcode System.
10. Place cassettes in formalin basket
11. Place completed requisitions in dictation bin
12. Specimen wait for processing
13. Deliver to tissue processor

Previous: 14 steps with 36% waste & 29% value-added
Current: 13 steps with 23% waste & 54% value-added
Error Potential DECREASED!

- When grossing, wrong tissue in block is impossible.
  - Scan the bottle
  - Section tissue in bottle
  - Place tissue in cassette
  - Scan cassette
- Reduction of inaccurate information to histology
  - Real time entering means better accuracy.

Error Statistics GONE!

- 0 “wrong patient tissue in block” since go-live
- Less re-work for Histology in following steps
Embedding Workflow – Current Snapshot

Previous: 12 steps with 50% waste & 17% value-added
Current: 10 steps with 20% waste & 50% value-added

Scan badge to ID blocks
Scan cassette
Open cassette & verify pieces
Mark Quality Issue if needed
Take out tissue
Embed tissue in mold
Fill mold with paraffin
Place cassette on cooler tray
Cassette cools on cooler tray
Scrape excess paraffin & place on cutting tray
Double Work & Safety Nets Eliminated!!

- Incorrect # of pieces marked as Quality Issue in Barcode System at the workstation – allowing us to track it and decrease the Quality Issue

- Embed priorities (colored cassettes) first and then just embed in numerical order – no more sorting by Doctors, etc.

- Embedding & Processor Logsheets are GONE!!
“In microtomy, we made our own decisions as histotechs for what our protocols would be with the new technology. Standardizing our own processes, as opposed to being told exactly how to do it by someone outside our station, gave us ownership of the new path ahead of us.”

— Ary Franklin, HT(ASCP), Lead Histotechnician
Microtomy Workflow – Current Snapshot

Previous: 17 steps with 35% waste & 35% value-added
Current: 11 steps with 18% waste & 73% value-added

Scan badge to ID slides
Face blocks
Put on ice
Scan the block
Initiate cutting
Place tissue on water bath
Print the label
Pick up tissue section
Label the slide
Slides dry & load on tray
Take slides to stainer
Microtomy – Current Snapshot

Error Potential DECREASED!

• When microtomy is done correctly, mislabeled slides are not possible.
• No longer need to verify the blocks with the labels. Follow the procedure, slides are labeled correctly every time.
• **Standardization of work:**
  – Scan the block
  – Cut the slide
  – Print the label
  – Label the slide

Error Statistics GONE!

• **0 mislabeled slides**
• **0 wrong blocks cut** – Our Barcode System “double-checks” you. Ordered tests only shows on the correct block.

Double Work, Safety Nets & “Blame Game” are Completely Eliminated!
Case Assembly Workflow – Current Snapshot

Previous: 14 steps with 71% waste
Current: 10 steps with 40% waste
Case Assembly – Current State

Error Potential Eliminated
- No Slide & Block Comparison

Double Work & Safety Nets Decreased!!
- No need for slide & block comparison – Barcode system
- We have not moved - so travel time and distance associated with transport to the pathologists office is still the same.
Throughout implementation and in the days following go-live, philosophies shifted as employees realized they were being empowered to change work processes to better protect patients — and themselves — from errors. They quickly understood they could trust new automated work processes and stop double- and triple-checking every action.

“Now we operate in a culture of safety, not fear.”

— Ary Franklin, HT(ASCP), Lead Histotechnician
So come on in, the waters fine...
Benefits of the Barcode System

- Zero mislabeling errors in microtomy post go-live
- New accessioning process resulted in zero errors post re-design
- Workflow cost savings of $45,000/year
- Reduced turnaround time (TAT) by 24% in the first 6 months post go-live & have maintained to date
- Increased volume by 11% while also increasing the complexity of cases
- Integrated Quality Metrics and Performance Dashboards now drive daily management and improvements
- Decreased overall recut rate by 37% and significantly reduced overall reprocessing rate
- Eliminated six paper-based worklists, previously used for labor-intensive manual tracking and safety nets
Added Benefits of the Barcode System

• Greater visibility into operations, we can now track:
  – All blocks & slides in the process (we can see where they are located and when they will be complete)
  – Staff Productivity (for performance evaluations & building new staff competencies)
  – Workflow Visibility
  – Quality Issues (helps us identify process problems, eliminate waste & retrain staff when appropriate)
Real-Time Specimen Tracking

- Can access where the specimen is in the workflow
- Who touched the specimen at each step
  - Accessioning
  - Grossing
  - Embedding
  - Microtomy
  - Case Assembly
• Reports are broken down by each staff member
  – By the hour
  – By the task
  – Customize it for date ranges
  – Can be exported to Excel
Accurate Staff Productivity Metrics

2013 Staff Productivity - Histology/IHC

- IHC 3
- IHC 2
- IHC 1
- Non HT 4
- Non HT 3
- Non HT 2
- Non HT 1
- HT 9
- HT 8
- HT 7
- HT 6
- HT 5
- HT 4
- HT 3
- HT 2
- HT 1

% Embed
% Cut
**Workflow Visibility**

- Customizable user screen
- Able to evaluate
  - Workflow
  - Staff productivity
  - Top quality issues
- Customizable by day, week, month, etc.
Quality Metrics Trending

- You can customize the Quality Issues for your lab.
- Reports again can be:
  - Customized for a date range
  - Exported to Excel
- Reports list each Quality Issue entered during the date range & tells you:
  - Case Number
  - Tissue Type
  - Who reported the quality issue
  - What date
  - What the next step was going to be
So you have all this data...now what???

• Take the most complained about issue
• Use a Lean tool – A-3 Root Cause Analysis Tool
• Collect data – quantify the problem
  – You now have a way to collect the data – Barcode System – Quality Issues Report
• Eliminate root causes one by one
• Track/analyze data

Don’t jump to conclusions - that leads to the “blame game”! Follow the process!!
Our preferred Lean Tool – the A3

• **A3 (a-three)** A problem-solving tool to identify the root cause of a problem. The name refers to the paper size 11x17” used for this report. Allows the story to be told on one page—displays all the relevant data and facts related to a problem, project, or proposal.

  **So let’s do one!!**
A-3 Example

**ISSUE** (problem statement)

**BACKGROUND**

**CURRENT CONDITION**

**PROBLEM ANALYSIS** (root cause theories)
Fishbone or 5-Whys

**IMPLEMENTATION PLAN**
Define and verify (test/pilot) corrective actions

<table>
<thead>
<tr>
<th>Action</th>
<th>Owner</th>
<th>Time Frame</th>
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**BENEFITS / RESULTS**

**FUTURE STEPS**
1.  
2.  
3.  
4.  
5.  

**TEAM**
1st: Most Complained about Issue???

- AP is experiencing too many reprocessed/raw/underprocessed blocks.
• We have three different processor types:
  – Small biopsies
  – Routine tissue
  – Fatty tissue
3rd: Problem Analysis

• Five Whys???

• 5 WHY ANALYSIS (five why’s) A problem solving technique where you ask "why?" five times in order to get to the root cause/causes of the problem. The actual number of why’s is not important, as long as you get to the root cause.

• Remember the Quality Issues Report that is generated? This is where you make it work for you.
3rd: Problem Analysis – “Why am I getting raw tissue?”

• Tissue was on “wrong” processor – Why?
  – Too many options to remember
  – Not enough training - Lack of Histology/Gross Lab cross training

• Tissue was cut too big/thick – Why?
  – Sloppy
  – Inexperience - Lack of Histology/Gross Lab cross training
  – Rushed to meet TAT
  – Rushed to meet processor start times

• Cassettes are over-stuffed with too many pieces-
  Why?
  – Lack of Histology/Gross Lab cross training
3rd: Problem Analysis (continued) – “Why am I getting raw tissue?”

- Inexperienced - Why?
  - Lack of Histology/Gross Lab cross training

- Rushing to meet TAT – Why?
  - Sloppy
  - Inexperienced - Lack of Histology/Gross Lab cross training
  - Cutting fresh tissue

- Cassettes in baskets are too close together – Why?
4th: Implementation Plan

• Purchase processor basket with spacers
• Reduce processor options to two types
• Monitor the number of raw tissue blocks and causes
• Implement Histology/Gross Lab cross training
• Evaluate a Rapid Tissue Processor

Give yourself deadlines for each item.
5th: Benefits/Results

• No staffing changes required due to changing processor schedules
• Alleviation of grossing staff stress due to extending processor start times
• Extension of Long processor deadline
• Decrease in Raw Tissue
6th: Future Steps

• Monitor raw block count daily
• Monitor wrong processor frequency
• Monitor TAT
• Monitor grossing staff & frequency of raw tissue
Example of Our A3

**ISSUE**
AP is experiencing too many reprocessed/under processed blocks.

**CURRENT CONDITION**
Currently we have three different types of processors:
1. One for small biopsies, which processes tissue in 5-6 hours.
2. One for fatty tissue, which processes tissue in 16 hours.
3. One for routine tissue, which processes tissue in 10 hours.

**PROBLEM ANALYSIS**
1. Wrong processor
   a. Too many options to remember
   b. Not enough training
2. Tissue cut too big
   a. Sloppy
   b. Rushed to meet TAT
   c. Rushed to meet processor start times
   d. Inexperience
3. Cassettes overstuffed with too many pieces
   a. Lack of histology/gross room cross training
4. Inexperienced
   a. Lack of histology/gross room cross training
5. Rushing to meet TAT
   a. Sloppy
   b. Cutting fresh tissue
   c. Inexperience
6. Cassettes in baskets are too close together

**IMPLEMENTATION PLAN**

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<thead>
<tr>
<th>Action</th>
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<tbody>
<tr>
<td>1. Eliminate options to only two processor types – Ary – 1/9/2013</td>
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<tr>
<td>2. Monitor the number of under processed tissue and over-stuffed &amp; grossing staff responsible – Ary &amp; Carol Beth – continual</td>
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<tr>
<td>3. Implement Histology/Gross Room cross training – Ary &amp; Carol Beth – January 2013</td>
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<td>4. Investigate other basket options from vendors – Ary – currently</td>
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<tr>
<td>5. Evaluate a Rapid Tissue Processor</td>
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**BENEFITS / RESULTS**
1. Extend the fatty tissue deadline.
2. Alleviate inexperience grossing personnel stress by extending the fatty tissue deadline.
3. Potential decrease of TAT with the addition of a second fatty tissue processor.
4. No Histology staffing changes.
5. No Gross Room staffing changes.
6. Potentially less under processed/reprocessed tissue.

**FUTURE STEPS**
1. Monitor reprocessed block count per day.
2. Monitor possible increase in over processed block count per day.
3. Monitor stain quality. When this change is implemented, we are hoping to have Daniel from Ventana onsite to troubleshoot any possible staining changes.
5. Monitor TAT.
6. Monitor grossing staff & frequency of under processed tissue.
7. Purchase of processing baskets with separation between cassettes.
8. Monitor the need for additional fixation or longer processing times.

**TEAM**
1. Ary Franklin
2. Carol Beth Taylor
3. Dr. Beissner
Quality Issues & Resolution

Total # of Cases Reprocessed - 2013
Quality Issue Resolution