




Achieving Small Batch Work Flow in AP to Achieve Faster TAT and Better Quality Results

Henry Ford Hospital

Lab Quality Confab VI, Nov. 6, 2012

 Richard J. Zarbo, MD
DETROIT, MICH.
Pathology and Laboratory Medicine

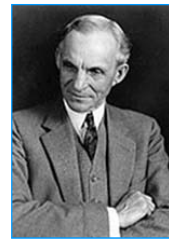
Disclosure

No conflicts of interest

Continuous Improvement in Anatomic Pathology

“We know from the changes that have already been brought about that far greater changes are to come, and that therefore we are not performing a single operation as well as it ought to be performed.”

– Henry Ford



© Henry Ford Health System

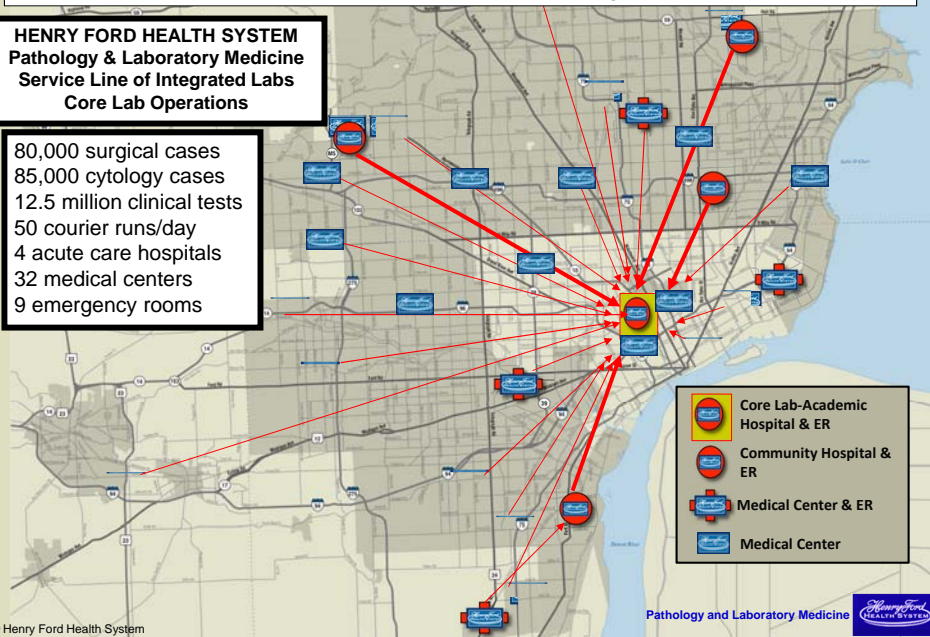
Pathology and Laboratory Medicine



Hub & Spoke Delivery Model

HENRY FORD HEALTH SYSTEM
Pathology & Laboratory Medicine
Service Line of Integrated Labs
Core Lab Operations

80,000 surgical cases
85,000 cytology cases
12.5 million clinical tests
50 courier runs/day
4 acute care hospitals
32 medical centers
9 emergency rooms



© Henry Ford Health System

Pathology and Laboratory Medicine



The Vision & Means & Goals

- All specimens from any Operating Room within the Henry Ford Health System 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

© Henry Ford Health System

Pathology and Laboratory Medicine



Foundations of Lean Production



© Henry Ford Health System

Pathology and Laboratory Medicine



Strive for the IDEAL Condition

Delivery of products & services should pursue the Ideal

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

Pathology and Laboratory Medicine



© Henry Ford Health System

Tradition vs Impossible

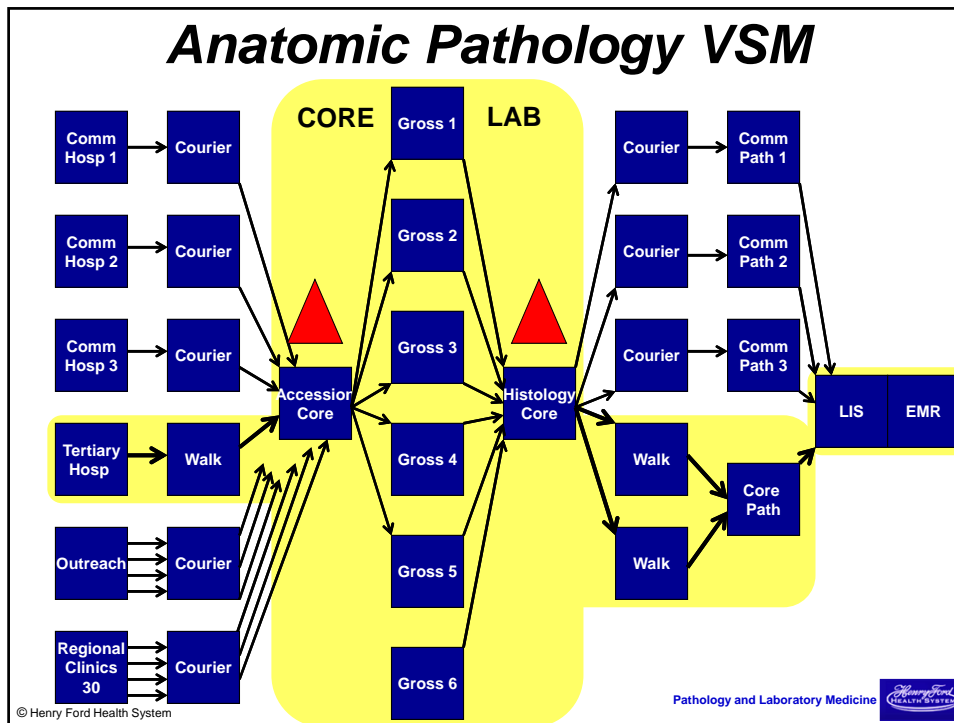
"It is not easy to get away from tradition. That is why all our new operations are directed by men who have had no previous knowledge of the subject and therefore have not had a chance to get on really familiar terms with the impossible."

– Henry Ford

Pathology and Laboratory Medicine



© Henry Ford Health System



The Challenge

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 triaged to Tumor Board presentations at 4 hospitals

Lean Operational Efficiency

- **Continuous flow goal**
 - Centralized production for Accession, Gross, Histology, all Stains and Slide disbursement
- **Operational challenges**
 - Load leveling**
 - **Original condition**- 1 histology shift
 - **Challenge**- Match courier with specimen availability and workers with volumes of work around the clock
 - Batch size reduction**
 - **Original condition**- overnight large specimen batch processors, same-day rapid cycle processing of small biopsies only since 2004
 - **Challenge**- rapid cycle processing of large specimens & biopsies
 - Work simplification and mistake-proofing**
 - **Original condition**- Barcoded operation with transcription-less & paper-less gross, histology and signout
 - **Challenge**- same-day metrics of successful production and defect resolution between hospitals

© Henry Ford Health System

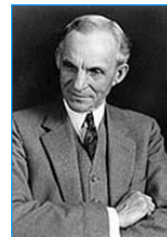
Pathology and Laboratory Medicine



Lean Principle Start with Work Simplification

*“Every well thought-out process is simple.
We can at least save the waste of human labour
in handling and transportation.”*

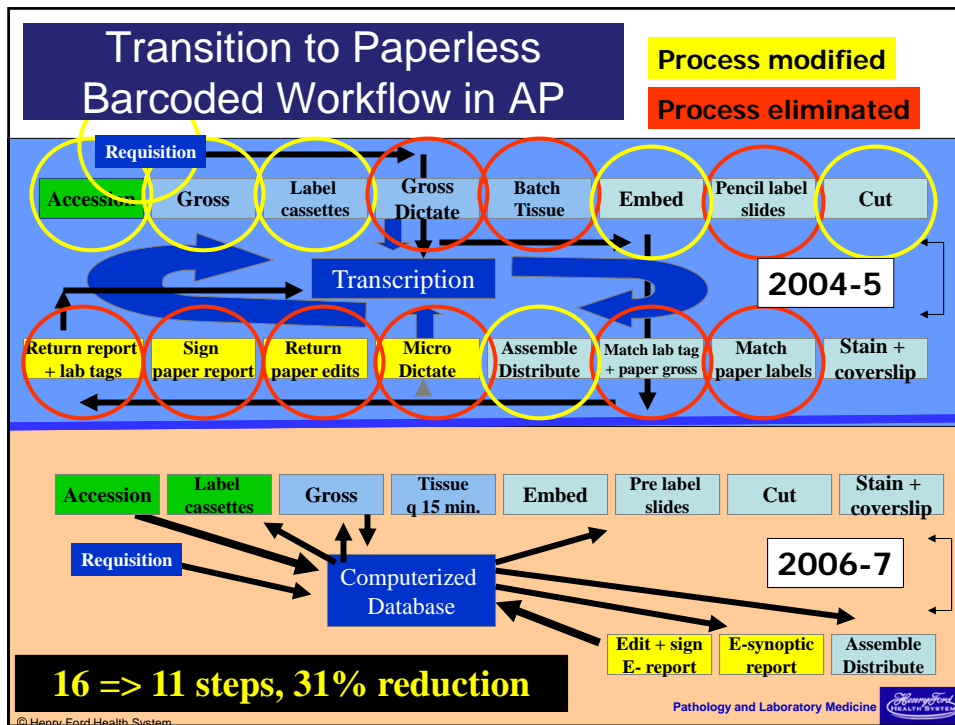
– Henry Ford



© Henry Ford Health System

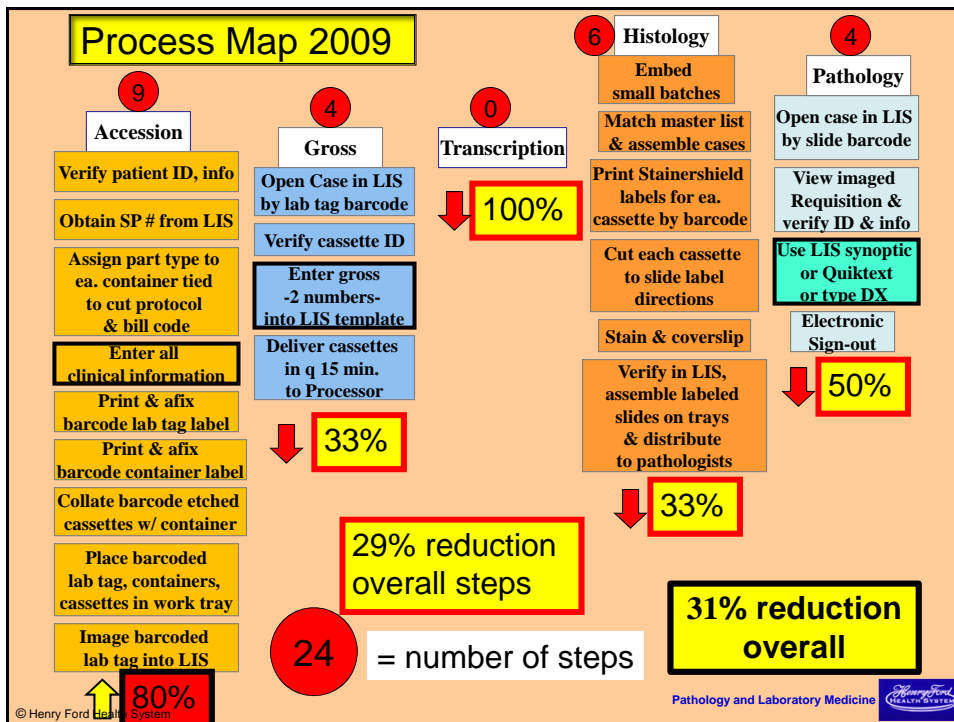
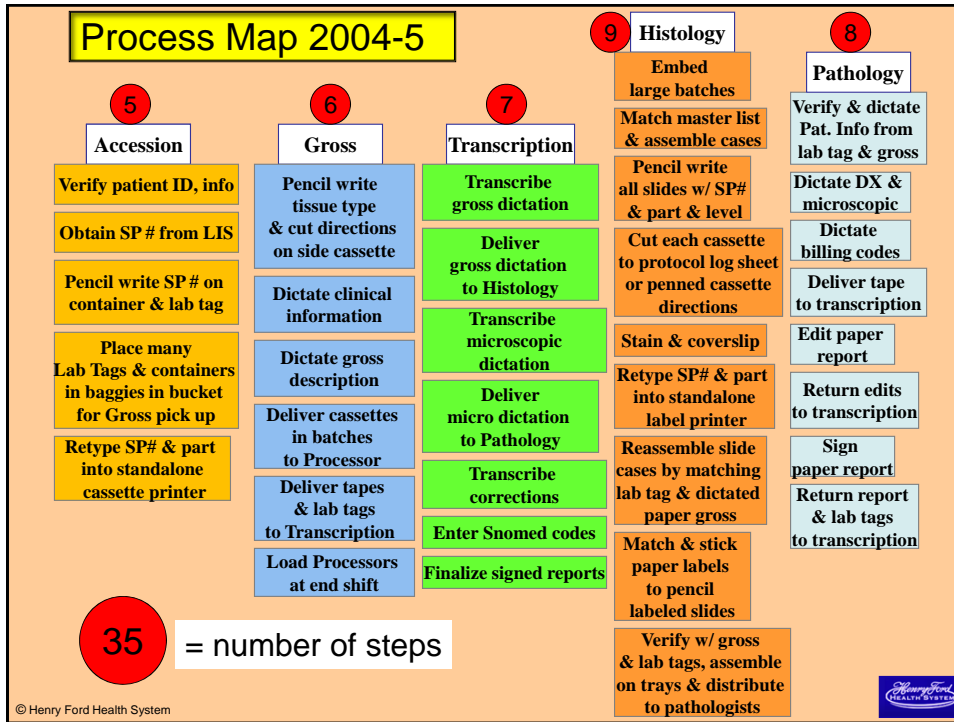
Pathology and Laboratory Medicine





Key Changes 2004-2008

- Work simplification & standardization reinforced by LIS design and barcode technology
 - Elimination of dictation 100% cases (-3 FTE transcription)
 - Gross & Diagnostic templates tied to LIS part types
 - Bar code specified work processes- accession to signout (2006)
 - Barcode design integrated with LIS (partner General Data)
 - Elimination internal mis-IDs (- 1.3 FTE rework)
 - Adopt chemical resistant slide labels (StainerShield DT)
 - Eliminate pencil writing glass slides (-0.37 FTE histotech)
 - Eliminate slide label matching post stain (-1.0 FTE histotech)



Accession

Simplified Activities

All work is highly specified and front-loaded



© Henry Ford Health System

Pathology and Laboratory Medicine



Key Changes 2004-2008

- Laboratory structural redesign, work cell design & standardization



- Linear flow
- U-shaped individual workcells

© Henry Ford Health System

Pathology and Laboratory Medicine



Key Changes 2004-2008

- Organized workflow, visual standard work, priority specimen streams



© Henry Ford Health System

Pathology and Laboratory Medicine



Work Simplification Redesign

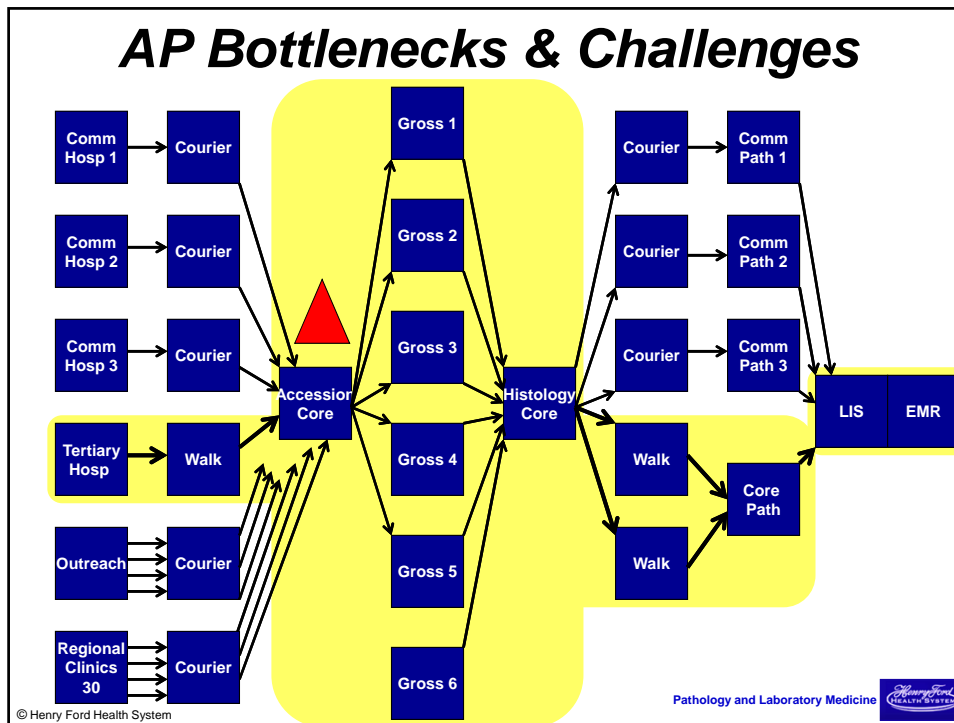


eliminated

© Henry Ford Health System

Pathology and Laboratory Medicine





Accession Core

- Resolving the bottlenecks
 - 2 shifts (16 hours) (7AM-11PM)
 - Standard work, QC checked, barcode production
 - Small batches, continuously pulled
 - Dictation-less
 - Front-loaded entry all clinical data, billing codes
 - Specimen tracking & delivery metrics
 - Case batch creation for internal tracking
 - Daily maintenance kaizen
- Lean aligned technology

- Laser etched cassette 2D barcodes
- Scanned, LIS attached requisitions

Gross Core

- Resolving the bottlenecks
 - 2 shifts (17.5 hours) (6AM-11:30PM)
 - Standard work, barcode driven, LIS integrated
 - Small batches, continuously pulled
 - Dictation-less
 - Daily maintenance kaizen
- Lean aligned technology, case embedded

- LIS gross templates, quick text, synoptics
- Digital gross images
- Digital specimen radiography

© Henry Ford Health System

Pathology and Laboratory Medicine



Accession & Gross Core Redesign

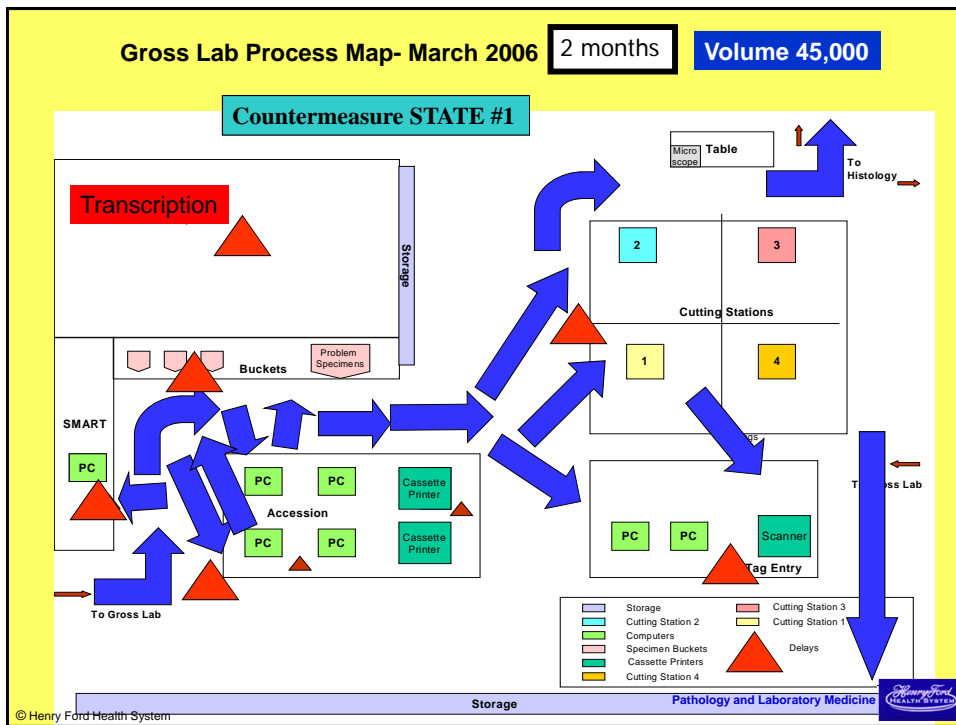
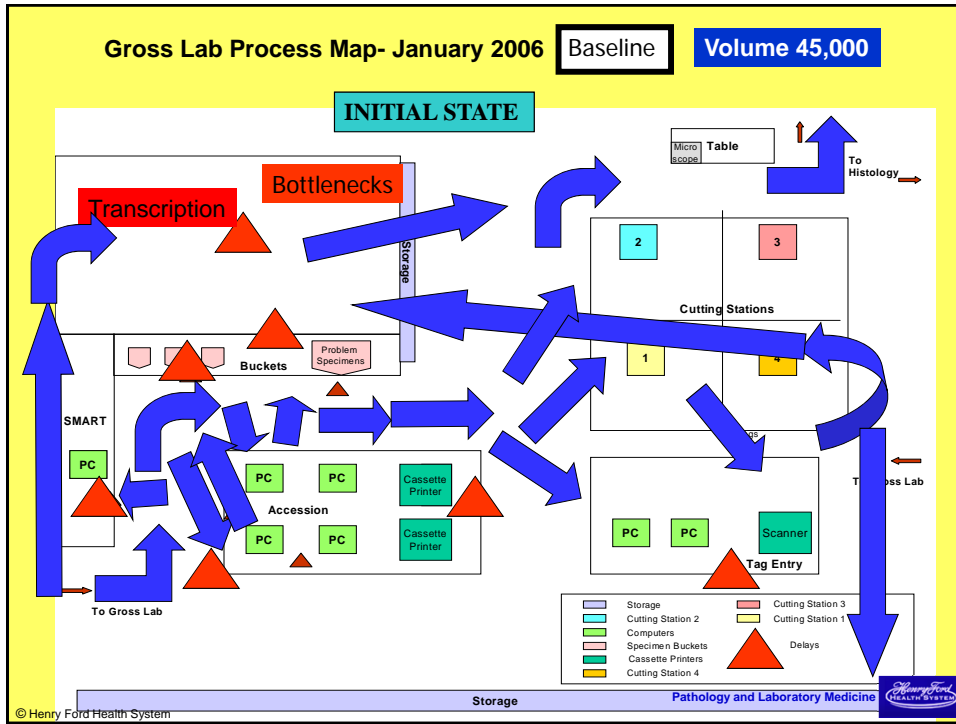
“Our own attitude is that we are charged with discovering the best way of doing everything, and that we must regard every process employed in manufacturing as experimental.”

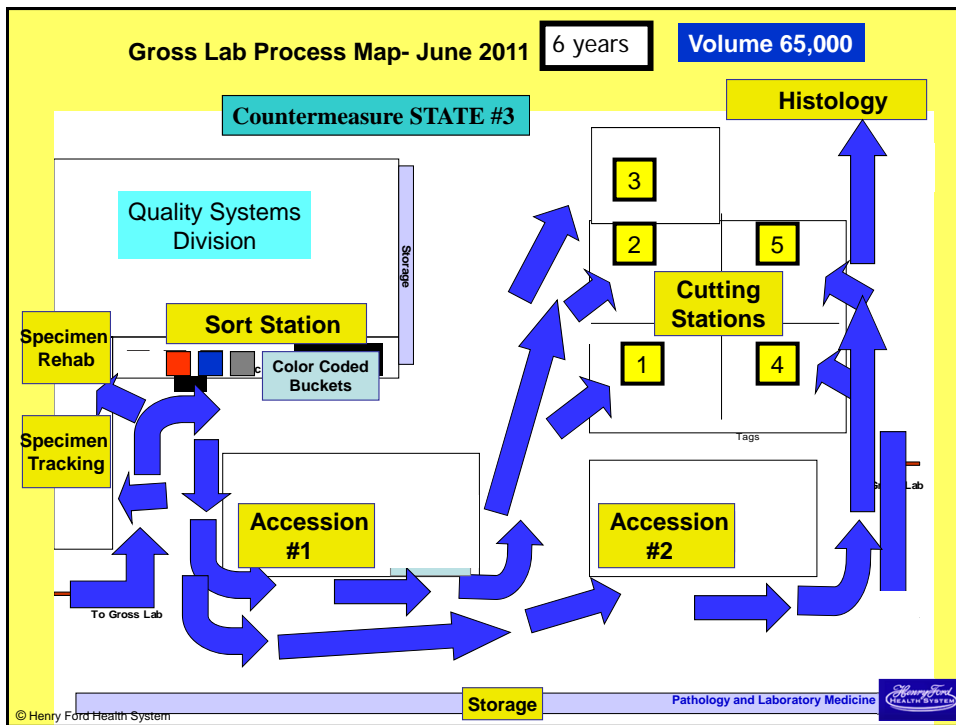
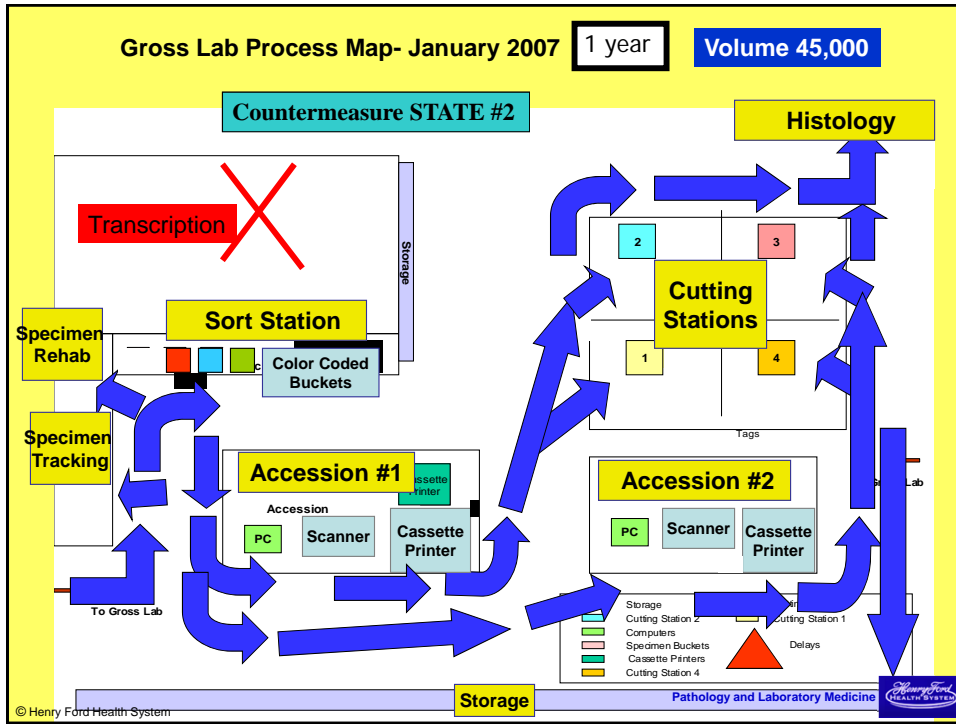
– Henry Ford

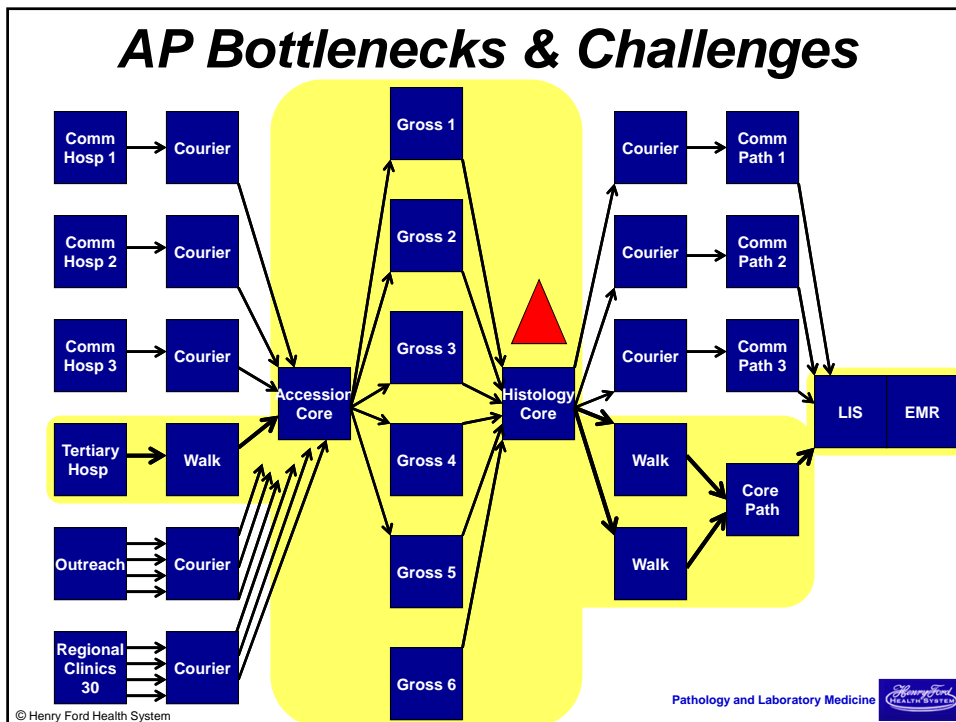
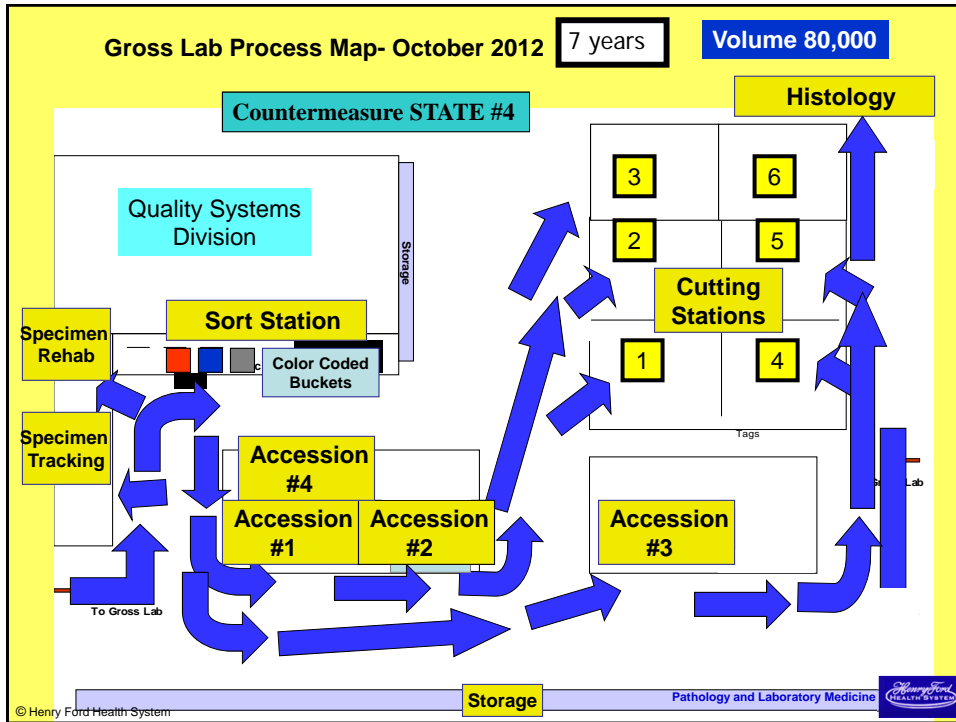
© Henry Ford Health System

Pathology and Laboratory Medicine









Histology Core

- Resolving the bottlenecks
 - 2.5 shifts (20 hours) (5AM-1AM)
 - Standard work, barcode driven, LIS integrated
 - Small batches, pull
 - Daily maintenance kaizen
- Lean aligned technology

- **Rapid cycle times**
- **Adapted to small batches**
- **Continuous Flow Production**
- **Closer to ideal flow one at a time**

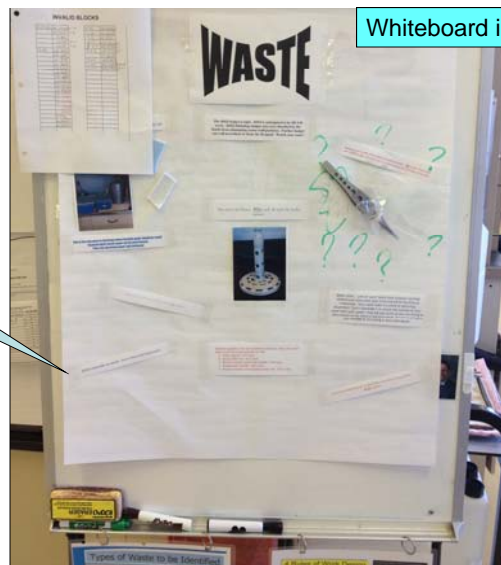
© Henry Ford Health System

Pathology and Laboratory Medicine



In Search of a Batch

“All this waste adds up quickly. Here’s where your bonus went!”



Whiteboard in Histology

© Henry Ford Health System

Pathology and Laboratory Medicine



7 AM AP Core Lab- Accession & Gross



To be accessioned same day arrival



Accessioned previous evening



Gross from previous evening

© Henry Ford Health System

Pathology and Laboratory Medicine



7 AM AP Core Lab- Histology



To be embedded



Cutting, 3 of 15 stations



Blocks to be cut



Slides to be stained



Cases delivered

© Henry Ford Health System

Pathology and Laboratory Medicine

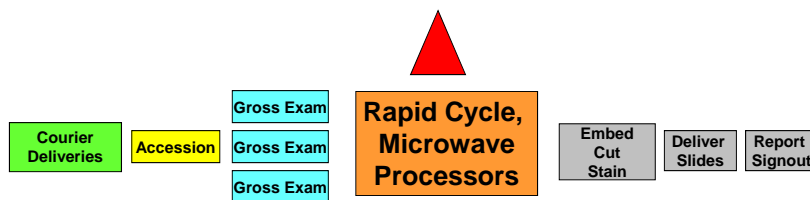


4 PM AP Core Lab- Level Load, Pull



Continuous Flow Promoted by Technology

Small Batches, Rapid Cycle Times Promote Flow



MoTown Motion- Continuous Flow

Bergamo Boulevard

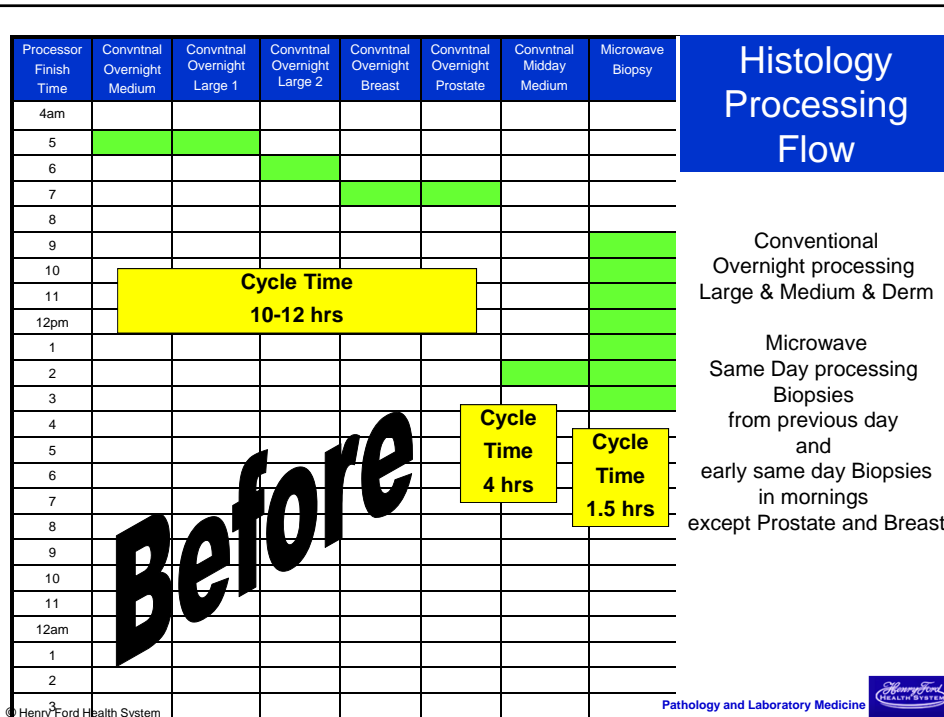


Woodward Avenue



© Henry Ford Health System

Pathology and Laboratory Medicine

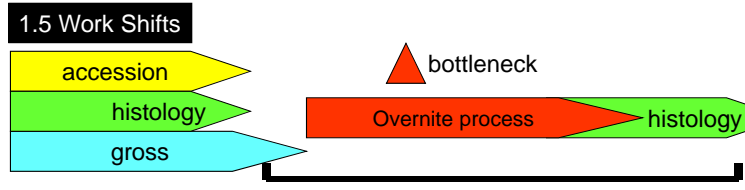
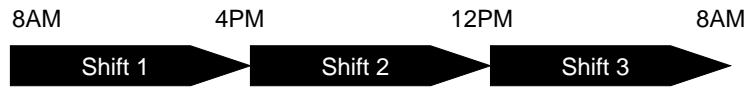


© Henry Ford Health System

Pathology and Laboratory Medicine

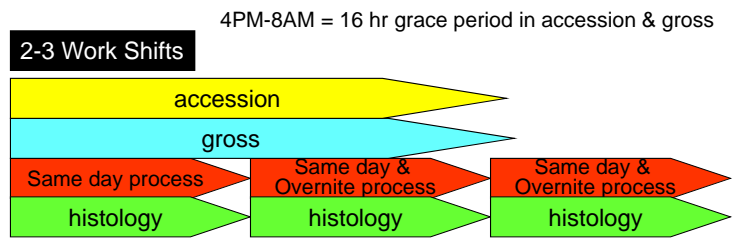


When Does the Clock Start?



8 hr
accession
clock

Perception of better TAT from time of Accession but not time of collection



16 hr
accession
clock

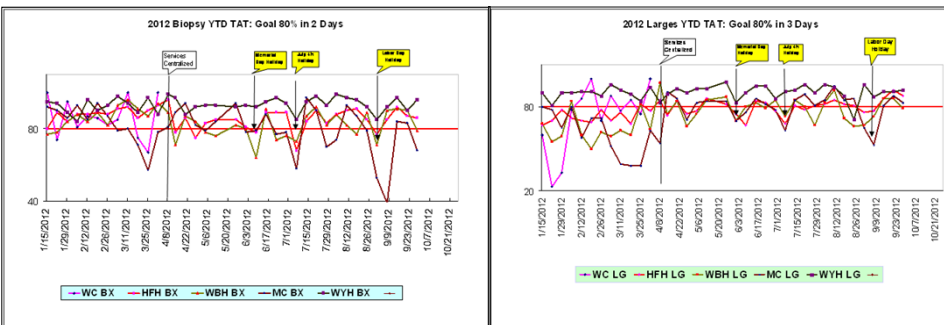
4PM-8AM = 16 hr grace period in accession & gross

© Henry Ford Health System

Pathology and Laboratory Medicine



TAT Outcomes



© Henry Ford Health System

Pathology and Laboratory Medicine



Work Flow, Pull & Smoothing Opportunities

Structure and management

Horizontal management across work stations, divisions
 Defined workcells, team leaders, teams along path of work, partnerships

Workplace physical redesign

U or linear workstations to reduce motion
 Inventory relocated to workstations

Work redesign for continuous flow and pull

Sensitization to time waste and in-process defects
 Reduction cycle times
 Front loading work in the path of workflow
 Elimination of loops, forks
 Reduction of steps
 Maintenance of sequence of parts
 Load leveling across shifts and hours
 Batch size reduction
 Visual workplace to surface defects daily for correction by teams
 Standardized activities, connections, pathways

Kanban system

Production kanbans to promote pull production & communication
 Inventory kanbans for JIT, recovery of stock room space

Metrics to monitor and target variation

Daily metrics to monitor performance variation
 Whiteboards to identify in-process defects and outliers
 Feedback loops to inform defect repair in real-time by empowered teams

© Henry Ford Health System

Pathology and Laboratory Medicine



Now that we have a functional System of Work

- What's next?

-  Defect Free
-  On demand
-  Immediate
-  One at a time
-  Continuous flow
-  Minimal waste

➤ **Safely for every employee**

© Henry Ford Health System

Pathology and Laboratory Medicine



What does Kielbasa

Employee safety and pre-analytic specimen quality have in common?



© Henry Ford Health System



Formalin



© Henry Ford Health System

Pathology and Laboratory Medicine



Vacuum Seal



© Henry Ford Health System

Pathology and Laboratory Medicine



Formalin Avoided



© Henry Ford Health System

Pathology and Laboratory Medicine



Vacuum Sealed, Refrigerated BioSpecimen Transport System*

TissueSAFE Trials 2012

- 1, 2 & 3 days tissue storage, under vacuum at 4° C, compared to paired formalin fixed tissues
- Specimen transport 25 miles from Community hospital to Core Lab, 1-2 days before fixation
- Specimen transport from ORs of Main hospital to Core Lab, 1-10 hrs before fixation

Vacuum sealed tissues held at 4° C are preserved for histologic assessment when held in that state up to 48 hours

Promising new technology to eliminate formalin from ORs and dramatically reduce Lab use of formalin and disposal costs

*TissueSAFE, Milestone Medical, Kalamazoo, MI

© Henry Ford Health System

Pathology and Laboratory Medicine



Lessons Learned- Must DOs

A centralized lab can be just as efficient as a small 'boutique' lab but provide higher levels of specialization & quality with lower \$\$

Involve those that do the work in its redesign

Educate your workforce so that they:

- 1. Know the goals and reasons for change***
- 2. Know what good work redesign looks like***
- 3. Are accountable for quality on a daily basis***

Select appropriate technology to meet the goal

"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

© Henry Ford Health System

Pathology and Laboratory Medicine



Lessons Learned- Must AVOIDs

Set the goal from above, but don't solve the minutiae

Don't rush it, this is a team that learns together

Don't fail to delegate

Don't fail to meet, regularly

Don't avoid transparency, visible measures and accountability

Don't forget to recognize contributions

Don't take the credit

*"It is amazing what you can accomplish
if you do not care who gets the credit."*

-Harry Truman

© Henry Ford Health System

Pathology and Laboratory Medicine



Conclusion

*"I cannot discover that anyone knows enough to say
definitely what is and what is not possible."*

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

- Henry Ford



© Henry Ford Health System

Pathology and Laboratory Medicine

