Success in the High-Volume Grossing Lab:

How We Achieved 18 Months of Zero Errors in Specimen Labels and Sustained it

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Gross Dissection

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Teach, facilitate, adapt Lean principles

ARUP's Gross Dissection Laboratory primarily services University of Utah Hospital and Clinics.

In fiscal year 2010 and 2011, the Gross Dissection Laboratory processed 57,654 patient cases (203,177 histology blocks):

- Dermatologic

- Surgical

- Autopsy

Internal Labeling Errors in a Surgical Pathology Department: A Root Cause Analysis

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ABSTRACT

Objective: To use statistical and root cause analysis to clarify relationships between labeling errors and causal factors in an anatomic pathology gross room and to identify potential solutions.

Methods: Retrospective analysis was performed on quality-assurance records of Associated Regional and University Pathologists (ARUP) Laboratories/University of Utah Department of Pathology between July 2009 and April 2011.
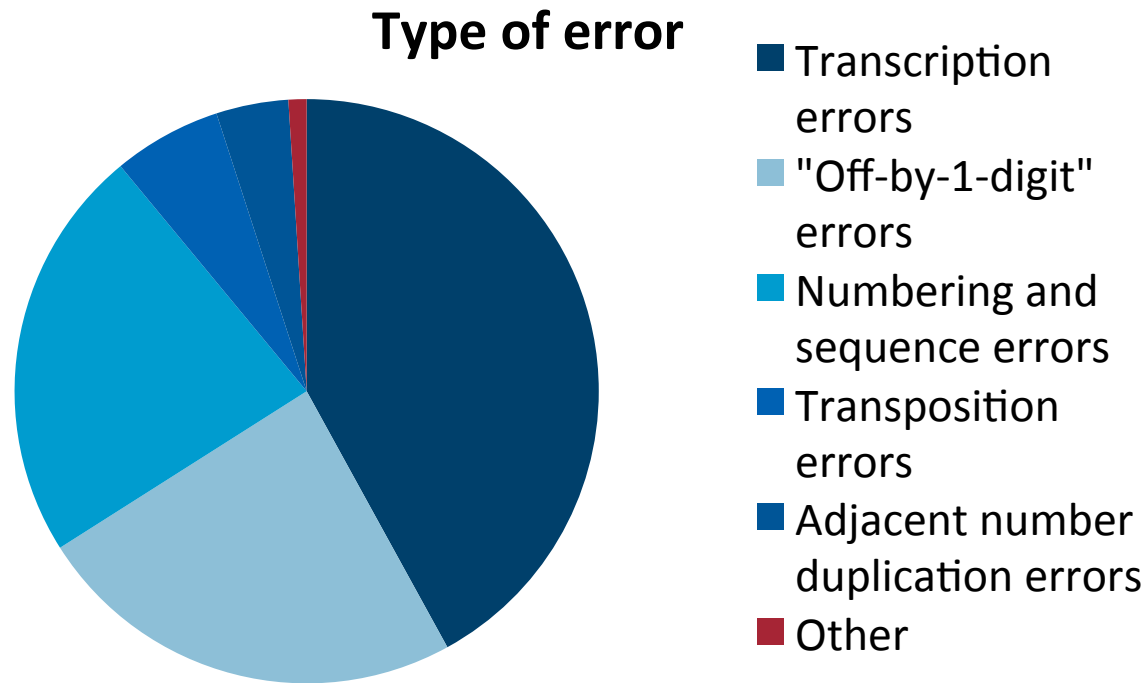
Results: Eighty-five errors had occurred among the 45,000 cases processed over the study period. A total of 27.0% of errors were committed by residents, although they processed only 5.5% of cases.

Errors were associated with case complexity. Root cause analysis identified the mechanical cassette labeler, the size and layout of the gross room, and process standardization as areas requiring improvement.
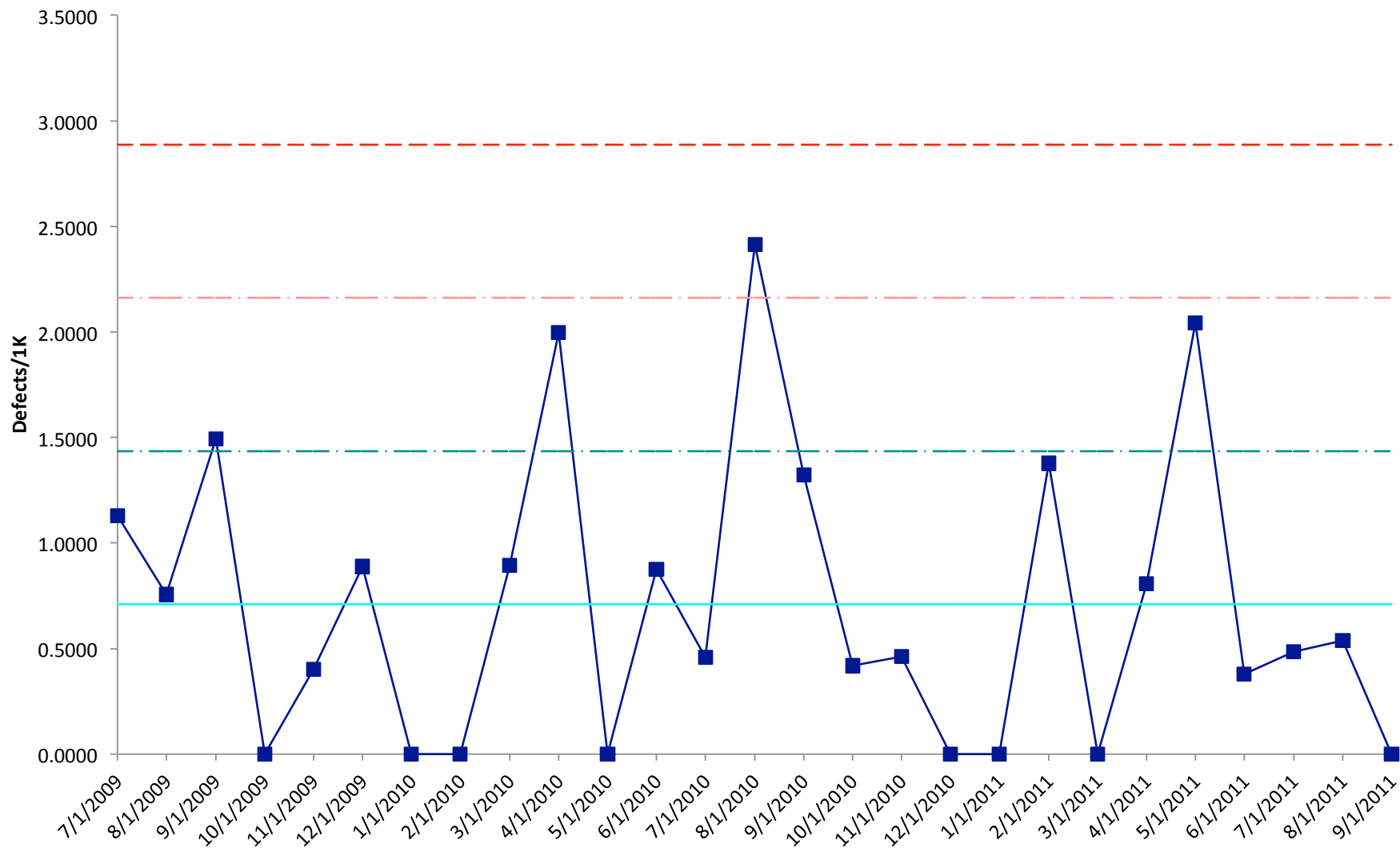
Conclusion: Labeling errors in an anatomic pathology laboratory appear to be endemic and show an association with case complexity, employee type, and certain time periods. Root cause analysis suggested improvements in equipment, standard practices, employee training, and design of the laboratory space.

Keywords: specimen labeling, root cause analysis, surgical pathology, quality management, errors, error classification

ARUP LABORATORIES | NATIONAL REFERENCE LABORATORY

In this two-year study, 84 labeling errors were identified within the Gross Dissection Laboratory (0.15% rate of error)

Type of error

- Transcription errors
- "Off-by-1-digit" errors
- Numbering and sequence errors
- Transposition errors
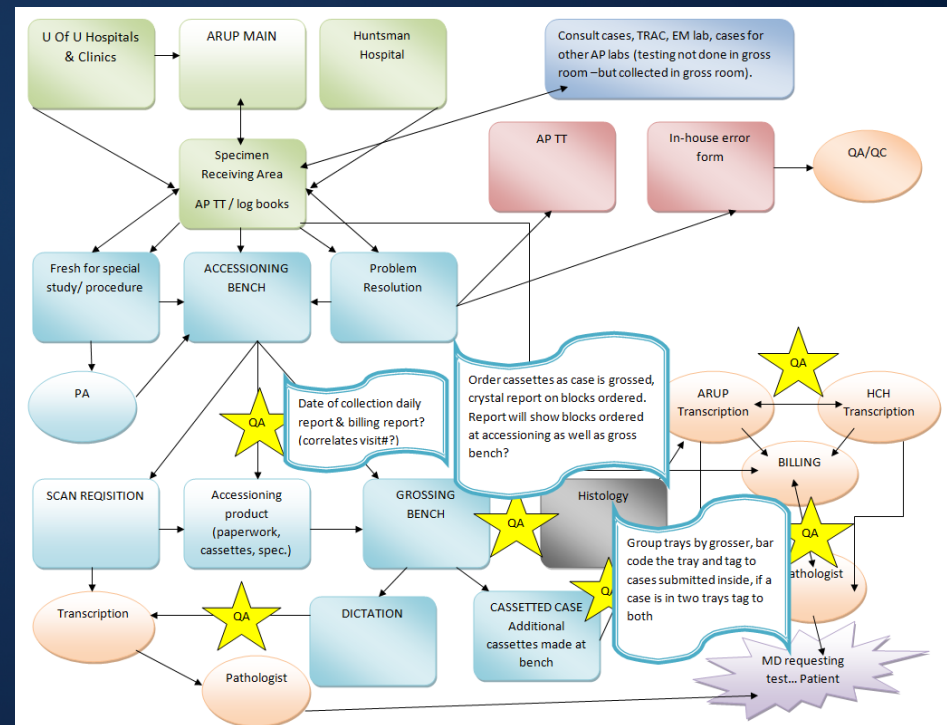- Adjacent number duplication errors
- Other

Mislabeled Samples / 1,000 Cases
(Major Only)

Employee Training

Quality Process Improvement Course

- Mind map

- Flow charts

- Lean

Accessioning Standardization

Video recorded

No set standard

No set procedure for problems

Assistance created confusion

Hand written numbers

Name	Sorting	AP TT	Accession	Order Frozen sections/ Cassettes	Photo Copy Req.	Print labels /cassettes
	Pulls out outside department cases and surgicals. Sort Bx's in every other order, pulling problem cases as she accessions. After accessioning files handles problem specimen.	Inlabs outside cases to go on the 7:30 run. Uses the extra labels accessioning (matches to pat. name). One big batch and verifies cases by 10am. Verifies after all accessioning is complete.	Accessions in the usual manner *see additional doc for full process.	At the end of accessioning goes back and orders, labels and logs.	Last step prior to printing cassettes. Does this in a "tray" batch organization, after she fills a tray she puts the paperwork out with tray to be copied and get cassettes made.	Prints labels after a tray is full or after the specimen group or batch is completely accessioned. Then goes back to AP TT after all "drop" cases are completed.
	He starts by making several piles separating the UGI BX, LGI BX, and misc. bx. He pulls from each pile as he goes. (sets aside AP TT later). Pulls out non-matching specimen. Files excepts after all accessioning complete.	Inlabs as he goes, in batches. One big batch verifies after all accessioning is complete.	Pulls from every other pile and then accessions in the usual manner *see additional doc for full process.	At the end of accessioning goes back and orders, labels and logs.	Last step prior to printing cassettes. Does this in a "tray" batch organization, after she fills a tray she puts the paperwork out with tray to be copied and get cassettes made.	Prints labels after a tray is full or after the specimen group or batch is completely accessioned. Then goes back to AP TT after all "drop" cases are completed.
	She starts by making several piles separating the UGI BX, LGI BX, OBGYN, and misc. bx. She then opens and lays out each specimen, pulling the APTT stickers (sets aside to AP TT later). Pulls out non-matching specimen. Files excepts after all accessioning complete.	Inlabs outside cases to go on the 7:30 run. Inlabs as she goes, in batches. One big batch and verifies cases by 10am. Verifies after all accessioning is complete.	Pulls from every other pile and then accessions in the usual manner *see additional doc for full process. However I noticed she struggles when picking the correct visit number and needs more help understanding which visit number is ok to use (calls client too often).	During accessioning orders, labels and logs.	Last step prior to printing cassettes. Does this in a "tray" batch organization, after she fills a tray she puts the paperwork out with tray to be copied and get cassettes made.	Prints labels after a tray is full or after the specimen group or batch is completely accessioned. Then goes back to AP TT after all "drop" cases are completed.

Accessioning Standardization

Standardized receiving and accessioning procedures

Created escalation protocol for problems

Barcode labels

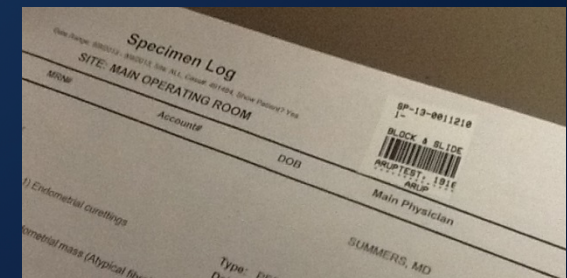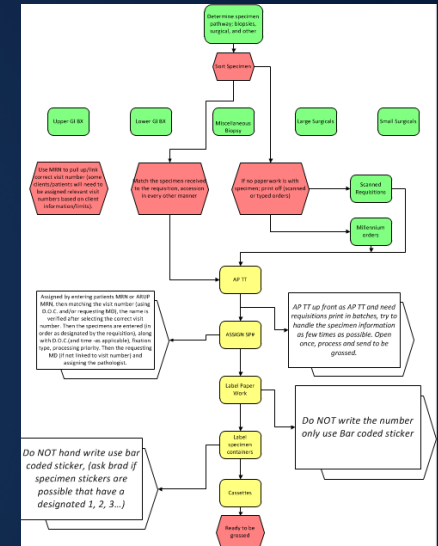| Nov 2010 to Nov 2011	Change
Average accessioning time	-22%
Time to delivery of first batch	-65%
Accessioning errors	-65%
New hire training time	-50%

"The biggest improvement is that everyone is on more of the same page concerning questions in how the process works. Besides speed, these improvements seem to have improved accuracy along the process." - *Technician*
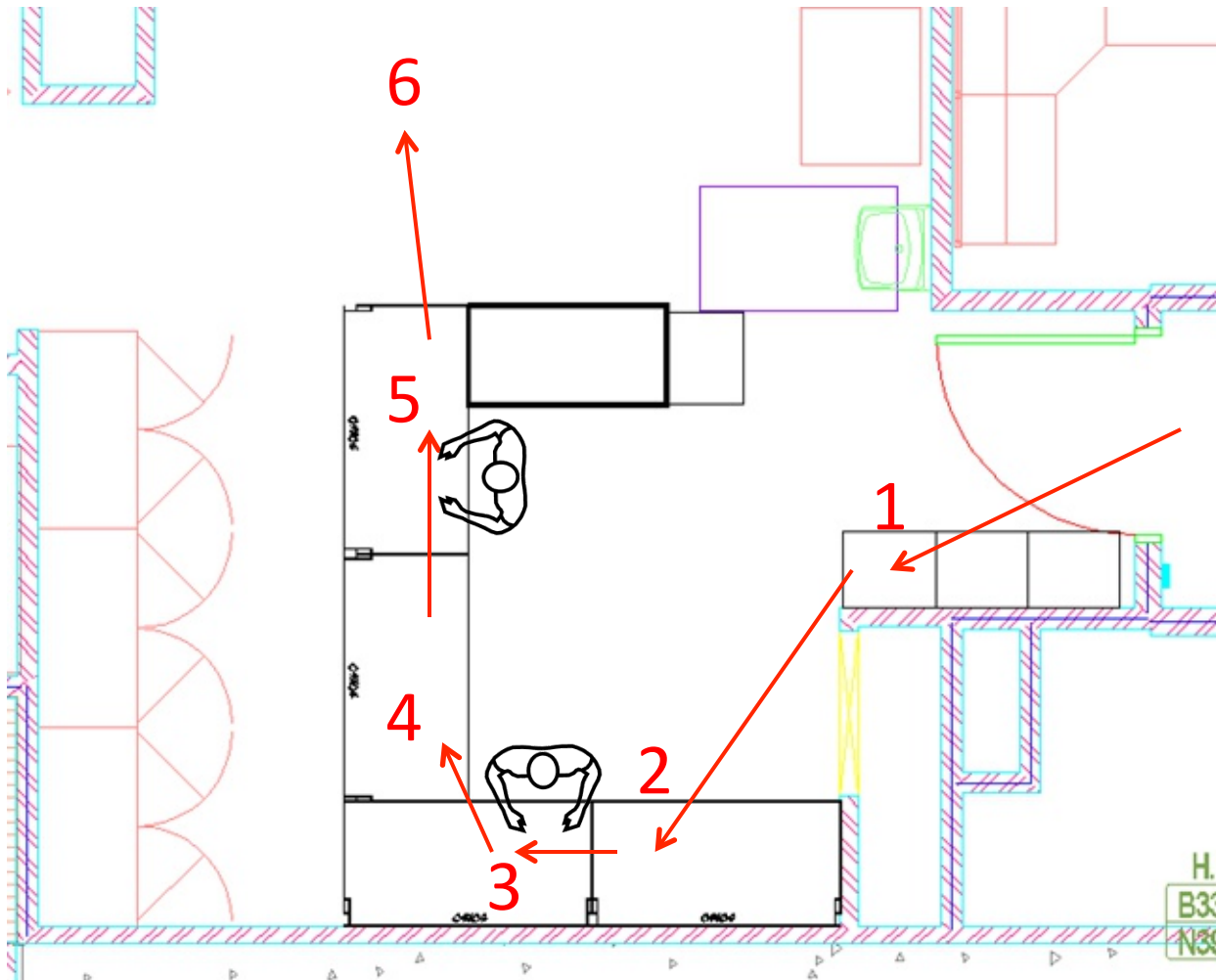
Accessioning Area layout

Backs to door

Multiple transfers

One accessioning computer

One cassette labeling computer

Old Layout

1: Drop off

2: Holding area

3: Accessioning

4: Batch holding area

5: Cassette labeling

6: Cart for delivery

Accessioning Area layout

Employee's idea

Face to face interaction

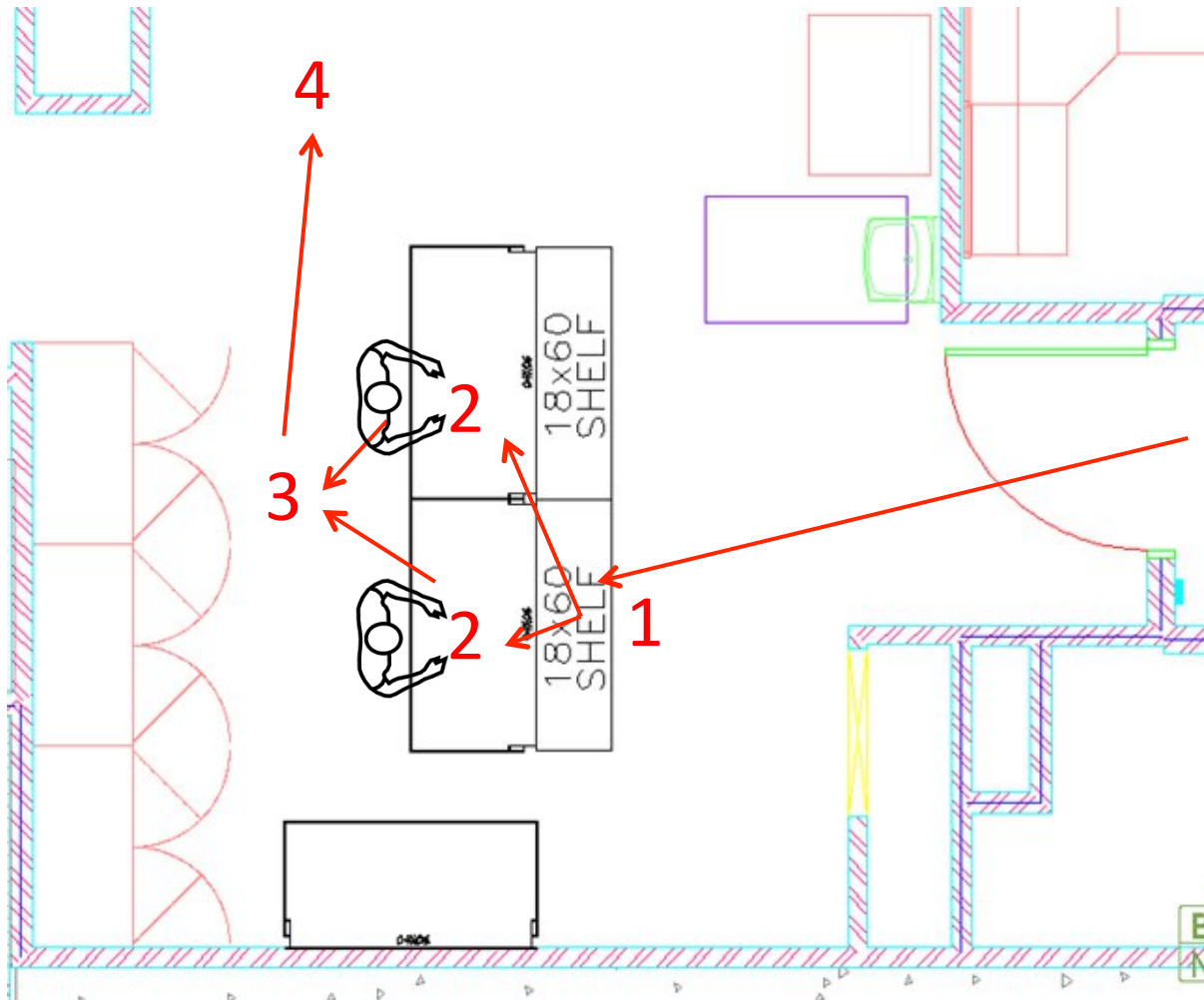Two accessioning computers

Both access cassette labeler

Drop off area is holding area

"[The new layout] has definitely helped with the receiving portion of the process...it helps to avoid mistakes with people taking and leaving specimens." - *Technician*

New Layout

1: Drop off

2: Accessioning and
   cassette labeling

3: Batch holding cart

4: Delivery

Cassette Printer

Best error rate	Method of ensuring accuracy	Example
1 in 1,000	• Clear process documents • Reliance on vigilance, memos, training, warnings • Audits	Hand written labels
1 in 10,000	All of the above plus… • Processes designed for human behaviors • Reminders, checklists, clear communication • Re-training, competency testing	Accessioning checklist
1 in 100,000	All the above plus… • Systems for identifying and preventing error (error-proofing) • Standardization • Elimination of distractions, interruptions and fatigue	Best practice
1 in 1,000,000	All the above plus… • Automation, software enhancements • Advanced process design (remove steps that require memory or knowledge)	Cassette printer

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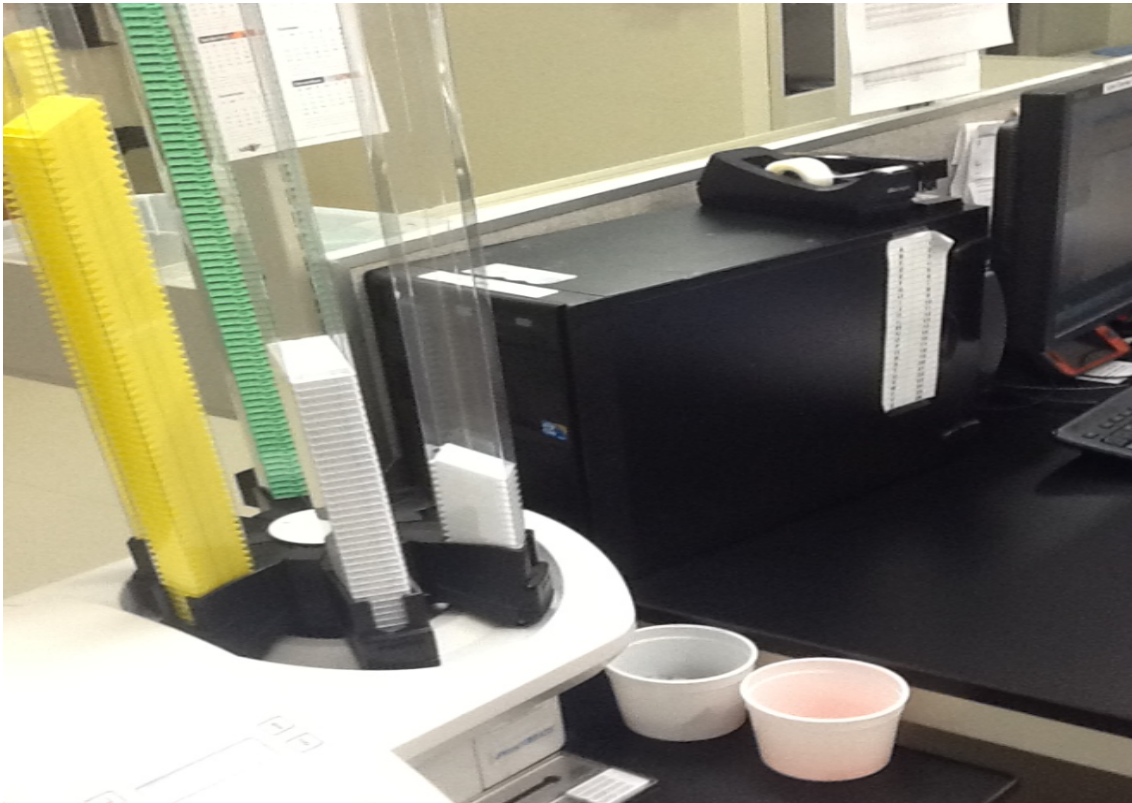
Cassette Printing- The Old Way

Colored cassettes to differentiate processing times and tissue types

Every cassette printed manually

Eight data entry points, eight opportunities for error

Cassette Printing – The New Way

- Hoppers are stocked with most commonly used cassettes to reduce cassette handling
- One hopper left empty for less commonly used colors
- Inventory is built, edited, and saved in LIS before cassettes are printed.
- Cassette printing can be stopped at any time.

Specimen Accessioning
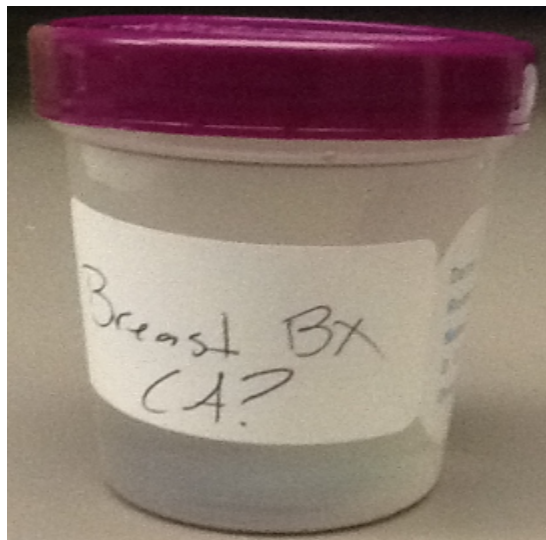
192 specimens choices

- Specimen labeling from clinicians and surgeons is a constant variable
- Labeling on specimens and the choices in LIS are not always a clear match
- Each specimen in LIS carries <u>CPT codes</u>, <u>quantity of cassettes</u>, and <u>additional processing tasks</u>
- Errors made at this level are difficult to correct and create negative downstream effects

Accessioning Resource – A simple solution to a complex task

	A	B	C	D	E	F	G
1	Color	Tissue	Description	R	CPT	#	Assign
26	Y	Brst Node				1	
27	W	Brst Capsule			4	1	
28	W	Brst Lumpectomy	w/ margins	X	7	6	
29	Y	Brst Ndl Bx	aka "breast bx"		5	1	
30	W	Brst Mast Mod	Mast-Mod w/ LN or Axilary Tail	X	9	15	
31	W	Brst Mast Sim	Mast-Part/Simp, stitch marks axillary tail	X	7	15	
32	W	Brst Reduct			5	2	
33	W	Brst w/o margin		X	5	2	

Summary

Employee training – Spurred employee innovation

Standardized accessioning protocols – Accessioning errors ⬇65%

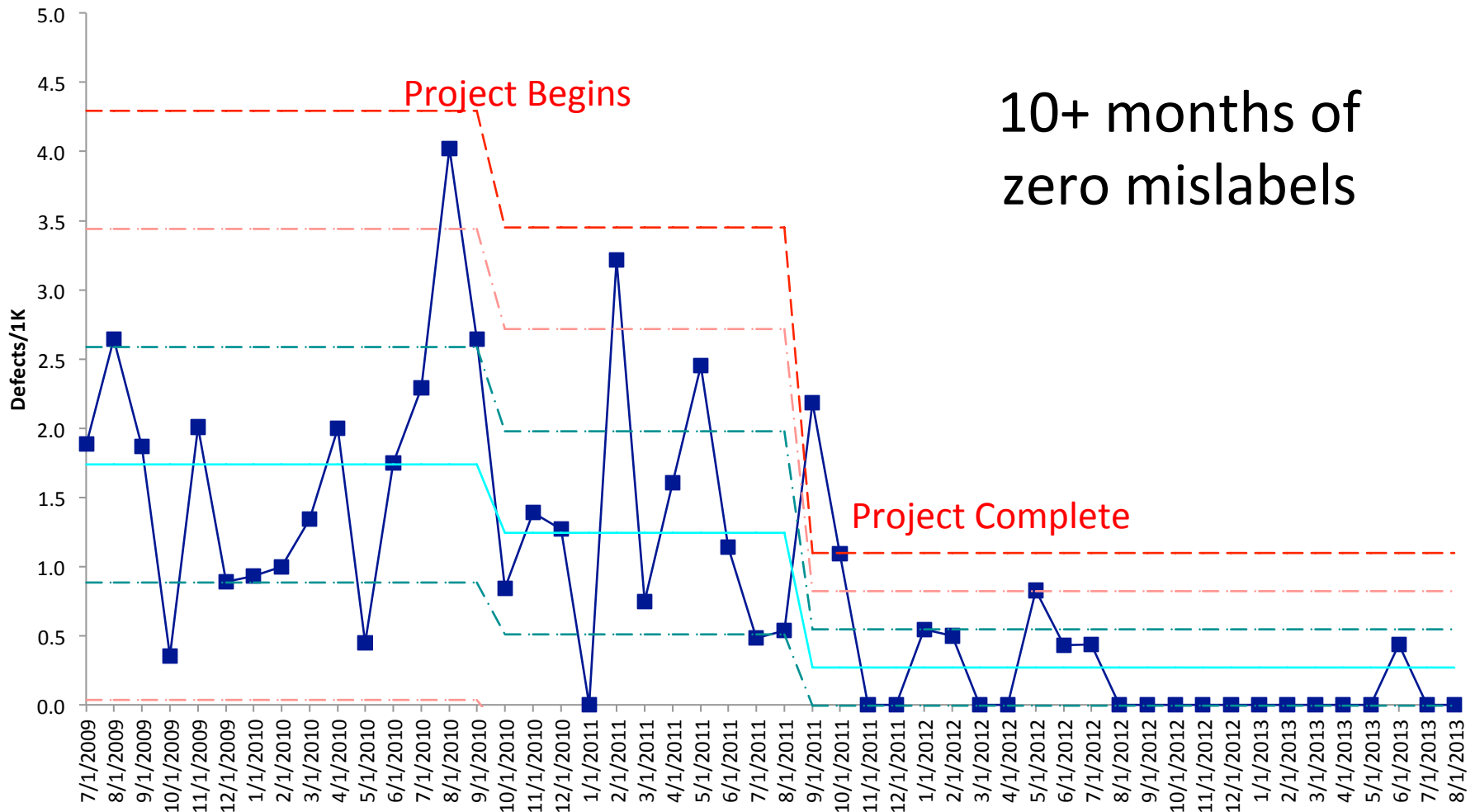Barcode labels – No handwritten numbers = ⬇chance for error

Improved layout – Less steps = ⬇chance for error

Cassette printer – Eliminated cassette mislabels
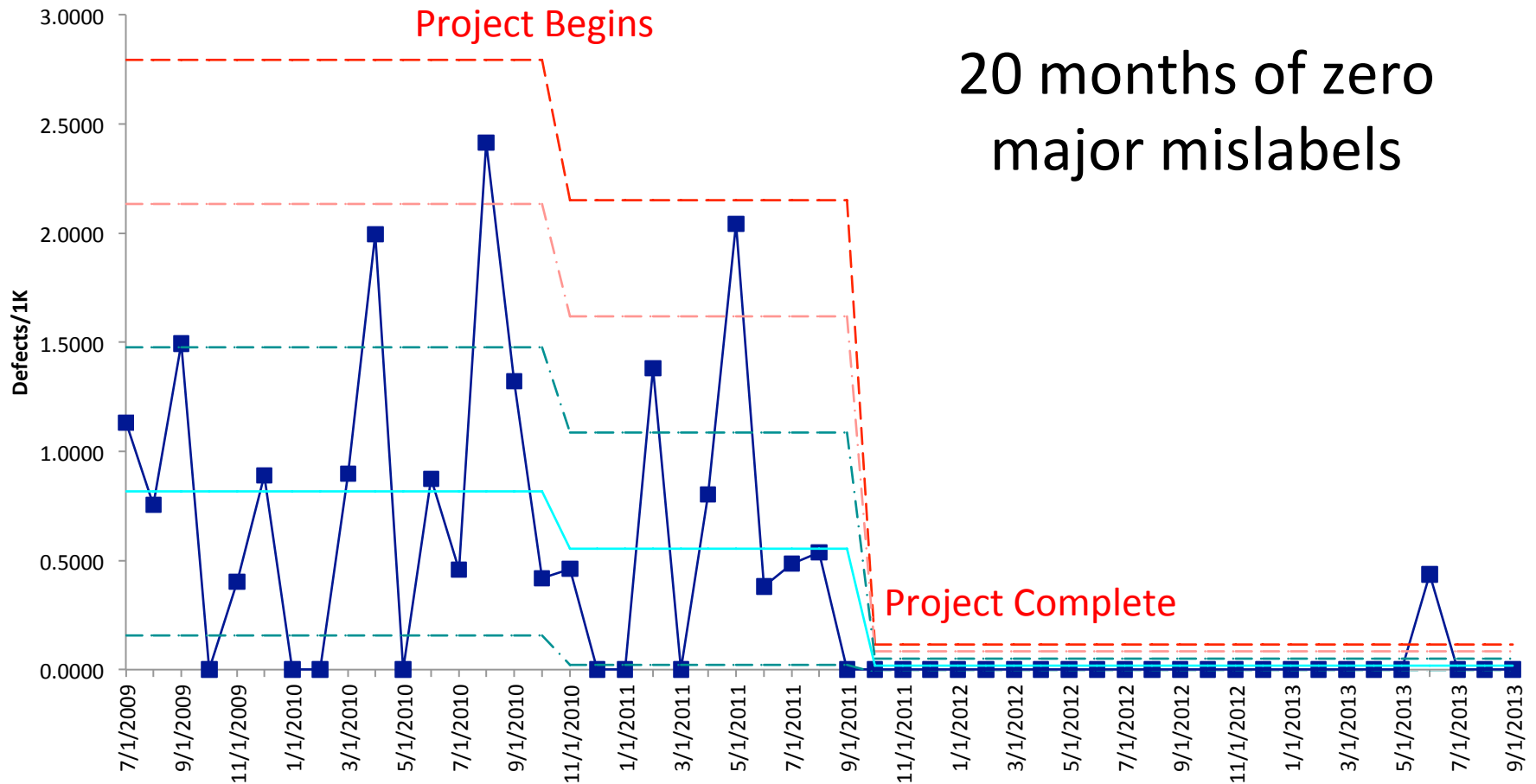
Accessioning resource – Get it right the first time

Sustaining the Gains

All Mislabels / 1,000 Cases
(Major and Minor)

Sustaining the Gains

Mislabeled Samples / 1,000 Cases
(Major Only)