Achieving Reliability in Histology

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BACKGROUND

Despite widespread efforts to abate labeling errors within the surgical pathology laboratory, incidence specifics have not been rigorously studied and standardized improvement efforts have not been reported. Specimen misidentification in the histology laboratory can result in serious patient harm. By utilizing tools such as root cause analysis, process mapping, selected quality metric assessment, and targeted quality improvement initiatives, we were able to drastically reduce labeling error and improve reliability in the labeling process.

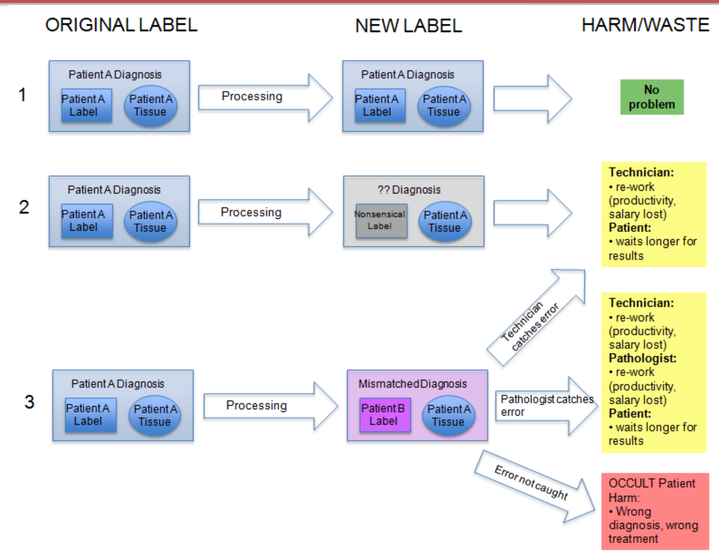
OBJECTIVES

To reduce labeling errors using QI tools such as Plan-Do-Study-Act and Lean.

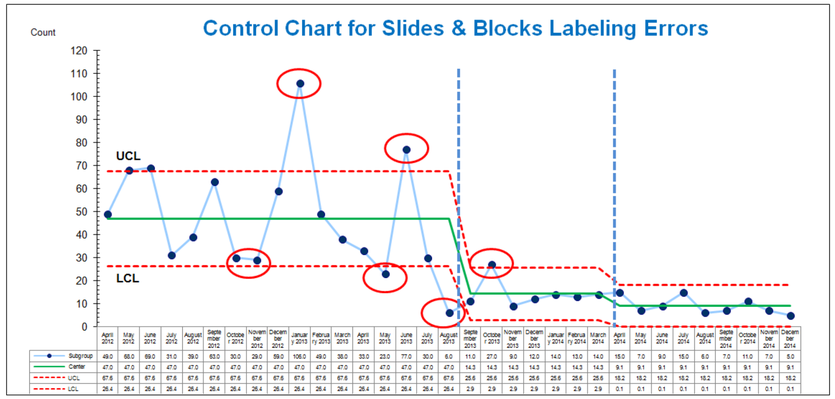
METHODS

Two distinct error-prone steps were identified in the laboratory workflow: manual slide printing and microtome cutting. Frontline staff and QI leadership created targeted workflow redesigns aimed at the vulnerable steps. In the initial PDSA cycle, bar-code technology was rolled out at the slide printing step. The second PDSA cycle used concepts such as Lean and single piece workflow to drastically cut specimen mix-ups at the microtome.

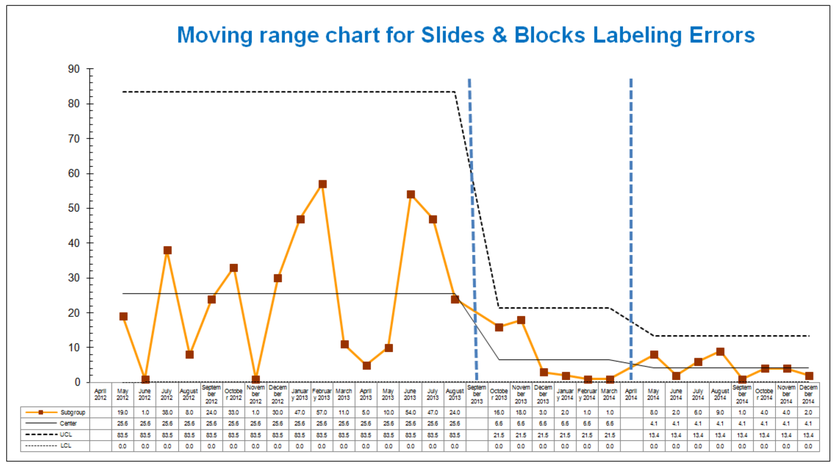
PROJECT IMPETUS



COLLECTED DATA



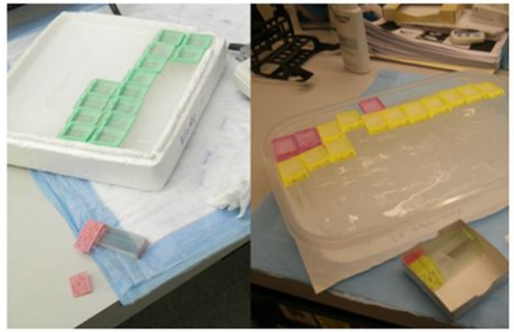
Info-Graphic Credit: Yigu Chen MPH CSSGB



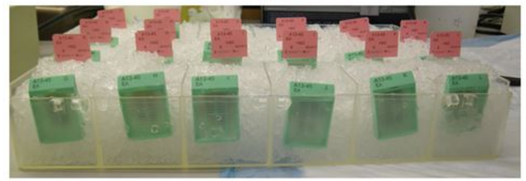
Info-Graphic Credit: Yigu Chen MPH CSSGB

Following PDSA cycles 1 and 2, quality improved on multiple levels. First, we approached our goal of 0% labeling errors, as shown in the control chart. The process itself also became more reliable, with errors occurring at a predictable rate and falling within usual cause variation, as opposed to special cause variation. This is shown by the decreased outlying data points in the control chart as well as the decreased moving range, both indicating improved reliability of the process.

SINGLE-PIECE WORKFLOW SOLUTION – iFREEZE



Standardization 5S → Single-Piece Workflow



Prior to interventions:

Paraffin blocks are kept physically separate from their corresponding glass slides at the microtome, increasing the chances of specimen mix-ups at this step. In addition, already difficult to visualize accession numbers are backwards and upside down.

Innovative Framework to Engage and Effect Zero Errors (iFreeze):

This single-piece workflow device drastically reduces the potential for specimen mix-ups by reuniting matching blocks and slides and by improving practical visualization of accession numbers.

RESULTS

147, 455 cases were analyzed during the study period. The baseline error rate was captured at 1% (793 errors in 76,958). Following PDSA cycle #1, the error rate dropped to 0.3% (92 errors in 32,534), and after PDSA cycle #2, the labeling error rate now stands at 0.2% (78 errors/37,963 cases). Overall, an 80% reduction in error rate has been noted. In addition, error data became more reliable with less special cause variation and an improved moving range.

CONCLUSIONS & FUTURE DIRECTIONS

Histology labeling errors are prevalent and can lead to significant patient harm. We were able to implement concrete targeted QI measures that dramatically decreased our overall error rate, improved process reliability, and made care safer for patients utilizing our services.

Future directions will necessarily include the continued collection and analysis of error-related data in order to assure that error rates remain at an absolute minimum.