Results

Effect of Employee Category: We identified 85 errors among approximately 45,000 cases labeled during a single study period. Forty-six percent of the cases were BCES. Overall, pathology residents had a higher error rate (p<0.001) than technologists. Pathology residents accounted for 27% of the errors but processed 5.5% of the cases. There was no significant difference in the error rate between pathology residents and technologists.

Effect of Specimen Complexity: The above results on employee type are confounded by the specimen complexity. Gross room and process standardization as areas requiring improvement.

Conclusion:

Labeling errors in an Anatomic Pathology laboratory appear endemic and are associated with both employee type and case complexity. We find formal checks ranking lower on the list of possible actions.

References


Materials & Methods

Data collection: We reviewed quality assurance (QA) records of ARUP Laboratories for all errors recorded between July 2009 and April 2011.

Statistical Methods: Logistic regression was used to explore associations between errors and causal factors such as daily case load, time of day, day of week, case complexity, and employee category (resident vs. staff).

Root cause analysis: A process flow diagram was developed to provide a detailed description of the process. Analysis was undertaken to identify the circumstances (what, who, when, where) of each error. Error impact (within case vs. between case) and error type (e.g., transposition of numbers, ‘one-off’ shift in digit).

Flexibility analysis: Many of the potential causal factors (e.g., crowding, machinery) may be related to each other, and changes in one factor may cause changes in another. Other items on the list of potential solutions involve tradeoffs between gross room production and error reduction. For example, more formal quality checks could be introduced at the start and end of the day; however, this would consume manpower that could otherwise be used for production.

Discussion

Labeling errors can occur at any point in the process (Figure 1) and result in two different types of errors which we designate as between-case errors (BCEs) and within-case errors (WCEs). BCEs occur at the level of the case number and can affect multiple cases. For example, a cassette may be mislabeled as SP11-29431 instead of SP11-24311. Such mistakes may involve a single cassette for one specimen (Figure 1, step G5) or all specimens for one case. WCEs only affect one case. For example, a cassette is mislabeled at the level of the specimen number (1A vs. 2A), cassette number (1A vs. 1B) or both (1A vs. 2B). The variables affecting accuracy were identified from the root cause analysis. Those with the greatest potential for producing error were employee category, specimen complexity and case load.

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