Effectiveness of Specimen Collection Technology in the Emergency, Med Surg, Critical Care, and Maternal Child Health Departments

April Saathoff DNP, RN, CPHIMS

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INTRODUCTION

There has been a recent focus in healthcare on the prevention of medical errors that have a significant impact on patient outcomes. According to the Institute of Medicine, technology plays a pivotal role in creating systems that are inherently proficient at reducing preventable errors. The literature indicates that specimen identification error rates in systems that do not utilize technology range from 0.024% to 0.420% which constitutes a serious problem, as errors contribute to incorrect or delayed treatment. Specimen collection and identification errors may cause significant patient injury or disability, increased lengths of stay, increased healthcare costs, diverted resources, and decreased patient satisfaction. It is estimated that over 160,000 adverse medical events each year can be attributed to misidentification of laboratory specimens.

Accurate specimen labeling is critical to prevent patient harm and increased costs of care. Although initially launched in 2003, the Joint Commission continues to list accuracy of patient identification as a National Patient Safety Goal, requiring two patient identifiers at the point of care and recommend that specimens be labeled in the presence of the patient. The importance of ensuring correct patient and sample identification is also reinforced by the College of American Pathologists. The Centers for Disease Control and Prevention have additionally endorsed the use of electronic point of care and barcode specimen collection systems to prevent specimen and lab testing identification errors.

Mercy Medical Center, a 280-bed community teaching in Baltimore, MD, began implementing Iatrics Mobilab specimen collection technology in November, 2014. The software functions via wireless portable digital assistants that are first used to scan the patient wristband, positively identifying the patient. Upon patient identification, the specimens ordered for the patient within the next four hours will appear on the device with the order of collection and specimen container type listed, and barcode specimen labels automatically print from a wireless printer at the bedside. At this point the specimens are obtained and labeled in the presence of the patient, and then scanned with the PDA as the final step in the collection process. The specimens are then sent to the laboratory where they are scanned into the lab system by a technician and correspondingly analyzed according to test type. Each step of the process involves collection of specific data that is time stamped and logged in the system.

RESEARCH QUESTION

How does implementation of specimen collection technology, compared with manual labeling of specimens with chart labels and paper requisitions affect mislabeled specimens and turn-around times?

STUDY DESIGN

Quantitative analysis with pretest-posttest design, exempt from IRB oversight. No patient identifiers obtained during data collection. Percentages for both the mislabeled specimens and turnaround times were compared using Chi-square tests of 2x2 contingency tables. All analyses were conducted with STATA 12. P-values were reported in tables and statistical significance was considered $p \leq 0.05$.

DEFINITIONS

Mislabeled Specimen: Specimen collected from one patient but labeled with another patient's name or unlabeled specimens that are entirely lacking a specimen label.

Collection Turnaround Time: The time span from the point when the specimen is collected through the time the specimen is received in the lab.

POPULATION & SAMPLING

Sample included all specimens obtained from the patient population in the Emergency, Med Surg, Critical Care, and Maternal Child Health Units three months prior to implementation, the implementation month, and twelve months after.
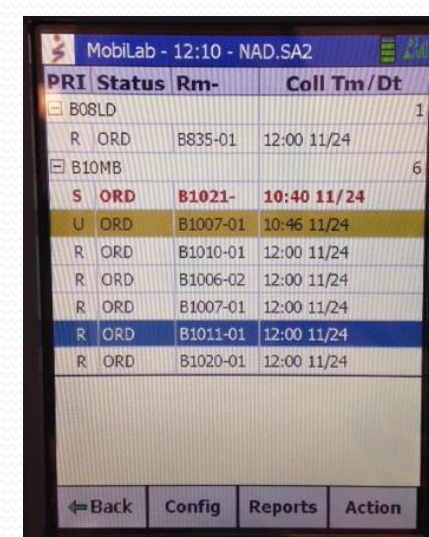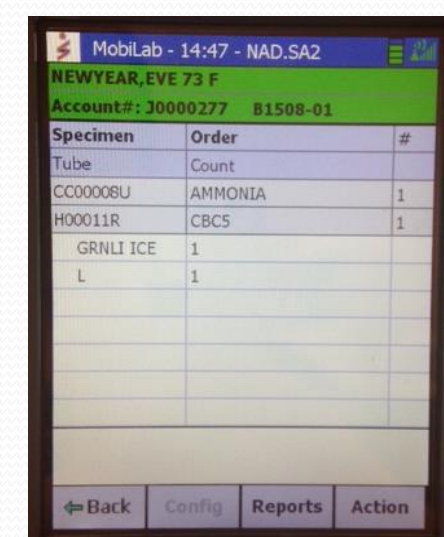
HARDWARE & SOFTWARE

Motorola MC55A0 Scanner

Zebra Wireless Label Printer


Iatrics Mobilab Specimen Collection Application

IMPLEMENTATION PLAN

- Project team included nursing informatics, project managers, lab system analysts, clinical nurses, nursing leadership, clinical educators, IT systems analysts, and help desk staff
- Workflow analysis and application development began three months prior to implementation
  - Weekly team meetings for large scale project decisions
  - Separate department specific meetings to address unique workflows
  - Provided technology demonstrations, mapped out pre/post workflows, updated policies, and made practice, hardware, and application decisions
- One month prior to implementation, the application and hardware was configured and tested by clinical users in the test environment, and a comprehensive training plan was developed
- Two weeks prior to implementation, users took a 2-hour training class
- Classes were didactic and scenario-based
- Implementation support was 10 days with unit based super users and project team support
- System audits allowed for daily feedback to end users
- Satisfaction survey following implementation indicated staff extremely satisfied with new technology

OUTCOMES MEASUREMENT

Mislabeled Specimens Pre/Post Specimen Collection Technology Implementation
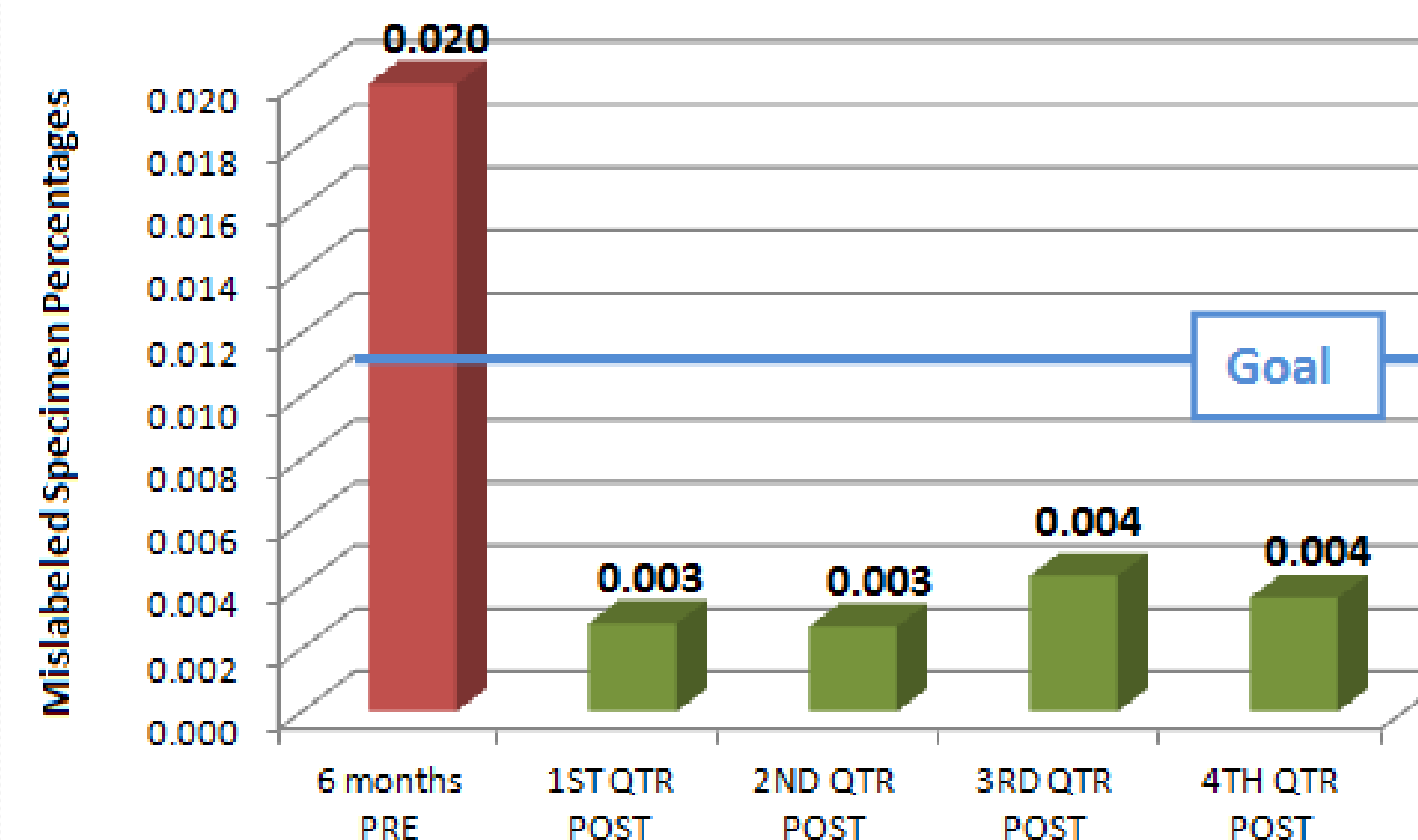
Mislabeled specimen percentages dropped in all areas from an average of 0.020% pre implementation to an average of 0.003% post implementation ($p<0.001$)

OUTCOMES MEASUREMENT

Collection Turnaround Times Pre/Post Specimen Collection Technology Implementation
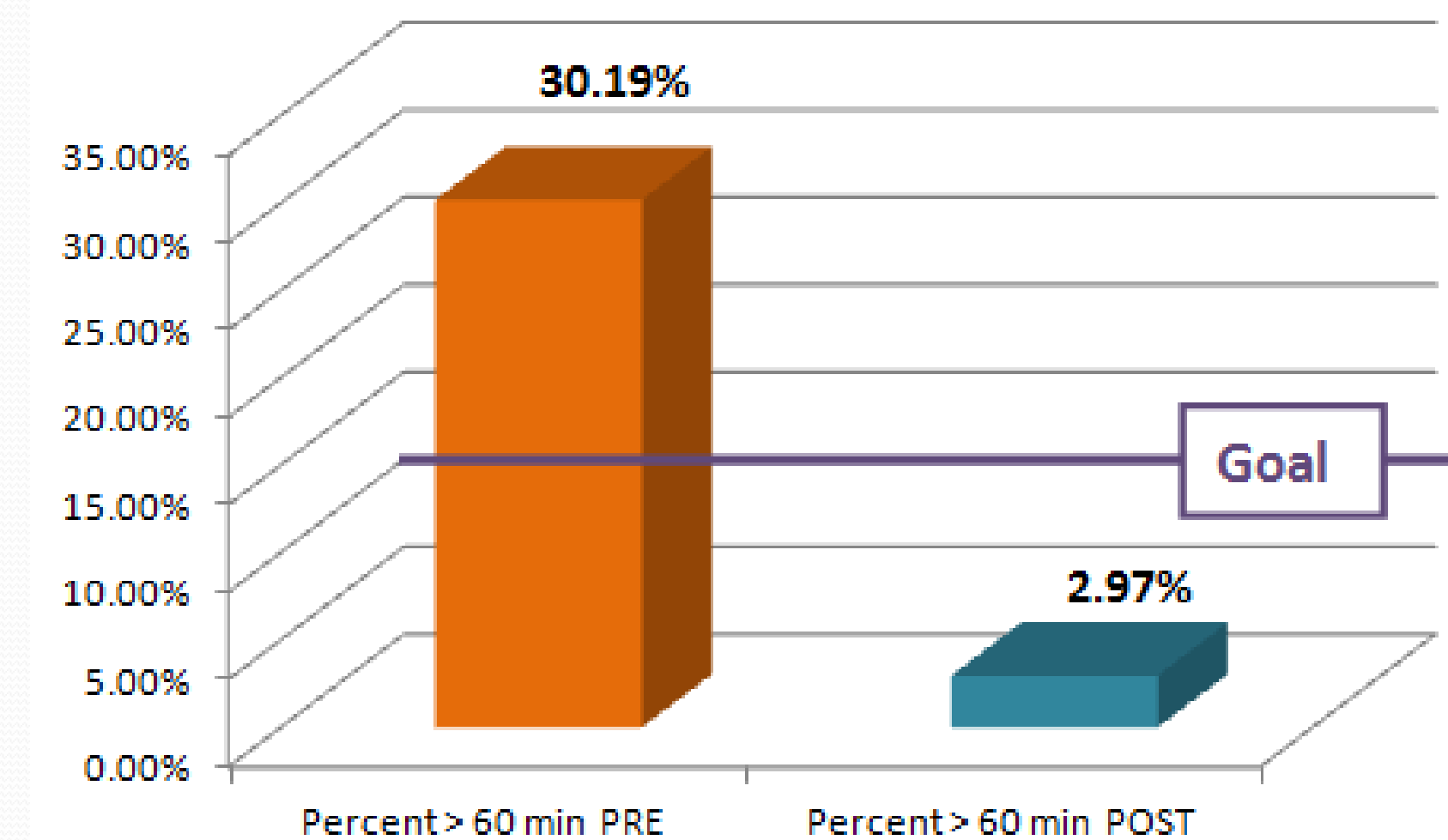
Collection turnaround times greater than 60 minutes decreased following implementation of specimen collection technology by an average of 27% ($p<0.001$)

DISCUSSION

Following implementation of specimen collection technology, both mislabeled specimen percentages and collection turnaround times were significantly decreased. Other benefits following implementation included improved communication between nursing and lab staff, decreased number of phlebotomy sticks for the patient, reduced number of missed collections, increased compliance with required specimen label elements, and an increased ability to track and monitor collection activities. Continued existence of an occasional mislabeled specimen following implementation reinforces the need for ongoing auditing and education to allow for continued system improvement over time.

CITATION WITH FULL REFERENCE LIST

Saathoff, A., MacDonald, R., & Krenzischek, E. (2018). Effectiveness of specimen collection technology in the reduction of collection turnaround time and mislabeled specimens in Emergency, Medical-Surgical, Critical Care, and Maternal Child Health Departments. *Computers, Informatics, Nursing, 36*(3), 133-139.

CONTACT INFORMATION

April Saathoff DNP, RN, CPHIMS – Nursing Informatics Director
asaathof@mdmercy.com