LABORATORY MEDICINE Best Practices

Effective practices for reducing patient specimen and laboratory testing identification errors in diverse hospital settings

Through the Laboratory Medicine Best Practices (LMBP) Initiative, evidence-based evaluations are conducted to identify effective laboratory medicine practices associated with improved healthcare quality outcomes.

The LMBP Workgroup and Expert Panels provide guidance and subject matter expertise to the Centers for Disease Control and Prevention to complete these reviews: wwwn.cdc.gov/futurelabmedicine

Patient specimen and laboratory testing identification errors have been reported as the leading cause of laboratory errors. Accurate identification is a national patient safety priority supported by accrediting, patient safety, professional, industry and regulatory organizations because these are preventable errors that have the potential for serious adverse consequences for the patient. Electronic barcoding is a positive means to establish identification and linkage of patients, specimens and laboratory testing throughout the entire testing process including test ordering, specimen collection, analysis, and test result reporting. The studies included in this review assessed the effectiveness of barcoding systems and point-of-care test barcoding for reducing patient specimen and laboratory testing identification errors.

Summary of LMBP™ Findings and Recommendations

The Laboratory Medicine Best Practices Workgroup recommends barcoding systems for specimen labeling and point-of-care test barcoding as evidence-based "best practices" with high overall strength of evidence based on consistent and substantial reductions in identification errors with improved accuracy of patient-specimen and laboratory testing identification in hospital settings.

About the Interventions and their Comparators

- **Barcoding systems** use barcode scanners to confirm patient identity. Other options include barcoded patient wristbands, portable printers to generate labels at the bedside, and use of an interface with a computerized physician order entry.
    - Studies have contrasted the patient-specimen identification error rates associated with barcoding systems with manual entry patient-specimen identification systems.
- **Point-of-Care Test Barcoding** uses bar-coded patient identification and bar code scanners with a test device at or close to the patient. Test devices can interface with laboratory information systems to receive and transmit patient identification and test result information. This practice may include barcoded patient wristbands.

- Studies have contrasted patient-specimen identification error rates associated with point -of- care test barcoding with manual entry patient-specimen identification systems.

Results from the Systematic Reviews

A total of seventeen studies met the review inclusion criteria.

- Ten studies assessed the reduction in identification error rates associated with barcoding systems (seven published and three unpublished).
- Seven studies assessed the reduction in identification error rates associated with the use of point-of-care test barcoding systems (two published and five unpublished).

- The results for both barcoding systems and point-of-care test barcoding consistently favor the tested practice. All studies reported positive effects and the results for all but three studies (two barcoding systems and one point-of-care test barcoding) were statistically significant. Meta-analysis indicates that patient-specimen identification errors are:
  - Approximately 4.4 times as likely from manual entry systems than from barcoding systems (mean odds ratio of 4.39; 95% CI: 3.06 – 6.32).
  - Nearly 6 times as likely from manual entry systems than from point-of-care test barcoding systems (mean odds ratio of 5.93; 95% CI: 5.28 – 6.67).
- All included studies were conducted in the United States.
- Some studies reported evidence based on incomplete implementation which may understate the impact of barcoding in reducing identification errors.
- Barcoding process design issues appear more complex for surgical pathology than for routine laboratory or point-of-care testing.
- Adequate training and education, well-designed patient ID bands, sufficient supplies, and equipment maintained in good working order (e.g., label printers, computers, batteries, wireless networks) were identified as necessary for successful barcoding implementation.
- Support and involvement from all relevant departments and leaders including nursing, laboratory, and information systems were identified as critical factors for success.

These results are based on a systematic review of all available studies. This systematic review is supported by contract CB-11-214 from the Centers for Disease Control and Prevention. Battelle Memorial Institute provided administrative, research and technical support for this review along with input from an Expert Panel of subject matter experts in laboratory medicine and systematic reviews.

Supporting Materials

- Supplementary Data: Evidence summary tables & included studies
- Search strategy

Publications

Snyder SR, Favoretto A, Derzon J, Christenson C, Kahn S, Shaw C, Baetz RA, Mass D, Fantz CR, Raab SS, Tanasijevic MJ, and Liebow E. Effectiveness of Barcoding for Reducing Patient Specimen and Test Identification Errors: A Laboratory Medicine Best Practices Systematic Review and Meta-Analysis. Clin Chem. 2012; 45(13-14):988-998. Barcoding Clin Biochem 2012.

Disclaimer

The findings and conclusions are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention/the Agency for Toxic Substances and Disease Registry (CDC/ATSDR).

Sample Citation

 Sample citation: Laboratory Medicine Best Practices Effective practices for reducing patient specimen and laboratory testing identification errors in diverse hospital settings (abbreviated). https://www.futurelabmedicine.org/pdfs/CDC_BarCodingSummary.pdf. Last updated: MM/DD/YYYY

Review completed: February 2012