IH Laboratory Information Management Systems (LIMS)

Improving Data Integrity in the Lab and the Field

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Topics to be Covered

- History of Laboratory Data Management
- What is a LIMS?
  - What can it do for the lab and its clients?
  - Concerns and Limitations
  - Client Responsibilities
- Future Possibilities

History of Laboratory Data Management

- Prior to 1980
  - Paper, pen, and slide rule calculations
  - Large bound books for data & sample tracking
  - Chart paper instrument printouts
  - Manually typed reports w/carbon copies

History of Laboratory Data Management cont

- 1980 to 1990
  - Expensive hand-held calculators
  - Sophisticated software programs for data crunching & sample tracking that were difficult to use
  - First rudimentary commercial LIMS available
  - Large bound books still common
  - Basic word processing for reports

History of Laboratory Data Management cont

- 1990 to 1999
  - Personal computers and software databases made programming and documentation easier
  - LIMS move from minicomputers to PCs
  - Different software systems spoke different languages creating communication issues
  - Direct instrument uploads developed
  - Analytical reports evolve from ground mail to overnight deliveries to facsimiles to e-mail PDFs to electronic files

History of Laboratory Data Management cont

- 21st Century
  - Laboratory data systems reach beyond simple lab sample tracking to web-based exchange of data
  - Field sample bar-coding & location ID via GPS possible
  - Data uses facilitated and expanded:
    - Exposure assessment data management
    - Industry-wide reports by job functions
    - Comparisons to historical data

What is LIMS?

- Computerized information management system designed for laboratories
  - Manages lab data from sample log-in to reporting
  - Interfaces with analytical instruments
  - Sorts and organizes data into various report formats
  - Stores data for future reference and use

Current LIMS Structure

- Database platforms range from Microsoft Access to Oracle to Web-based systems
- Basic functionality built-in by vendor and adaptable by the individual laboratory for custom fit
- Data format, management and storage media determined by regulatory and client needs

Information Available from LIMS

- Project, Sample, and Test documentation
- Sample tracking history within laboratory
- Reporting results (hardcopy, electronic file)
- Financial information by test, client, dates
- Information on productivity

Advantages of LIMS Use

- Fewer transcription errors & faster processing with direct instrument uploads
- Real time control of data quality with built in QC criteria
- Direct report generation meeting specific client requirements
- Direct electronic reporting to clients or direct client access to data

Disadvantages/Concerns

- Customization of LIMS/interfaces required for specific lab/client needs
- Adequate validation to ensure data quality
- Data integrity and confidentiality, especially when clients have direct access to data
- Limited interface between lab & field computer systems

Client Responsibilities

- Evaluate lab's LIMS capabilities
  - System validation/maintenance
  - Interfacing capabilities
  - Regulatory compliance/accreditation status
  - Confidentiality/data integrity protection
- Determine lab's willingness & ability to meet current & future client needs

LIMS of the Future

- Provide a complete database management service
- Direct downloads of field sampling data into LIMS, eliminating multiple entries of the same data
- Direct uploads of laboratory data to the database, eliminating multiple entries of the same information
- Standardized interfaces minimizing the need to build custom interfaces

BIG BENEFITS

- LIMS will store client-specific data by job function, job classification, employee, and facility
- Enable identification of trends, best practices, and problem solving
- If multiple companies within an industry use the same database, there will be an ability to benchmark between companies