



K2 Application of Laboratory Information Management Solution Software System Supporting Forensic Toxicology Operations

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After attending this presentation, attendees will learn the application of the Laboratory Information Management Solution (LIMS) software in a forensic toxicology operation.

This presentation will impact the forensic community and/or humanity by providing examples and detailed information on the toxicology LIMS software system, illustrating that the system can be used in laboratories to maximize their operation and services. Use of this type of software system can effectively improve multiple aspects of laboratory performance required by current scientific and legal standards.

The Federal Aviation Administration's Civil Aerospace Medical Institute (CAMI) toxicologically evaluates postmortem biological samples collected from victims involved in transportation accidents. Such biosamples are analyzed for the presence of primary combustion gases (carbon monoxide and hydrogen cyanide), alcohol/volatiles, and drugs. During the entire evaluation process, beginning with receiving samples through dispatching toxicology reports, there is a critical need to ensure the quality and integrity of the chain-of-custody, demographic, accessioning, and analytical data/records. Additionally, retrieving case-related information is frequently desired in an expedited manner. Therefore, an effective quality assurance/quality control (QA/QC) program is an absolute necessity. Information pertaining to these case-related components could effectively be achieved using a suitable software system.

Based on the need for this approach, the CAMI Laboratory has been using the LIMS software since 1997. Initially, this system was tailored to fulfill the unique needs of the Laboratory. However, since the inception of this software system, it has been going through continuous developmental improvements and has become a dynamic forensic toxicology application, designed with input from the biologists, chemists, and toxicologists. Characteristics of this software system are described herein.

This software system has the components to allow laboratories to meet the requirements necessary to conform to the accreditation standards of the College of American Pathologists, the American Board of Forensic Toxicology, and any similar agencies. The basic components are oriented toward a forensic laboratory, covering sample receiving, report generating, record maintaining, QA/QC monitoring, and associated rapid information retrieving.

Specific features of the software include the ability to reliably track the chain-of-custody and acceptance of unlimited specimens per case, utilizing barcode labels created for all specimen vials. Information pertaining to the types and stability of blind QA/QC samples can be created, thereby allowing the accumulated specimen history to be easily tracked. Samples of analytical batches may be re-accessioned for additional analysis. The final case and batch information is locked from changes when completed. A case status snapshot feature shows the progress of a case. Multi-level security prevents analysts from being aware of the cases they are analyzing. If required, additional process-specific modules can be easily incorporated into the system. For example, incident reporting and Freedom of Information Act (FOIA) request processing modules have been easily added.

A case-edit-history view is available for upper-level management. This feature displays case or batch edits including date, time, and user. Management can also view system login history. Requests for case information under the FOIA can be easily tracked. Analytical and statistical report capabilities include information pertaining to QA/QC, internal and external specimen chain-of-custody, case status, and other specialized aspects of a case. Analytical reports can be easily generated through the batch-based case results with an option to include any notes that might enhance the interpretation of the analytical findings by report receivers. Laboratory incidents, along with their evaluations/resolutions and cost, are documented with a Lab Incident Report methodology. An archive feature stores historical data in a separate location, while preserving easy access to needed information. Data can be exported to a Microsoft® Excel worksheet, and report information to a Microsoft® Word document. The dynamic character of the LIMS makes it user-friendly and suitable for rapidly extracting information necessary for research. In essence, this software system is an effective tool to optimize the operation of a laboratory, covering its entire operational spectrum.

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