

COLA'S

# inSights

## *Lab's Important Role in Infection Control*

### **ALSO IN THIS ISSUE:**

Letter from the Chair .....	2
An Overview of the Role Of the Laboratory In Infection Control.....	4
Importance of Proper Specimen Collection and Handling for Microbiological Studies .....	7
Rapid Response: Infectious Disease Reporting Through ELR .....	9
Role of the Microbiology Lab on the Infection Control Team.....	10
A History of the EHR, and the Important Role of Lab Professionals In its Development and Application.....	11
Lab Testing Matters: Stories from the Front Line of Labs .....	16
Advertisements.....	3, 13, 15

# FROM THE CHAIR



Bradley J. Fedderly, MD,  
FAAFP, Chair, COLA Board of  
Directors

In this issue of COLA Insights we discuss Infection Control, the sub-specialty of clinical microbiology concerned with the prevention of nosocomial or healthcare associated infections. COLA laboratories, especially those associated with hospitals, nursing homes and other institutions providing patient care, play key roles in all phases of this discipline, from infection surveillance, to microbial identification and tracking, to monitoring treatment and to providing patient and general epidemiological reports. Our laboratories provide important information and guidance for institutional Infection Control Programs, and should be a routine part of the infection control team.

We begin this discussion with an **Overview of the Roles of the Laboratory** in Infection Control. We start by defining surveillance of nosocomial infections, and list the requirements to effectively implement this. We then discuss the technical responsibilities of the laboratory toward the infection Control Program, including responsibility for all phases of specimen collection, handling, testing, microbial ID and susceptibility, and reporting. The active involvement of the laboratory in the Infection Control Program provides consultative benefits from surveillance and test results, to training, and environmental investigations.

This overview is then followed by three focus articles that provide more in depth information on aspects of the laboratory's role in infection control:

**Highlight Article #1:** Discusses the particular importance of proper specimen handling for microbiological testing. This includes pre-collection guidelines, as well as specimen management principles.

**Highlight Article #2:** Reviews the epidemiological advantages of rapid response reporting of infectious disease information through Electronic Laboratory Reporting (ELR). This is the automated transmission of laboratory data from those participating in infection control programs to state and local health departments to meet state reportable disease laws, as well as provide key information rapidly when immediate epidemiological action is needed.

**Highlight Article #3:** Details the many important roles that the microbiology laboratory has on the Infection Control Team, including providing culture and sensitivity information; data collection and reporting; monitoring of infection trends; shared communication with physicians and other healthcare providers, and assisting in epidemiological response strategies.

On a different note, we feature an in-depth discussion of **Electronic Health Records (EHR)**, and the significant impact this is having on the delivery of healthcare. We begin with a short history of its development, driven by advancements in computer technology, the need for rapid, comprehensive data sharing among healthcare providers; and the push from regulatory legislation such as the Affordable Care Act. We then enumerate key clinical benefits derived from the use of EHRs. There is then an in-depth discussion of the important role of laboratory professionals in the implementation of electronic health records: from providing technical expertise to ensure data integrity; to assisting in the integration of laboratory information with other clinical data to ensure accurate diagnoses, appropriate treatment, and the overall determination of patient care decisions. There is no question that the participation of laboratory professionals on committees involved with the successful implementation of HER's is vital.

*Bradley J. Fedderly, MD*



## COLA INSIGHTS

COLA is sponsored by the American Academy of Family Physicians (AAFP), the American Medical Association (AMA), and the American College of Physicians (ACP); and is endorsed by 29 national and state medical organizations. Letters to the editor are welcome.

### ADVERTISING POLICY

COLA accepts advertising requests for inclusion in its publications. All advertisements are subject to review and approval by COLA.

COLA reserves the right to reject or cancel any advertisement that is not in keeping with COLA's standards as a national accreditation organization and its publication standards.

COLA and its publications do not and will not endorse, directly or indirectly, any advertiser's products or services.

If you would like to discuss advertising opportunities, please contact COLA at 410.381.6581, ext. 3735.

© COLA 2012

COLA INSIGHTS  
is published periodically by  
CRI®, 9881 Broken Land Parkway,  
Suite 215, Columbia, MD 21046-1195.

COLA INFORMATION  
RESOURCE CENTER:  
800.981.9883

This publication may be obtained through enrollment in a COLA accreditation program.

ALL RIGHTS RESERVED  
Reproduction in whole or in part without written permission is prohibited.

[www.colas.org](http://www.colas.org)  
[www.LabUniversity.org](http://www.LabUniversity.org)  
[www.COLAcentral.com](http://www.COLAcentral.com)  
[www.criedu.org](http://www.criedu.org)



# The time to prepare for the new CMS Quality Control Guidelines is NOW.

## Learn how at a CRI® IQCP Workshop.

CRI's Live Workshops will help you implement the new CMS Individualized Quality Control Plan guidelines which go into effect at the end of 2015. Compliance with the new guidelines is an important step for every medical laboratory that performs non-waived testing.

## CRI FINAL IQCP Workshop for 2015!

October 7, 2015: Las Vegas, NV  
Tropicana Las Vegas

Register at <http://www.criedu.org/iqcp-2/iqcp-workshops/>



**COLA Resources, Inc.**  
Leading Excellence in Laboratory Medicine

*Event offers six (6) P.A.C.E.® credits*

Register at  
<http://www.criedu.org/iqcp-2/iqcp-workshops/>  
or call 800. 981. 9883

# An Overview of The Roles Of The Laboratory In Infection Control

## Introduction

**Infection control is the discipline concerned with preventing nosocomial or healthcare-associated infections.** It is about identifying and controlling the factors involved with the spread of these infections, whether from patient-to-patient, from patients to staff, from staff to patients, or among staff. These factors include prevention (via hand hygiene/hand washing, cleaning / disinfection / sterilization, vaccination, surveillance); monitoring/ investigation of demonstrated or suspected causes for spread of infection within a particular health-care setting; and the surveillance, investigation, and management of outbreaks. It is on this basis that the more common title being adopted within health care is “infection prevention and control.”<sup>1</sup>

In the United States, the Centers for Disease Control and Prevention estimated roughly 1.7 million hospital-associated infections, from all types of microorganisms combined, cause or contribute to 99,000 deaths each year. The most frequent type of infection hospital-wide is urinary tract infection (36%), followed by surgical site infection (20%), and bloodstream infection and pneumonia (both 11%).<sup>2</sup>

Hospital-acquired infections are an important category of hospital-acquired conditions. HAI is sometimes expanded as healthcare-associated infection to emphasize that infections can be correlated with health care in various settings (besides hospitals, such as nursing homes), which is also true of hospital-acquired conditions generally.

The CDC, through its guidelines development, nosocomial infection surveillance methodology, outbreak investigations, and laboratory studies, has provided much of the scientific and epidemiologic basis for infection control in the United States. It also organized some of the early training for infection control programs and hospital epidemiologists.

## Surveillance of Nosocomial Infections<sup>3</sup>

Surveillance is defined as “the ongoing, systematic collection, analysis, and interpretation of health data essential to the planning, implementation, and evaluation of public health practice, closely integrated with the timely dissemination of these data to those who need to know”

Surveillance, which is an essential element of an infection control program, provides the data to identify infected patients and determine the site of infection and the factors that contributed to the infection. When infection problems are recognized, the hospital is able to institute appropriate intervention measures and evaluate their efficacy. Surveillance data are also used to assess the quality of care in the hospital.

## Requirements of a Successful Infection Control Committee Surveillance Program include:

- Clear goals for doing surveillance. These goals must be reviewed and updated frequently to meet new infection risks in changing patient populations, the introduction of new high-risk medical interventions, and changing pathogens and their resistance to antibiotics
- Trained Personnel with knowledge of clinical patient care, epidemiology and microbiology
- Accepted definitions and criteria for nosocomial infections, risk factors, and other outcomes
- Readily available sources of data for identifying infections
- Systems in place for data analysis, dissemination, and confidentiality
- Identifying infected patients
- Use of surveillance data for continuous quality improvement

## The Roles of the Microbiology Laboratory in Infection Control

### A. Technical

As the source of microbiologic culture information, the laboratory must provide easy access to high-quality and timely data and give guidance and support on how to use its resources for epidemiologic purposes.

The services that the infection control program can offer to the laboratory include functioning as a liaison to the clinical services to improve the quality of specimens sent to the laboratory and promoting appropriate use of cultures and other laboratory tests. It can also assist the laboratory with

its system for monitoring antimicrobial agent susceptibilities by identifying the pathogens that are of nosocomial origin.

**The microbiology Laboratory contributes to the work of the Infection Control Program by fulfilling its technical responsibilities by performing quality microbiology investigations through:<sup>4</sup>**

- Proper Specimen Collection
- Accurate Identification and Susceptibility Testing
- Laboratory Information Systems for comprehensive information /ordering
- Rapid Diagnostic Testing
- Rapid reporting of Laboratory Data
- Outbreak Recognition and Investigations – Molecular Typing
- Maintaining Organism Storage
- Maintaining Cultures of Specimens from Hospital

**Personnel and the Environment**

**B. Active involvement in the Infection Control Program<sup>5</sup>**

The effectiveness of infection control efforts hinges to a large extent on the active involvement of the laboratory in all aspects of the infection control/surveillance program. Laboratory personnel should understand why infection control is necessary, the approaches being taken by the infection control program to meet its objective to reduce nosocomial infections, and how the laboratory can support and cooperate with the program.

- **Liason To Clinical Services: Designate at least one person from the microbiology laboratory to be the consultant to the infection control program and to serve as a member of the infection control committee.**

Any activity of the infection control program that involves the laboratory should be coordinated through a designated person. This representative should keep the infection control program informed about changes in the laboratory that may affect surveillance and other aspects of the program. This person should be selected for his or her knowledge of and interest in infection control.

- **Make laboratory test results available in an organized, easily accessible, and timely manner.**

The infection control program depends on the cooperation of the laboratory in making laboratory data accessible. The design of the laboratory's record-keeping system should accommodate the needs of the infection control program and should be developed in collaboration.

- **Provide training on basic microbiology for the infection control program staff.**

Most beginning members of Infection Control Programs do not have a working knowledge of microbiology and will require training before they are able to effectively use the laboratory services for the infection control program.

- **Monitor laboratory results for unusual findings.**

The laboratory should watch for clusters of pathogens that may indicate an outbreak, the emergence of multidrug-resistant organisms, and the isolation of highly infectious, unusual, or virulent pathogens. The laboratory staff is usually the first to recognize these unusual events or trends, and reporting them early to the infection control program may avert a more serious problem.

- **Use environmental cultures judiciously.**

Microbiology laboratories are often asked to perform environmental cultures to assess microbial contamination of inanimate objects or the level of contamination in certain areas of the hospital. Such culturing must be coordinated with the infection control program to ensure that it is performed only when indicated and that the specimens are processed appropriately. Environmental cultures, including personnel cultures, should not be done unless epidemiologic evidence clearly indicates an environmental source of the pathogen. Under these circumstances, information about the etiologic agent can often lead to a clearer understanding about the source of the infection and mode of transmission.

- **Take proper action when contamination of a commercial product is suspected.**

Contamination of commercially produced products or devices during manufacture or transportation is rare. If intrinsic contamination is suspected, the hospital laboratory should not attempt to culture the product or

device, since special techniques and equipment are required. If substantial patient disease or mortality is occurring, notify your state health department. The Hospital Infections Program at CDC can assist in an investigation if invited to do so by the state health department.

- **Epidemiologic uses of laboratory findings.**

Laboratory findings are used to support epidemiologic evidence of the spread of a common organism between patients, employees, and the environment. Strain identification permits the infection control program to confirm the association between patients (hosts) and reservoirs for the microorganisms of interest and to determine possible modes of transmission. The mode of transmission, reservoir, and nature of the susceptible hosts are easier to determine if a single strain is involved, because the mode of transmission or reservoir may not be the same for multiple strains. The degree to which organism identification is routinely carried out can be important. In general, identifying an isolate as *Pseudomonas cepacia* provides more useful epidemiologic information than identifying the organism only as “*Pseudomonas* species,” since a variety of related bacilli could be included in the latter group but have different reservoirs or modes of transmission. The laboratory should assist the infection control program by making clear the strengths and weaknesses of different assays when they use them for epidemiologic purposes.

- **Store isolates that may require further identification for epidemiologic purposes.**

In collaboration with the infection control program, the laboratory should develop a system for storing epidemiologically important strains of pathogens from nosocomial infections by sub-culturing them and maintaining them in a viable state. The collection should be reviewed frequently, and isolates should be discarded when they are no longer needed.

## CONCLUSIONS

Infection control is concerned with preventing nosocomial or healthcare-associated infections.

Surveillance, which is an essential element of an infection control program, provides the data to identify infected patients and determine the site of infection and the factors that contributed to the infection.

The microbiology laboratory should be involved in all aspects of the infection control program. Particularly important are its roles in the hospital infection surveillance, as well as assisting the infection control program to effectively and efficiently utilize laboratory services for epidemiologic purposes; equally important is the quality of the technical work performed, and the expertise provided.

---

## RESOURCES:

1. Infection Control: Wikipedia-the free encyclopedia. June 2015. [https://en.wikipedia.org/wiki/Infection\\_control](https://en.wikipedia.org/wiki/Infection_control)
2. Hospital-Acquired Infection: Wikipedia-the free encyclopedia. 2015. [https://en.wikipedia.org/wiki/Hospital-acquired\\_infection](https://en.wikipedia.org/wiki/Hospital-acquired_infection)
3. Emori, T.G., and Gaynes, R.P. 1993. An Overview of Nosocomial Infections, Including the Role of the Microbiology Laboratory Clinical Microbiology Reviews. V.6, No. 4, P.428-442. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC358296/pdf/cm00037-0128.pdf>
4. Johnson, J.K. Role of the Microbiologist in Infection Control and Hospital Epidemiology. July 7, 2014 [http://www.hopkinsmedicine.org/armstrong\\_institute/\\_files/fellows\\_course\\_materials/3%20Johnson%20Role%20of%20the%20microbiologist%202014.pdf](http://www.hopkinsmedicine.org/armstrong_institute/_files/fellows_course_materials/3%20Johnson%20Role%20of%20the%20microbiologist%202014.pdf)
5. Emori, T.G., and Gaynes, R.P. 1993. An Overview of Nosocomial Infections, Including the Role of the Microbiology Laboratory Clinical Microbiology Reviews. V.6, No. 4, P.428-442. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC358296/pdf/cm00037-0128.pdf>

# The Importance of Proper Specimen Collection and Handling For Microbiological Studies

It is a basic rule for any laboratory test procedure that the value of the test is compromised or even negated by using specimens that have not been properly collected, labelled, handled or stored prior to and during the testing process.

Microbiological tests are not as standardized as some other lab tests; the way in which a sample is processed and the results are interpreted depends heavily on the information provided with the specimen. Erroneous results as a result of specimen mis-management affects patient care and outcomes, as well as hospital infection control, patients' length of stay in the hospital, costs and laboratory efficiency.

## Pre-Collection Guidelines<sup>1</sup>

The initial collection of samples for microbiology testing is critical, since errors that occur at this stage cannot be corrected at a later time, and since mistakes require collection of new specimens.

- Document that proper patient preparation prior to collection of the specimen has been done.
- DO NOT pre-label specimen containers as this increases the risk of errors. The specimen must be labelled next to the patient when the sample is taken.
- A laboratory request form with the following information must accompany the specimen. This aids interpretation of results and reduces the risk of errors.
  - Patient's name, DOB, hospital number, and ward/department.
  - Type of specimen and the site from which it was obtained.
  - Date and time collected.
  - Diagnosis with history and reasons for request such as returning from abroad (specify country) with diarrhea and vomiting, rash, pyrexia, catheters in situ or invasive devices used, or surgical details regarding post-operative wound infection.
  - Any antimicrobial drug(s) given.
  - Name and number of the clinician who ordered the investigation, as it may be necessary to

telephone preliminary results and discuss treatment before the final result is authorized.

- Hands should be washed before and after specimen collection. In line with standard precautions, appropriate personal protective equipment should be worn when collecting or handling specimens.
- Specimens should be collected in sterile containers with close fitting lids to avoid contamination and spillage. All specimen containers must be transported in a double-sided, self-sealing polythene bag with one compartment containing the laboratory request form and the other the specimen.
- Ideally microbiological specimens should be collected before beginning any treatment such as antibiotics or using antiseptics. However, treatment must not be delayed in serious sepsis.
- Transport medium may be used to preserve micro-organisms during transportation.

## Tenets of Specimen Management<sup>2</sup>

It is important to be knowledgeable of caveats that are relevant to specific specimens and diagnostic protocols for infectious disease diagnosis. However, there are some strategic tenets of specimen management and testing in microbiology that stand as community standards of care and that set microbiology apart from other laboratory departments such as chemistry or hematology. Ten points of importance are:

- 1.** The laboratory should set technical policy; this is not the purview of the medical staff. Good communication and mutual respect will lead to collaborative policies.
- 2.** The laboratory must follow its procedure manual.
- 3.** A specimen should be collected prior to administration of antibiotics. Once antibiotics have been started, the microflora change, leading to potentially misleading culture results.
- 4.** Specimens must be labeled accurately and completely so that interpretation of results will be reliable. Labels such as "eye" and "wound" are not helpful to the interpretation of

results without more specific site and clinical information (eg, dog bite wound right forefinger).

**5.** “Background noise” must be avoided when possible. Many body sites have normal flora that can easily contaminate the specimen. Therefore, specimens from sites such as lower respiratory tract (sputum), nasal sinuses, superficial wounds, fistulae, and others require care in collection.

**6.** The laboratory requires a specimen, not a swab of a specimen. Actual tissue, aspirates, and fluids are always specimens of choice, especially from surgery. A swab is not the specimen of choice for many specimens because swabs pick up extraneous microbes, hold extremely small volumes of the specimen (0.05 mL), make it difficult to get bacteria or fungi away from the swab fibers and onto media, and the inoculum from the swab is often not uniform across several different agar plates. Swabs are expected from nasopharyngeal and viral respiratory infections.

**7.** Specimens of poor quality must be rejected. Microbiologists act correctly and responsibly when they call physicians to clarify and resolve problems with specimen submissions.

**8.** Physicians should not demand that the laboratory report “everything that grows,” thus providing irrelevant information that could result in inaccurate diagnosis and inappropriate therapy.

**9.** Susceptibility testing should be performed on clinically significant isolates, not on all microorganisms recovered in culture.

**10.** Microbiology laboratory results that are reported should be accurate, significant, and clinically relevant.

The microbiology laboratory policy manual should be available at all times for all medical staff to review or consult. It would be particularly helpful to encourage the nursing staff to review the specimen collection and management portion of the manual. This can facilitate collaboration between the laboratory, with the microbiology expertise, and the specimen collection personnel, who may know little about microbiology or what the laboratory needs in order to establish or confirm a diagnosis.

Most infectious disease protocols have based their strategies on the management of results generated by microbiology laboratories. Getting the right diagnosis is contingent upon laboratory results that are accurate and clinically relevant.

---

#### RESOURCES:

1. Cantón, R. (2005), Role of the microbiology laboratory in infectious disease surveillance, alert and response. *Clinical Microbiology and Infection*, 11: 3–8. doi: 10.1111/j.1469-0691.2005.01081. http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2005.01081.x/full
2. Baron, E.J, Miller, JM, Weinstein, MP, Richter, S.S, Gilligan, PH, Thomson Jr., RB, Bourbeau, P., Carroll, Kehl, SC, Dunne, WM, Robinson-Dunn, B., Schwartzman, JD, Chapin, KC, Snyder, JW, Forbes, BA, Patel, R., Rosenblatt, JE, and Pritt BS. A Guide to Utilization of the Microbiology Laboratory for Diagnosis of Infectious Diseases: 2013 Recommendations by the Infectious Diseases Society of America (IDSA) and the American Society for Microbiology (ASM). *Clinical Infectious Diseases* Advance Access . July 2013. [http://www.idsociety.org/uploadedFiles/IDSA/Guidelines-Patient\\_Care/PDF\\_Library/Laboratory%20Diagnosis%20of%20Infectious%20Diseases%20Guideline.pdf](http://www.idsociety.org/uploadedFiles/IDSA/Guidelines-Patient_Care/PDF_Library/Laboratory%20Diagnosis%20of%20Infectious%20Diseases%20Guideline.pdf)

# Rapid Response Infectious Disease Reporting Through ELR

Once clinical laboratories identify dangerous infections, it's crucial for the correct information to get to health departments quickly and in a format that allows them to recognize disease outbreaks.

Electronic Laboratory Reporting (ELR) is the automated transmission of laboratory-related data from commercial, public health, hospital, and other labs to state and local public health departments through interfacing with an electronic health records (EHR) system or a Laboratory Information Management System (LIMS). ELR helps identify reportable conditions determined by confirmatory testing and supports case reporting at the state or local level. ELR is used by laboratory providers to help them meet state reportable diseases laws mandating that providers report cases of specified diseases to the health department.<sup>1</sup>

ELR supports overall public health surveillance by helping improve the timeliness and accuracy of case reporting and confirmation to state and local health departments. It also supports national public health surveillance by improving the timeliness and accuracy of notifiable disease data voluntarily shared by states with CDC. Approximately 10,400 labs send reportable data to health agencies

“Infectious disease outbreaks will always be with us—and rapid recognition of an outbreak saves lives,” says CDC director Tom Frieden, MD, MPH. “Thanks to electronic laboratory reporting (ELR), we’re detecting outbreaks faster than ever. Unfortunately, only a quarter of the 10,000 labs across the country use ELR. We must keep expanding use of ELR to help CDC and our partners save lives and reduce healthcare costs.”

“Electronic laboratory reporting can give health officials better, more timely and complete information on emerging infections and outbreaks than they have ever received before,” says Robert Pinner, MD, associate director for surveillance, programs and informatics in CDC’s National Center for Emerging and Zoonotic Diseases. “Implementing these systems is a complex task that requires substantial investment, but ELR will provide health departments the tools they need to quickly identify and respond to disease threats and monitor disease trends now and in the future.”<sup>2</sup>

The advances in ELR implementation have been accomplished through funding from the Prevention and Public Health Fund of the Affordable Care Act, distributed through CDC’s Epidemiology and Laboratory Capacity (ELC) cooperative agreement.

Speeding the nation’s response to infectious disease outbreaks is part of the CDC’s ongoing 24/7 work to connect state and local health departments across the U.S., recognizing disease patterns and making state responses to health problems more effective.

---

## RESOURCES:

1. Electronic Laboratory Reporting (ELR). National Notifiable Disease Surveillance System (NNDSS). CDC. May 2015 <http://www.cdc.gov/nndss/>
2. Infection Control Today (ICT). Better, Faster Lab Reports Help States’ Outbreak Response. Sept. 2013 <http://www.infectioncontrolday.com/news/2013/09/better-faster-lab-reports-help-states-outbreak-response.aspx>

# The Role of the Clinical Microbiology Lab On The Infection Control Team

The participation of microbiology laboratories in infection control programs has clear advantages for increasing the effectiveness of infectious disease surveillance. Effective communication is one of the most important characteristics of a microbiology laboratory; but to be effective, the opportunity for dialogue between health care providers and laboratory personnel must be readily accessible, if not immediately available. As the source of microbiology culture information, the laboratory can provide easy access to high-quality and timely data and give guidance and support on how to use its resources for epidemiologic purposes.

Increased opportunities for personal interaction has been shown to improve patient care because the information provided is nearly always qualitative and interpretive. Face-to-face meetings that occur either at scheduled times or on an ad hoc basis whenever necessary, as dictated by the patient's needs, best accomplishes this goal. Although e-mail and information systems are helpful, especially for documentation, they are less useful for the kind of interchange that fosters optimal patient care and infection control practices under complex circumstances. Furthermore, the perception of quality influences the behavior and decisions of the attending physician.<sup>1</sup>

It is important to designate at least one person from the microbiology laboratory to be the consultant to the infection control program and to serve as a member of the infection control committee. Any activity of the infection control program that involves the laboratory should be coordinated through the designated person. Conversely, this representative should keep the infection control program informed about changes in the laboratory that may affect surveillance and other aspects of the program. This person should be selected for their knowledge of and interest in infection control.

The microbiology laboratory should be involved in all aspects of the infection control program. Particularly important are its roles in the hospital's infection surveillance system and in assisting the infection control program to effectively and efficiently use laboratory services for epidemiologic purposes. Through the infection surveillance system, the infection control program collects

data on nosocomial infections in the hospital, the pathogens and their patterns of antimicrobial agent resistance, the factors that contributed to the infections, and their outcomes. The purposes of surveillance are to identify possible infection problems, monitor infection trends, and assess the quality of care of the hospital.<sup>2</sup>

In conclusion, infectious disease surveillance requires the active participation of microbiology laboratories, in which new methodologies and robust information technologies should be implemented in order to guarantee early detection of outbreaks. Early response strategies should be designed with the cooperation of microbiology laboratories, in which the efforts of clinical and research microbiologists should be coordinated.<sup>3</sup> Enhanced opportunities for communication between physicians and the laboratory increases the effectiveness of the infection control program.

---

## RESOURCES:

1. L. Barth Reller, Melvin P. Weinstein, Lance R. Peterson, John D. Hamilton, Ellen Jo Baron, Lucy S. Tompkins, J. Michael Miller, Catherine M. Wilfert, Fred C. Tenover, and Richard B. Thomson Jr. 2001. Role of Clinical Microbiology Laboratories in the Management and Control of Infectious Diseases and the Delivery of Health Care. *Clinical Infectious Disease* (2001) 32 (4) P.605-610. <http://cid.oxfordjournals.org/content/32/4/605.full>
2. Emori, T.G., and Gaynes, R.P. An Overview of Nosocomial Infections, Including the Role of the Microbiology Laboratory. *Clinical Microbiology Reviews* Oct. 1993, p. 428-442. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC358296/pdf/cm00037-0128.pdf>
3. Cantón, R. (2005), Role of the microbiology laboratory in infectious disease surveillance, alert and response. *Clinical Microbiology and Infection*, 11: 3-8. doi: 10.1111/j.1469-0691.2005.01081.x <http://onlinelibrary.wiley.com/doi/10.1111/j.1469-0691.2005.01081.x/full>

# A History of Electronic Health Records and the Important Role of Laboratory Professionals In Its Development and Application.

## Introduction

An Electronic Health Record (EHR) is an electronic version of a patient's medical history maintained by a provider over time. It may include all of the key administrative clinical data relevant to that person's care under a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates access to information and has the potential to streamline the clinician's workflow. The EHR also has the ability to support other care-related activities directly or indirectly through various interfaces, including evidence-based decision support, quality management, and outcomes reporting.

EHRs are the next step in the continued progress of healthcare that can strengthen the relationship between patients and clinicians. The data, and the timeliness and availability of it, will enable providers to make better decisions and provide better care.<sup>1</sup>

The development of Electronic Health Records correlates with the development of computer technology, and actually had its genesis during the 1960's. However, adoption was slow and limited due to the significant expense involved for implementation, training and maintenance of these systems; the limitations of computer technology; and the lack of computer use and capacity within physician offices. These limitations, in turn, hid the potential for one of the greatest benefits of using electronic health records: the widespread sharing of patient records and the instant access to and use of this data by other healthcare professionals.

## EHR History

Beginning in **2004**, in his state of the union address, President Bush launched an initiative to make electronic health records available to most Americans within the next 10 years; in **2006**, CMS defined its role as providing: "support for development of Electronic Health Records"; and in **2009**, President Obama, in a speech at George Mason University

said "[EHRs] will cut waste, eliminate red tape, and reduce the need to repeat expensive medical tests...it just won't save billions of dollars and thousands of jobs -- it will save lives by reducing the deadly but preventable medical errors that pervade our health care system." By **2010**, President Obama signed the Patient Protection & Affordable Care Act. Provisions in the Act strengthened the HITECH Act, giving rise to "Meaningful Use" by 2014. Physicians and hospitals needed to prove that they had met 25 different functional objectives with their use of an EHR product to be considered "meaningful users." These objectives included computerized physician order entry (CPOE), the use of clinical decision alerts, incorporation of lab results into their EHR as discrete data, e-Prescribing and electronic information distribution to patients. Future penalties included cuts to Medicare payments for those not implementing EHR.

By **October 2011**, the Final Rules for ACOs (Accountable Care Organizations) strengthened the need for robust EHRs, with more financial incentives for rural doctors and hospitals; digital data collection of 33 performance measures; "double points" for EHR as a quality measure; and random audits. Electronic records were now required of all providers participating in an ACO, as "failure to report quality measure data accurately, completely and timely (or to timely correct such data) might subject the ACO to termination or other sanctions." Finally, in **June 2012**, the Supreme Court upheld the Affordable Care Act (ACA). Many items in the ACA warranted the rapid transition to electronic medical records for skilled providers: 1) Hospitals increasingly aligned with like-minded, data-driven partners who can prove successful outcomes like readmission prevention; 2) Corporate compliance programs that can be required for nursing homes to drive continuous improvement and prove it with data; 3) Accountable Care and its incentives for participants who have electronic medical records. **Summary:** market forces, more than ever before, are driving the rapid transition to EMR in post-acute care.<sup>2</sup>

## Benefits of EHR

The benefits to providers for using Electronic Health Records are many. They include:

- The immediate availability of complete healthcare information whenever an evaluation is needed of the patient's current condition, whether during a routine office visit or a medical emergency.
- Reduced delays in patient treatment, since the availability of a patient's complete medical history may reduce the number of diagnostic tests and procedures needed.
- The facilitation of rapid decision making during medical emergencies since EHRs also provide information regarding allergies and medications, and their dosages, and can reduce the potential for drug interactions.
- All the above lead to a reduction in medical errors.
- The rapid coordination of care with other healthcare providers familiar with the patient.
- The ability to easily share information with the patient's family and caregivers.<sup>3</sup>

## The Essential Role of Laboratory Professionals<sup>4</sup>

The potential benefits of universal implementation and use of EHRs are readily acknowledged. It is also changing how laboratory data is transmitted and displayed throughout the healthcare system. There are key areas in which laboratory professionals can contribute their expertise to the development of accurate exchange and display of laboratory data in EHR systems. Thoughtfully designed and rigorously tested EHR systems improve patient care by making it easier to collect, share, and interpret patient data. However, variations in EHR system design, functionality, and ability to exchange data accurately (interoperability) can also cause preventable patient safety risks. An EHR is safe and effective for laboratory data when the display of information and the computer system's behaviors (such as critical result alerts) are developed and implemented to optimally ensure accurate and timely interpretation by the end user.

The active participation of laboratory professionals as part of multidisciplinary teams is essential to improving the safety of EHR systems by identifying and eliminating laboratory data exchange and display errors, as well as supporting compliance with existing and new federal regulations.

Healthcare executives and laboratory leaders can also encourage and support the participation of laboratory professionals in the development of national health IT policies and standards.

Participation by laboratory professionals in the development of institutional health IT policies and standards also helps to ensure that patient safety concerns related to laboratory data are considered and addressed at the local level. Laboratory professional input is important since each organization's circumstances and technologies are unique and vary by clinical setting, such as those seen in a private practice, hospital, or healthcare system. Executive and medical leadership at these institutions can develop a multidisciplinary team, including pathologists and other laboratory professionals, to provide their expertise in the development of such policies and evaluate their potential impact on patient care and outcomes. Laboratory professionals serving on such teams can consider whether their institutions' unique needs are appropriately addressed in the development of these local policies. The combination of seeking consultation from a multidisciplinary team and using standardized EHR assessment tools will provide tailored advice to healthcare executives on their organization's specific scope of issues throughout the configuration, implementation, use, and evaluation of health IT systems.

## Engagement Strategies

*The list below summarizes actionable **engagement strategies** that can be implemented by laboratory professionals:*

- Provide laboratory expertise for health IT decision making at national and local levels
- Serve on policy and standards federal advisory committees and the numerous workgroups that support the ONC healthcare initiatives
- Monitor and submit comments on proposed rules and guidelines from all areas of government that impact EHR implementation and future EHR data use, including those from ONC, CMS, FDA, NQF, NIST, and AHRQ,<sup>22</sup>
- Foster healthcare executive and laboratory leadership support for staff to participate in national collaborative efforts such as ONC's Standards & Interoperability Framework workgroups and other initiatives
- Work with ONC, NIST, and the Healthcare Information and Management Systems Society (HIMSS) and other policy, certification, and standards development

organizations to determine opportunities for collaboration

- Institute communication networks for the timely distribution of relevant healthcare information and issues
- Improve awareness of and connect providers and laboratories with resources that support the improvement and use of EHR systems

Like all medical information, laboratory orders and results contained in EHRs convey information that is inherently private, confidential, and sensitive for patients, their families, and healthcare providers. Patient-specific laboratory data are integral to accurate diagnosis, appropriate treatment, and determining overall patient care decisions. Therefore, assurance is needed that patient-specific laboratory information is provided in a timely manner to the intended recipient, not altered in an exchange between systems (interoperability and fidelity), and displayed in a manner assuring accurate interpretation.

### **Data Integrity and Usability Strategies:**

*Laboratory Professionals and Organizations can:*

- Engage with EHR developers on the development and design of laboratory-related EHR system features, such as critical results alerts
- Provide laboratory expertise for assessing and improving the interoperability and usability of EHR systems at both organizational and national<sup>36</sup> levels
- Facilitate rigorous assessment of the usability of laboratory test ordering and reporting functions in the EHR for high-risk patient testing

### **Innovation Strategies:**

*Laboratory professionals can partner with stakeholders to stimulate innovation in EHR technology and usability to reduce laboratory data-related errors attributed to the use of EHR systems.*

- Champion collaborative efforts and support research agendas to provide more detail on laboratory data-related patient safety concerns in the EHR

# REGISTER NOW!



We look forward to seeing you at the next  
**CRI® ANNUAL SYMPOSIUM FOR  
CLINICAL LABORATORIES!**

**October 7 - 10, 2015**  
Tropicana | Las Vegas, NV

[CLICK HERE  
TO REGISTER](#)



- Collaborate with human factors engineers, EHR system interface designers, and others to advance innovation and the usability of laboratory data displays
- Encourage participation in EHR system assessments and voluntary reporting of EHR-related issues to PSOs
- Lead innovation in patient access to laboratory information

## CONCLUSION

Laboratory professionals and organizations can support the future vision and potential of Electronic Health Records and help improve the overall quality of healthcare for individual patients and the national population. To do so, laboratory professionals can educate themselves on the promises and pitfalls of EHR systems, and proactively engage in creating the solutions essential to sustaining the transformation of the U.S. healthcare system. In the best case scenario, the laboratory profession, laboratory industry, clinicians, and governmental agencies would work together to create and promote the implementation of standards, policies, practices, and services that improve the use of laboratory information throughout the patient encounter.

Understanding and integrating the expertise and perspective of laboratory professionals in the development of EHR systems is critical to ensuring the safety and effectiveness of laboratory data in EHR systems and establishing a solid foundation for a health IT infrastructure to benefit this nation's citizens now and for future generations.

---

## RESOURCES:

1. <https://www.cms.gov/Medicare/E-Health/EHealthRecords/index.html>
2. American Health Tech: A Brief History of Electronic Health Records (EHR.) Jan. 18, 2012
3. HealthIT.gov. Providers & Professionals: Benefits of EHRs
4. Sawchuk, M., Linville, M., Cornish, N., Pollock, A., Lubin, I., Gagnon, M., and Stinn, J. The Essential Role of Laboratory Professionals: Ensuring the Safety and Effectiveness of Laboratory Data in Electronic Health Record Systems. Atlanta, GA: Center for Surveillance, Epidemiology and Laboratory Services, Centers for Disease Control and Prevention; May 2014. Retrieved from [http://www.cdc.gov/labhit/paper/Laboratory\\_Data\\_in\\_EHRs\\_2014.pdf](http://www.cdc.gov/labhit/paper/Laboratory_Data_in_EHRs_2014.pdf)

# Follow CRI's Pathway to navigating the new IQCP transition period.

5 Key milestones to transition from EQC to IQCP by end of 2015



FOLLOW THE PATH TO QUALITY THROUGH IQCP IMPLEMENTATION!  
For more information visit [www.criedu.org](http://www.criedu.org)



## Stories from the Front Lines: The Patient Behind the Sample

**Name:** Krisann Howell, MLT (ASCP)

**Title:** General Supervisor of Laboratory Operations

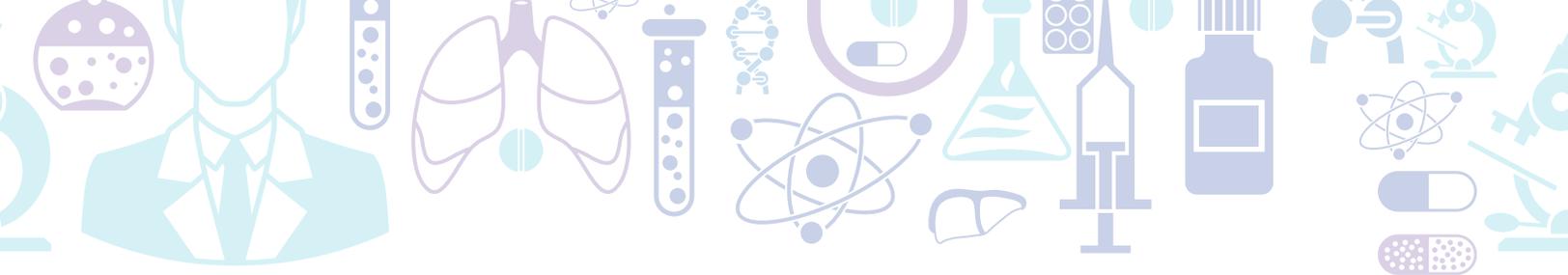
**Employer:** The Center for Hematology-Oncology, The Lynn Cancer Institute, Boca Raton, FL



We're a moderate complexity laboratory, with one specialty: Hematology. We serve about 13 physicians, and have an annual testing volume of about 50,000 tests. You may not think that a smaller lab like ours with only one specialty really "matters," but I have always thought that the lab plays a very important role in the health of our patients. We treat patients with diseases like Lymphoma, Leukemia, Multiple Myeloma and Sickle Cell Anemia. When you think about it, the whole life of a cancer patient is wrapped up into the CBC (complete blood count) result that we are constantly testing prior

to administering chemotherapy treatment. If their WBC (white blood cell) count is too low, it can mean a delay in treatment, or hospitalization; at the very least, it can cause them to change their social plans temporarily. And if their hemoglobin and platelets are too low, they are game changers, too; once again, treatment stops, and, now, blood transfusions are required.

When I first started as a technician, I worked in a hospital, as many of us do. I never really had much patient contact. Since working in this cancer center,



I've been amazed at how much the patients become involved with their lab results. They come to know what WBC and absolute neutrophil counts are, and what they need to be. They understand that their hemoglobin needs to stay above 8.0 g, and if it drops below that number, everything will change for them: Treatment stops, transfusion begins, and they must start all over again.

You get to know people who come in regularly for treatment; some can be here for months, even years. They kid with you when you draw their blood, saying things like "Make sure you give me good numbers." They want to know if they are going to be able to get on with their plans, like attending their grandchild's recital later that evening. And they ask lots of questions. They don't understand, for example, how some lab results can be delivered almost instantly, while others take more time. We recently got a new blood analyzer, and some of them asked whether it was a good brand of equipment! But all of these things are important to them: They come in to have their blood drawn, hoping for a good result, so they can get on with their chemo treatments. Those lab results determine what is next for them, as they fight to win their battle against cancer.

Visit [LabTestingMatters.org](https://www.LabTestingMatters.org) to read more **Stories from the Front Line of the Lab** and join us as we **build a community to support quality laboratory medicine**. If you are interested in sharing your story with the Lab Testing Matters Community you can contact Victoria Farrell at [vf Farrell@cola.org](mailto:vf Farrell@cola.org) or [submit your story online](#).