

What Will the Role of the Clinical Microbiology Laboratory Director Be in 2015?

Richard B. Thomson, Jr.,^{1*} and Gary V. Doern²

Microbiology Laboratories, Evanston Hospital and NorthShore University HealthSystem, and The University of Chicago Pritzker School of Medicine, 2650 Ridge Avenue, Evanston, Illinois 60201,¹ and University of Iowa Carver College of Medicine, Iowa City, Iowa 52242²

In a recent commentary titled “The Clinical Microbiology Laboratory Director in the United States Hospital Setting,” the authors concluded by suggesting that “conversation among medical microbiologists is needed to focus efforts on defining, standardizing and improving our performance as clinical microbiology laboratory directors” (8). The Camp Clinical Microbiology (Camp Clin Micro) meeting did exactly that. Issues discussed included the likely responsibilities of a laboratory technical director versus those of a medical director or a clinical consultant in 2015, how a laboratory director will be paid, management and personnel oversight responsibilities, teaching obligations and opportunities, research requirements and opportunities, extramural lecturing, income-producing activities, opportunities to educate and be recognized by the lay public, and training and certification challenges. Although many microbiology laboratory directors may ask, “Where’s the problem?” since they currently have positions that allow clinical consultative activities, educational responsibilities, unlimited or generous professional travel, and research time, changes occurring in the practice and delivery of medicine warn of an unpredictable future for laboratory medicine. Discussing the competition and cost reductions coming in the future will prepare and allow clinical microbiology laboratory directors to control changes in the delivery of laboratory medicine for the betterment of patient care and the profession.

In a survey conducted in 1994, 53 clinical microbiology laboratory directors responded that, on average, 30% of their day was devoted to management, 30% to clinical service, 10 to 15% to education, 5 to 10% to volunteer professional society activities, and 10 to 15% to research (7). Management responsibilities included an increase in time spent on personnel and budgeting issues. Increased effort was recognized in outreach laboratory work, infection control, and patient consultations. Research efforts were thought to be increasing, as was the time devoted to volunteer organizations. In 1994, clinical microbiology laboratory directors averaged 18 days per year away from the laboratory for professional travel, with some directors traveling as many as 54 days per year. The summary that follows will detail how the role of the clinical microbiology director has changed since 1994 and how it will continue to evolve into the year 2015.

* Corresponding author. Mailing address: Microbiology Laboratories, Evanston Hospital and NorthShore University HealthSystem, 2650 Ridge Avenue, Evanston, IL 60201. Phone: (847) 570-2745. Fax: (847) 733-5314. E-mail: rthomson@northshore.org.

TECHNICAL DIRECTOR

The clinical microbiology laboratory is and will be filled with complex and evolving instrumentation. Currently, laboratory directors are believed to spend 40 to 50% of their time evaluating, controlling, interpreting, and otherwise addressing technical issues in microbiology. It is likely that this percentage will decrease in the future. Responsibilities as technical director today are largely contained within the walls of the microbiology laboratory and controlled by the microbiologist director. The future will force a change in this dynamic. Automation will encompass specimen processing, plate reading, organism identification, and antimicrobial testing. Rooms filled with robotics and cameras will replace space which today is filled with workbenches and technologists (1). The cost of purchase, implementation, and maintenance of instrumentation will bring administrators and those with financial expertise into the process. Microbiology specimen processing will be combined with specimen processing for other areas of laboratory medicine. Technical competence in microbiology will be more of an engineering challenge than a medical challenge. Purchase and placement decisions will be made by administrator experts in lean-type production practices (6). Maintenance will be accomplished by engineers and those holding technical positions. This paradigm has occurred in the clinical chemistry, hematology, and immunology laboratories today and resulted in the core laboratory concept (2).

Government participation and control in health care will lead to a role for third-party payers in laboratory test decision making. Contracts that will limit the type or brand of automation and instrumentation may be negotiated. Cost mandates will result in consolidation of portions of microbiology automation into chemistry and hematology, with one administrative or technical director overseeing combined operations. Technical directors may hold bachelor’s- or master’s-level degrees or be doctoral scientists with generic laboratory management and science certification. The future role of a technical director in clinical microbiology will change dramatically. In order for the clinical microbiology laboratory director to maintain his or her central role in technical leadership in microbiology in the future, postdoctoral training will need to evolve to provide financial, efficiency (lean type), engineering, and computer training.

MEDICAL DIRECTOR AND CLINICAL CONSULTANT

The microbiology laboratory of the past featured primary care doctors and hospital-based specialists periodically visiting

the on-site laboratory to review smear and culture results. Looking through the microscope or examining a culture plate solidified impressions that were carried to the bedside and prominently used in therapeutic decision making. The scene today is one of near silence and no conversations, featuring only computer screens and keyboards in outpatient offices, clinic examination rooms, hospital intensive care units, and patient bedsides where the physician, physician's assistant, nurse practitioner, or other caregiver merely reads computerized reports and then type notes and orders. There is no relationship with the medical microbiologist and scant understanding of report content. Among the Camp Clin Micro discussants polled, it was estimated that only 20% of a laboratory director's time today is occupied as a clinical consultant and that this needs to and should increase significantly by 2015.

What are the obstacles to expanded clinical consultation? Proximity and time! Increasingly, laboratories are located miles from patient care areas. Consolidation has stretched one clinical microbiologist among multiple hospitals. Relationships with key physicians are more difficult to establish and are diminishing. Physicians themselves are rushed to accomplish more and more each day. Opportunities for laboratory consultations have largely disappeared. Responsibilities held by physicians in the past are now carried out by other caregivers, such as physician's assistants, nurse practitioners, and pharmacists.

Are there opportunities for clinical consultation? The radiologist has faced isolation problems similar to those of the medical microbiologist. Radiology was located in a major thoroughfare within the hospital, allowing doctors to quickly examine a patient's imaging studies (X rays in the past) and discuss findings with the radiologist. Today this face-to-face contact is missing, but digital images are available on high-resolution monitors throughout hospitals, outpatient offices, and even on home computer monitors or personal handheld devices (5). The image and the radiologist's interpretation can be reviewed at any location. The clinical microbiology laboratory director of 2015 must begin to take advantage of similar means of information transfer in an effort to optimize the use of information generated in the laboratory. In some cases, this may include the transfer of relevant images accumulated in the laboratory. Importantly, such a paradigm offers the opportunity to convey interpretive statements and care suggestions. Attaching an antibiogram or empirical antimicrobial guidance from the Pharmacy and Therapeutics Committee reflecting antibiotic stewardship efforts results in an information exchange that may improve upon the face-to-face interactions that occurred in the past. The microbiology laboratory director needs to assume a lead role in this process.

HOW WILL THE CLINICAL MICROBIOLOGY DIRECTOR BE PAID?

Income streams for clinical microbiology laboratory directors are many and varied. Laboratory directors are currently supported using payment strategies that consider them to be individual consultants, private contracting pathology groups, medical practice employees, hospital or medical center employees, government employees, clinician directors doubling as surgical pathologists or infectious diseases consultants, and scientists supported by research funding. Medicine has tradi-

tionally been a fee-for-service industry, but laboratory directors are rarely reimbursed on a fee-for-service basis (3).

The source of future salary funding is not clear. Cuts and changes by government and third-party insurance payers make salary predictions difficult and job security a question. Health care systems with employed physician and doctoral professionals create job categories designed for a commodity rather than a negotiated position. The clinical microbiology laboratory director must demonstrate value that translates into improved patient care, more efficient delivery of care, and increased revenue. This will require astute oversight of the vagaries of salary and professional reimbursement and calculated lobbying by professional organizations and individuals to secure and optimize income in 2015.

LABORATORY MANAGEMENT AND ADMINISTRATION

Long a major responsibility of the clinical microbiology laboratory director, management and administrative activities have been taken over by professional administrators. The daily work responsibilities of the microbiology director of hiring, firing, promoting, budgeting, capital expenditure, and job scheduling decisions have disappeared or represent a very small portion of the director's responsibilities. Although some of these functions are still performed by directors in smaller laboratories, it is expected that management and administrative duties will not be a responsibility of the clinical microbiology laboratory director in 2015.

TEACHING

The educational activities of the microbiology laboratory director are important in nearly all settings and include teaching physicians, nurses, laboratory personnel, and other allied health personnel, both those who are currently practicing and those who are in training. Teaching may be didactic in the setting of the classroom or less formal during conferences, laboratory teaching rounds, and impromptu discussions. In addition, continuing education segments and competency training of technical workers in the laboratory are the responsibilities of some laboratory directors. Educational activities are expected to increase in quantity and importance by 2015.

Novel learning and educational activities were discussed. The most exciting was the development and use of simulation laboratories (4). Surgical and emergency personnel are now training with simulators that mimic patients needing intubation, resuscitation, surgical intervention and repair, orthopedic repair, and related procedures. Simulators conjure thoughts of airline pilots training to fly new aircraft or for flight emergencies. It is appealing to think that microbiology personnel will not encounter a routine, STAT, or emergency task or accident in the laboratory that they have not been trained and certified to be proficient to perform or remedy. Easy retraining and competency using computer models and simulation rooms to teach (or reteach) biosafety, aseptic practices, processing steps for lean production, instrument maintenance, phone etiquette, etc., may result in reduced errors, improve service, and standardize work among all employees. The quality and quantity of laboratory education using simulation rooms could be ex-

panded under the scrutiny of the laboratory directory without additional teaching time and effort by the director.

RESEARCH

Clinical research under the direction of the clinical microbiology laboratory director has been the backbone of advances in the discipline for decades; however, today it has become more challenging for the laboratory director to be involved in meaningful research initiatives. The laboratory-industry relationships that have fueled a great deal of clinical research now face many obstacles. Industry has less money to spend. The relationships between laboratory directors and industry have eroded. Expanded institutional review board (IRB) requirements and the cost of IRB review, laboratory staffing that can no longer accommodate research projects, overhead costs established by hospitals receiving outside research funding, and limitations faced by industry to fund programs all constitute challenges to performing research in the setting of the clinical microbiology laboratory today. In the past, research programs often thrived in university laboratories that had more than one director-level individual with responsibility in clinical microbiology. One person, paid for by the university, was responsible for the clinical service, while additional personnel, paid for by research funding from outside agencies, conducted research. A full-time commitment to research permits individuals to successfully compete for funding, conduct multiple projects simultaneously, readily respond to sponsor requests, and publish results in a timely manner. As institutions, even those in academic settings, have cut back on director-level positions in laboratory medicine, the opportunity to perform research has eroded. The result has been a precipitous decline in research activities by clinical microbiology laboratory directors. In the absence of compelling new science, clinical microbiology becomes a trade; it ceases to be a medical-scientific discipline. What can be done about it? This issue is explored in detail in the third discussion of Section 5 of this supplement, but clearly, part of the solution has to rest with laboratory directors themselves. Notwithstanding all of the obstacles, research simply needs to become a bigger priority for clinical microbiologists.

EXTRAMURAL ACTIVITIES

Clinical microbiology laboratory directors have traveled and lectured extensively in the past. In addition to meetings hosted by professional organizations and local clinical microbiology organizations, industry-sponsored seminars and university visiting professorships provide opportunity for travel as a means to disseminate new information, new perspectives, and new ideas. Although plentiful in the past, travel opportunities are expected to largely disappear by 2015. Employers will increasingly discourage travel by laboratory directors in the future, the funding for such activities will diminish, and regulations surrounding continuing medical education will become more onerous. If laboratory directors want to continue to be involved in these activities in the future, albeit at a much reduced level, they will need to articulate the conditions of such activities in employment contracts. A maximum number of days away, funding for travel and education, and coverage responsibilities for the home laboratory will be negotiated perquisites.

LAY PUBLIC RESPONSIBILITIES AND OPPORTUNITIES

Clinical microbiology laboratory directors are at the epicenter of contemporary medical challenges that include emerging pathogens, antimicrobial resistance, nosocomial infections, and bioterrorism threats. The lay public needs a clear understanding of the issues and solutions. Few have the background and experience with these problems to the extent that medical microbiologists who direct clinical laboratories do. The public needs a forum in which to interact with scientists and clinicians from the clinical laboratory. Short of Hollywood filming of a real-life drama taking place in the hospital clinical laboratory, à la *CSI: Miami*, a forum will need to be developed by professional organizations. Podcasts, Facebook, Twitter, and electronic inventions of the future can and should be used to advertise the value of clinical microbiology laboratory directors and to educate the public when important scientific issues are part of local or world news.

TRAINING FOR CLINICAL MICROBIOLOGY LABORATORY DIRECTORS

Excellent postdoctoral microbiology training is currently available through fellowship programs accredited by the Committee on Postgraduate Education Programs (CPEP) or the Accreditation Council for Graduate Medical Education (ACGME). Training objectives will need to be updated as clinical microbiology laboratory directors are challenged with advances in medicine and science and new laboratory responsibilities arise. Importantly, training via either a CPEP or ACGME pathway should qualify graduates to sit for either or both of the examinations of the American Board of Medical Microbiology (ABMM) and American Board of Pathology (ABP). Such a paradigm would also serve to standardize the profession by presenting one professional to medical peers and to the public.

SUMMARY

The job of a clinical microbiology laboratory director is difficult to define. With different training pathways and board certifications and no standard job description, the public and fellow professionals are unsure about what clinical microbiology directors really do. We have endeavored to define those skills needed to address the current responsibilities of and challenges faced by clinical microbiology laboratory directors and, further, projected which of these skills will be needed in the year 2015. Changes that are likely to occur for the clinical microbiology laboratory director are many. (i) Automation of processing steps, robots replacing technologists, consolidation into core laboratories, and administrative and financial oversight by others may significantly decrease the technical expertise needed. (ii) Clinical consultation using electronic transmission may increase the time devoted to assisting the patient care team. No one in medical care knows and understands the ecology, pathogenesis, detection and identification, antimicrobial response, and public health dangers of agents of human infectious diseases better than the medical microbiologist who directs the clinical microbiology laboratory. (iii) The source

and amount of salary for laboratory directors are difficult to predict in the changing health care environment. The trend continues toward directors becoming salaried employees of hospitals, universities, and group medical practices. (iv) The need to spend time with management and personnel issues as in the past will disappear by 2015. Professional administrators, managers, and accountants will provide support for the laboratory environment. (v) Teaching at all levels will increase, and teaching methods may change to the use of simulation laboratories that will use computers and simulated infectious material to mimic all routine and emergency procedures that need to be known by laboratory personnel. (vi) Research in clinical microbiology laboratories, long an important component for the advancement of diagnostic testing and antimicrobial testing developments, is threatened. Laboratory directors must struggle to maintain this activity. (vii) Traveling for educational activities is expected to be significantly diminished by 2015. (viii) The knowledge and experience held by the clinical microbiology laboratory director should be recognized and shared with the public. Professional organizations should be called upon to exploit this resource. (ix) Currently, clinical microbiology directors are trained along different pathways. The future would benefit by consolidation or mutual recognition between CPEP/ABMM and ACGME/ABP.

The future does look different. Changing directors' training

and contributions to match the new needs of the profession must be combined with a renewed energy by individuals and professional organizations to underscore the value of clinical microbiology laboratory directors to fellow professionals, those paying medical bills, and the lay public.

Session discussants: Sheldon Campbell, Jane Coogan, Gina Ewald, Betz Forbes, Robert Jerris, Nate Ledeboer, Alex McAdam, Mike Saubolle, Michael Towns, Markita Weaver, Mel Weinstein, and Alice Weissfeld.

REFERENCES

1. **Beall, A.** 2008. Microbiology lab automation arrives. *MLO Med. Lab. Obs.* **40**:48–50.
2. **Dadoun, R.** 1998. Impact on human resources: core laboratory versus laboratory information systems versus modular robotics. *Clin. Lab. Manage. Rev.* **12**:248–255.
3. **Federal Register.** 29 November 2010. Medicare program; payment policies under the physician fee schedule and other revisions to Part B for CY 2011. Final rule with comment period. *Fed. Regist.* **75**:73169–73860.
4. **Lateef, F.** 2010. Simulation-based learning: just like the real thing. *J. Emerg. Trauma Shock* **3**:348–352.
5. **Oehler, R. L., K. Smith, and J. F. Toney.** 2010. Infectious diseases resources for the iPhone. *Clin. Infect. Dis.* **50**:1268–1274.
6. **Pocha, C.** 2010. Lean six sigma in health care and the challenge of implementation methodologies at a veterans affairs medical center. *Qual. Manag. Health Care* **19**:312–318.
7. **Thomson, R. B.** 1995. The changing role of the clinical microbiology laboratory director—results of a survey. *Diagn. Microbiol. Infect. Dis.* **23**:45–51.
8. **Thomson, R. B., M. L. Wilson, and M. P. Weinstein.** 2010. The clinical microbiology laboratory director in the United States hospital setting. *J. Clin. Microbiol.* **48**:3465–3469.