Professions, Professionalism, and Professional Identity

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LEARNING OBJECTIVES

1. Define the characteristics of a profession.
2. Identify the components of a code of ethics.
3. Describe the components of professionalism.
4. Describe teaching methods educators can use to enhance professional identity development.

ABSTRACT

Professions are characterized as having a specific body of knowledge, professional authority, society authorization, a code of ethics, and a specific culture. Professional identity and attributes of professionalism are acquired during the professional education process. Multiple methods for teaching professionalism may be incorporated into curricula for medical laboratory science professionals, including mentoring, reflection papers, and specific communication skills required to work in interprofessional teams. The acquisition of professionalism concepts is critical for novices to become fully functioning medical laboratory professionals.

ABBREVIATIONS: ASCLS - American Society for Clinical Laboratory Science, ASCP - American Society for Clinical Pathology, ASCP-BOC - Board of Certification of the American Society for Clinical Pathology, MLS - Medical Laboratory Scientist, MLT - Medical Laboratory Technician, NAACLS - National Accrediting Agency for Clinical Laboratory Sciences, NCA - National Certification Agency for Clinical Laboratory Personnel.

INDEX TERMS: profession, professional, professionalism, professional identity, professional socialization.

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INTRODUCTION

The practice of clinical laboratory science is a profession, regardless of whether it is well known or understood by nonhealthcare professionals. Five attributes characterize a profession: a specific body of knowledge, professional authority, society authorization, a code of ethics, and a specific culture (Table 1).[1] Developing attributes of a professional is as important as learning the requisite technical skills and can be achieved using multiple methods.

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CHARACTERISTICS OF A PROFESSION

Body of Knowledge

Professions have specific identifiable skills and expertise based upon theoretical knowledge.[2] This theoretical knowledge, often referred to as a body of knowledge, is specific to each profession and serves as the foundation for the other four characteristics of a profession. Clinical laboratory science has a large body of knowledge comprised of the disciplines of hematology, clinical chemistry, microbiology, transfusion medicine, urinalysis, body fluids, clinical immunology, and laboratory science practice.[3] In order to practice as a skilled member of a profession, one masters specific knowledge—the body of knowledge—that can only be developed by intellectual and practical experience via extensive academic and practical (experiential) education and training. Clinical laboratory science professionals master their specific body of knowledge via rigorous prerequisite science courses, discipline-specific courses, and clinical experiences followed by the development of expertise via experience as a practicing professional. Given that the theoretical knowledge expands, members of a profession hold regular meetings to evaluate its continued development and progress. Clinical laboratory science professionals meet to listen to lectures, participate in workshops, and debate policies

Pertaining to the profession during meetings held at local, state, regional, national, and international venues.

Professional Authority

Mastery of a body of knowledge confers professional status because nonprofessionals do not have that specific knowledge or expertise.[1] This grants individuals their professional authority. For example, a nonclinical laboratory professional cannot analyze and interpret a peripheral blood smear to differentiate white blood cell stages that may be indicative of an infection or a myeloproliferative condition. Nor can a nonlaboratory professional competently interpret laboratory test results without professional consultation. This is a fundamental characteristic of a profession and a professional; likewise, client is the term used for the individual whom the profession and professional

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serve.[1] A client is different than a customer; customers can ascertain services needed, whereas a client cannot determine which healthcare services are needed or not desired (eg, complete blood count, magnetic resonance imaging, or surgical procedure). Medical services are not purchased based upon want, desire, or promotion; they are purchased or engaged based upon need (need that cannot be specifically identified by the client). Clients engage professionals who then use their specific knowledge and expertise to serve or benefit the needs of the client. Thus, the patient for whom clinical laboratory analyses are performed is the client, and the clinician (physician, nurse practitioner, or physician's assistant) who orders the laboratory testing is the customer. This is an important distinction with respect to how clinical laboratory science is practiced; clinical laboratory science professionals serve the patient; however, many if not most interactions are with clinicians, our customers. Professionals use their distinct skills, expertise, and judgment solely for the benefit of the client.[1] Although clinical laboratory science professionals may not interact directly with each patient whose specimen they analyze, they advocate for the patient by ensuring that instruments are performing appropriately using quality control systems, reviewing test results for appropriateness, and interacting with the clinician who ordered the tests. They are performing their duties on behalf of the patient, who not only benefits from the laboratory test information that is provided but receives remuneration from the patient's insurance company as compensation.

Society Authorization

Society authorizes professional self-control to professions if certain criteria are met.[1] The premise for self-control is the requirement of specialized education and practical experience to practice as a professional and the fact that the profession and its members are the only individuals who can evaluate the performance of professionals and whether educational requirements are met. Professions maintain control over entry into their ranks by specifying requirements as a condition of admission to their academic and training programs, passing an entrance examination prior to becoming a practicing professional, and using the profession's title.[1] Educational programs are approved through an accrediting process that uses peer review for its evaluation and approval process. National Accrediting Agency for Clinical Laboratory Science (NAACLS) accredits programs for professions in clinical laboratory science.[4] Entrance to a profession is marked by successfully passing an entrance examination, such as a licensing or certification exam. Although clinical laboratory professionals are not licensed throughout the United States, a nationally recognized certification exam provided by the Board of Certification of the American Society for Clinical Pathology (ASCP-BOC) is a general requirement to practice as a Medical Laboratory Scientist (MLS) or Medical Laboratory Technician (MLT).[5] Although there are other certification organizations, such as the American Medical Technologists[6] and the American Board of Bioanalysts,[7] American Society for Clinical Pathology (ASCP) certification is the predominant credential earned for those entering the profession as MLS and MLT, having certified more than 525 000 professionals.[5]

Code of Ethics

Professions have codes of ethics; occupations and jobs do not.[1] Codes of ethics distinguish the relationship between members of the profession and their clients, their colleagues, and their duty to society; they describe how to practice the profession and identify relationships between the professional and client and role within society. The American Society for Clinical Laboratory Science (ASCLS) Code of Ethics identifies three duties—to the patient, colleagues, and the profession and society[8] (Supplement 1). The International Federation of Biomedical Laboratory Science, an organization of which ASCLS is a member, identifies identical duties as well as a responsibility to the global practice of our profession[9] (Supplement 2). The ASCLS Code of Ethics incorporates a Pledge to the Profession, which is often recited at graduation ceremonies as a ritual celebrating entrance into the profession of clinical laboratory science.

Specific Culture

Professions are practiced in specific locations unique to services they provide.[1] Clinical laboratory science is practiced primarily in healthcare settings; however, it would be appropriate to consider that the profession is also practiced in its educational settings and in consultative roles with other healthcare professionals and with patients (clients) in nonhealthcare settings. The culture of a profession is specific to each profession; it includes its values, norms, and symbols.[1] These values, norms, and symbols are components of professional identity and define how the individual views their role within the context of the profession and society.

Professional culture—values, norms, and symbols—differentiates professions from occupations.[1]

Furthermore, incorporating and adopting these values, norms, and symbols is required for development of an individual's professional identity.

Professional Organizations

Although there are numerous, most likely thousands, of organizations that represent professions, special interests, and occupations, professional organizations (often generically called professional societies) are gathering places (literally and figuratively) in which its members gather to discuss and learn new knowledge (expand its body of knowledge), advance the profession's status, and establish

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benchmarks for entrance into the profession and educational requirements.[1] Multiple professional societies represent the interests of clinical laboratory professionals; some represent the entire scope of the profession, such as the ASCLS, or specific aspects of the profession, such as the American Association for Clinical Chemistry, American Society for Microbiology, and Clinical Laboratory Management Association (Table 2). All support their members by providing continuing professional education, publishing a journal, and advocating on behalf of its members in the legislative and regulatory arenas.

PROFESSIONALISM

"Professionalism is the basis of a profession's social contract with society."[10] Professional identity and professionalism are developed during academic and experiential preparation prior to entry into practice, and they are composed of the knowledge, skills, and values attributable to the specific profession.[11] One can have the knowledge, skill, and values of a specific profession; however, incorporating a professional identity requires practicing the profession—performing the duties of the profession.[11] Lastly, professional identity is achieved when one identifies oneself with one's profession.[11]

Socialization in the profession is a common term used for this phenomenon of transforming novices into practicing professionals. Socialization or developing professional identity requires skill development in three aspects of the profession: knowledge, experience, and integration of the norms and values of the profession into the individual's identity.[12] Developing professional identity is a complex process, and skills in professionalism do not lend themselves to summative evaluation tools, such as multiple-choice exams or mastery of checklists. Yet because professionalism is more than a set of behavioral characteristics, it is often not included as a specific component of educational curricula.[13] Educators have frequently relied solely on evaluation of behavioral aspects required of working professionals as measurement of student progress toward professionalism as an MLS or MLT. Given the importance of professional identity upon the practice of the clinical laboratory science profession, it is imperative that professionalism be explicitly incorporated into medical laboratory science professional curricula.

Teaching Professionalism

Before health professional education programs can develop curricula in professionalism, the profession itself must define specific components of professionalism.[13] Professionalism requires competency in technical, interpersonal, and valued-based competencies specific to each profession.[13]

Accreditation organizations require professionalism as one component of healthcare professions curricula, including that for clinical laboratory sciences, NAACLS.[4] NAACLS Standards state that entry-level MLSs have basic knowledge and skill in "principles and practices of professional conduct and the significance of continuing professional development" along with the respective requirement that the curriculum includes these same requirements; however, there is no program outcome assessment that includes a professionalism component.[4]

Incorporating a specific curriculum would benefit clinical laboratory science. First, it is important to explicitly define professionalism values for clinical laboratory science professionals. The Code of Ethics provides a foundation; however, professionalism values, such as responsibility, respect, honesty, and communication skills, may not be explicitly stated.

Descriptions of behaviors that demonstrate professional values must be expressly communicated to students and then used for evaluation throughout the curriculum, not just the experiential component of the curriculum.[14] Evaluation of professionalism behaviors needs to provide formative feedback that describes the behavior, not just the use of a 3- or 5-point Likert scale. If students do not meet standards for professional behaviors, instructors need to provide that feedback and provide opportunities for remediation.

Curricula to teach professionalism from medicine and other healthcare professions provide examples to incorporate into MLS and MLT curricula.[15] Incorporating professionalism into the curriculum requires explicitly stating expectations, providing meaningful experiences for students to demonstrate skills and behaviors followed by evaluating student outcomes.[15] Two methods frequently used in medical education are employing role models and mentorship to teach professionalism.[15] McGill University uses a formal mentorship program in which one physician is assigned to six students for their 4-year program, meeting six times per year for the first 2 years and four times per year for the second 2 years.[10] Specific requirements are covered; however, the primary purpose of the mentoring program is to discuss student's progress in professional identity development. Role modeling has been used as one of the primary methods to teach professionalism in medicine; however, without a standard curriculum and specific evaluation tools, it is difficult to measure outcomes. Role modeling as a teaching tool can be improved by rewarding those who are identified as exemplary role models.[16] Awards for exemplary professionalism can be presented for students, faculty, and clinical instructors.

However, these methods (role modeling, mentoring, and awarding exemplary role modeling) are susceptible to subjectivity without identifying and sharing specific measurable behavioral expectations with students.

Mentoring is not often formally used to teach professionalism in MLS and MLT curricula, yet MLS and MLT faculty and clinical instructors tacitly serve as role models and mentors for novice professionals. Although MLS and MLT

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students are enrolled in their programs for less time than medical, pharmacy, and physical therapy students—1–2 years versus 3 or 4 years—with creative use of faculty and current professionals, a mentorship program can be developed. MLS and MLT programs can employ a similar methodology to that used by McGill University by engaging current professionals with small groups of students during the students' tenure in their program.[10] Interestingly, nonhealthcare programs, such as business programs (undergraduate and graduate), engage alumni to serve as mentors with current students.[17] Although they has not been evaluated, it is possible that formal mentoring programs may play a role in transitioning student membership to full membership in laboratory professional organizations.

Introducing opportunities for students to prepare reflections on their experiences, specifically their learning and professional development, at several stages in their educational career improves learning as well as professional practice.[16,18] Reflective writing assignments can be introduced beginning in the first semester of curricula, usually after introducing the Code of Ethics and Description of Expected Professional Behaviors. These assignments can be short or long and include small group work wherein students share their experiences.[18] These are assignments—reflective writing opportunities—in which novices recognize and describe their progress and challenges toward becoming a professional. Creating methods that demonstrate to students their progress in professional development provides both an opportunity for faculty to establish specific outcomes and for students to develop skills in reflection. Reflection and self-evaluation are critical thinking skills that are used for problem-solving and process improvement in the practice environment.

Improving patient safety, specifically, delivering healthcare that is safe, effective, timely, efficient, patient-centered, and equitable, requires all healthcare professionals develop and use five competencies: employing evidence-based practice, applying quality improvement, utilizing informatics, working in interprofessional teams, and providing patient-centered care.[19,20] One of these competencies, "working in interprofessional teams," requires communication skill development and team-building opportunities to be incorporated into the curricula, two areas that faculty often have little formal training to teach these skills as well as a perception about a lack of time to teach these competencies.[14,16] Communication—how professionals communicate with customers and clients—is a key characteristic of professionalism, and there are specific requirements for communicating as a clinical laboratory professional that must be developed during educational and clinical practice in order to participate as a fully functioning member of the interprofessional healthcare team.

As pharmacists prepared to change to an entry-level practice doctorate for their profession, they identified specific skills required for their new level of practice and a new professional identity.[21,22] In addition to establishing additional skills for their new level of practice, they identified a new title for their role in healthcare delivery: pharmaceutical care, to deliver drug therapy to improve patients' quality of life.[21,22] To prepare for the new role on the healthcare team, as Doctors of Pharmacy (PharmD), the concept of caring was incorporated into the curriculum. Effective communication was identified as the foundation skill required to implement the concept of caring into pharmaceutical care practice. This preparation permitted educators to easily incorporate patient safety competencies, specifically, working in interprofessional teams, into their curricula.

Teaching Professionalism—Communication Skills and Team Building

Given the need to become a fully functioning member of an interprofessional healthcare team in the healthcare delivery system of the 21st century, current and future MLSs and MLTs need to communicate in a manner that improves patient safety. Students need to practice communicating clinical laboratory science–specific information in safe environments prior to completing interprofessional learning during the didactic portion of their education and, more importantly, prior to entering into the practice environment as an entry-level professional where they have the opportunity to work in interprofessional teams. Communication skills may be incorporated within the didactic disciplines of clinical laboratory science, with a focus upon the content of the communication, for example, answering technical questions in a manner and at an appropriate level for entry-level professionals in hematology, chemistry, microbiology, and transfusion services.[23] Assignments that focus upon answering questions from clinician and patient perspectives can be integrated into learning management system discussion modules. These types of assignments require critical thinking skills that often employ application, analysis, synthesis, and evaluation cognitive levels of learning. Working in interprofessional teams requires specific communication methods and tools to create a culture of safety in healthcare settings. TeamSTEPPS is a communication and team-building method frequently used in healthcare settings.[24] Communication tools such as these can be incorporated into MLS and MLT curricula prior to student participation in interprofessional educational modules and, more importantly, as the foundation to develop competency in professional communication.

Teaching Other Aspects of Professionalism—Duty to Colleagues and Society

Incorporating other aspects of professionalism into MLS and MLT curricula is critical to professional development, particularly the duty to profession and colleagues. Latshaw and Honeycutt performed a qualitative assessment of their professionalism requirements. Students were required to

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complete activities in professional development (such as join a professional society), community service (participate in a health fair, community health clinic), and scholarly activities (poster presentation, teach other healthcare professionals via an educational program).[25] An evaluation of the reflective papers prepared by the students at the end of the their educational programs demonstrated that students appreciated service learning opportunities.

Although it is unknown whether incorporating these types of assignments into the MLS and MLT curricula have lasting effects upon individual commitment to the duties to colleagues and the profession as well as to society, without exposure to these expectations and activities, students will not have opportunities to incorporate these values described in the Code of Ethics.

Transition—Evolving the Profession

Throughout the 20th and 21st centuries, healthcare delivery systems and health professions that provide care have been in transition as new delivery models were adopted (eg, hospitals as the center of care, integrated healthcare systems like group health maintenance organizations, accountable care organizations), new financing and payment systems were created (eg, Medicare, Medicaid, Diagnosis-Related Groups, Medical Necessity), professions have expanded their roles (eg, Nurse Practitioner, Doctorate of Pharmacy, Doctor of Physical Therapy), and quality improvement programs have been incorporated into delivery systems (eg, Patient Safety, Triple Aim, TeamSTEPPS).

Clinical Laboratory Science has undergone many transitions recently after two certification organizations, ASCP-BOC and National Certification Agency for Clinical Laboratory Personnel (NCA), merged in 2009.[26] Prior to this merger, ASCP-BOC used Medical Technologist and NCA used Clinical Laboratory Scientist as titles for certified individuals who were baccalaureate-prepared clinical laboratory professionals. After the merger, MLS became the title used by the ASCP-BOC, a combination of the two previous titles.

Using more than one title for members of the profession creates confusion with respect to professional identity and job titles used in healthcare systems, hospitals, clinics, and independent laboratories. However, in order to progress as a profession, MLS is the title that should be and needs to be used, because as the title of an article recently published in the *Journal of the American College of Radiology* suggests, "Titles Change, A Profession Evolves."[27] It is especially important for members of the clinical laboratory science profession to adopt the title MLS as the profession expands to include the clinical practice doctorate, Doctor of Clinical Laboratory Scientist.[28-31] Scientist is the key word and concept that must be embraced. No longer, and this has been true for a long time, are members of this profession technologists; members of this profession are scientists.

The Clinical Laboratory Science profession is not moving to an entry-level doctorate as pharmacy and physical therapy have done; it is expanding its career ladder based upon the foundation of clinical laboratory science practice.[32] This expanded role and new competencies required for all healthcare professionals (National Academies of Medicine)[19] are an opportunity for all levels of clinical laboratory science professionals to renew their commitment to laboratory testing services that are safe, effective, efficient, timely, patient-centered, and equitable.[33] It is an opportunity for all levels of clinical laboratory professionals to practice at the highest level of their scopes of practice.

SUMMARY

By definition, clinical laboratory science qualifies as a profession based upon the five characteristics of a profession: a specific body of knowledge, professional authority, society authorization, a code of ethics, and a specific culture. Attributes of professionalism are specific to each profession. Professional identity requires acquisition of knowledge, skills, and values of the profession. The foundation of professional identity is acquired during the education process for preparing clinical laboratory professionals, and it is critical to becoming a fully functioning professional.

REFERENCES

1. Greenwood E. Attributes of a profession. *Soc Work*. 1957;2 (3):45–55.
2. Kultgen J. Sociological theories. In: *Ethics and Professionalism*. University of Pennsylvania Press; 1988:57–153. Accessed March 27, 2018. http://ebookcentral.proquest.com/lib/rutgers-ebooks/detail.action?docID=3441431.
3. American Society for Clinical Laboratory Science. Body of knowledge. Accessed May 15, 2018. https://members.ascls.org/store_category.asp?id=68.
4. National Accrediting Agency for Clinical Laboratory Sciences. NAACLS Standards for Accredited and Approved Programs. November 2017. Accessed May 15, 2018. https://naacls.org/getattachment/6adf9e07-de30-45a4-9854-f63176586561/2012-Standards-Edited.aspx.
5. American Society for Clinical Pathology Board of Certification. Accessed May 15, 2018. https://www.ascp.org/content/board-of-certification.
6. American Medical Technologists. Accessed May 31, 2018. https://www.americanmedtech.org/Get-Certified#177227-eligibility.
7. American Board of Bioanalysis. Accessed May 31, 2018. https://www.aab.org/aab/Certifications_Qualifications.asp.
8. American Society for Clinical Laboratory Science. Code of Ethics. Accessed May 15, 2018. http://www.ascls.org/about-us/code-of-ethics.
9. International Federation of Biomedical Laboratory Science. Code of Ethics. Accessed May 15, 2018. http://www.ifbls.org/index.php/statements/code-of-ethics.
10. Cruess SR, Cruess RL. From teaching professionalism to supporting professional identity formation: lessons from medicine. *Mercer Law Rev*. 2017;68(3):665–686.

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11. Trede F, Macklin R, Bridges D. Professional identity development: a review of the higher education literature. *Stud High Educ*. 2012;37(3):365–384. doi: 10.1080/03075079.2010.521237
12. Cornelissen JJ, vanWyk AS. Professional socialisation: an influence on professional development and role definition. *S Afr J High Educ*. 2007;21(7):826–841.
13. Wynia MK, Papadakis MA, Sullivan WM, Hafferty FW. More than a list of values and desired behaviors: a foundational understanding of medical professionalism. *Acad Med*. 2014;89(5):712–714. doi: 10.1097/ACM.0000000000000212
14. Kirk LM. Professionalism in medicine: definitions and considerations for teaching. *Proc Bayl Univ Med Cent*. 2007;20:13–16. doi: 10.1080/08998280.2007.11928225
15. Birden J, Glass N, Wilson I, Harrison M, Usherwood T, and Nass D. Teaching professionalism in medical education: a best evidence medical education systematic review. BEME Guide No. 25. *Med Teach*. 2013;35(7):e1252–e1266. doi: 10.3109/0142159X.2013.789132
16. Al-Eraky MM. Twelve Tips for teaching medical professionalism at all levels of medical education. *Med Teach*. 2015;37:1018–1025. doi: 10.3109/0142159X.2015.1020288
17. Portland State University. The School of Business. *Alumni Involvement*. Accessed May 3, 2018. https://www.pdx.edu/sba/alumni-involvement.
18. Cohn RJ, Plack MM. A cloud with a silver lining: helping students learn about professionalism. *Teach Learn Med*. 2017;29(3):304–312. doi: 10.1080/10401334.2016.1274658
19. Institute of Medicine. Greiner AC, Knebel E. (eds.) *Health Professions Education: A Bridge to Quality*. National Academy of Sciences; 2003.
20. Morris S, Otto CN, Golemboski K. Improving patient safety and healthcare quality in the 21st century–competencies required of future medical laboratory science practitioners. *Clin Lab Sci*. 2013;26:200–204.
21. Chalmers RK, Adler DS, Haddad AM, Hoffman S, Johnson KA, Woodward JMB. The essential linkage of professional socialization and pharmaceutical care. *Am J Pharm Educ*. 1995;59(Spring):85–90.
22. Akiyode O. Teaching professionalism; A faculty's perspective. *Curr Pharm Teach Learn*. 2016;8(4):584–586. doi: 10.1016/j.cptl.2016.03.011
23. Golemboski K, Otto C. Improving patient safety through laboratory communication. *Clin Lab Sci*. 2015;28(2):106–107.
24. Agency for Healthcare Research and Quality. TeamSTEPPS. Accessed May 25, 2018. https://www.ahrq.gov/teamstepps/index.html.
25. Latshaw S, Honeycutt K. Professionalism–a required CLS/CLT curricular component. *Clin Lab Sci*. 2010;23(3 Suppl):3–24, 31. doi: 10.29074/ascls.23.3_Supplement.24
26. Morris S. Unification of the NCA and the ASCP Board of Registry. *Clin Lab Sci*. 2010;23(1):2–4. doi: 10.29074/ascls.23.1.2
27. Moehrle A. Radiology is going away . . . and that's okay: titles change, a profession evolves. *J Am Coll Radiol*. 2018;15(3 Pt B):499–500. doi: 10.1016/j.jacr.2018.01.018
28. American Society for Clinical Laboratory Science. Advanced Practice: Doctorate in Clinical Laboratory Science. Accessed June 3, 2018. http://www.ascls.org/position-papers/178-advanced-practice-doctorate-in-clinical-laboratory-science/154-advanced-practice-doctorate-in-clinical-laboratory-science.
29. Rutgers University. Doctorate in Clinical Laboratory Science. http://shp.rutgers.edu/dept/CLS/DCLS/.
30. University of Texas Medical Branch. Doctorate in Clinical Laboratory Science. https://shp.utmb.edu/ClinicalLaboratorySciences/DCLSprogram.asp.
31. University of Kansas. Doctorate in Clinical Laboratory Science. http://www.kumc.edu/school-of-health-professions/clinical-laboratory-science.html.
32. American Society for Clinical Laboratory Science. Practice Levels and Educational Needs for Clinical Laboratory Personnel. July 25, 2009. Accessed June 3, 2018. http://www.ascls.org/position-papers/175-levels-of-practice/151-levels-of-practice.
33. American Society for Clinical Laboratory Science. Patient Safety and Clinical Laboratory Science. July 2015. Accessed June 3, 2018. http://www.ascls.org/position-papers/185-patient-safety-clinical-laboratory-science.

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