The Doctorate in Clinical Laboratory Science: A View of Clinical Practice Development

ELIZABETH KENIMER LEIBACH

ABBREVIATIONS: ASCLS = American Society for Clinical Laboratory Science; CLS = clinical laboratory science; DCLS = doctorate in clinical laboratory science; NAACLS = National Accrediting Agency for Clinical Laboratory Sciences.

INDEX TERMS: clinical doctorate; clinical laboratory science; evidence-based practice; professional doctorate.

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***Elizabeth Kenimer Leibach** is **professor** and **chair** in the Department of Biomedical and Radiological Technologies, Medical College of Georgia, Augusta GA.*

***Address for correspondence:** Elizabeth Kenimer Leibach EdD MS CLS MT(SBB), professor and chair, Department of Biomedical and Radiological Technologies, EC 2437 Medical College of Georgia, Augusta GA 30912-0500. (706) 721-3046, (706) 721-7631 (fax). ekenimer@mcg.edu.*

Seminal reports refocusing the operational definition of quality in clinical laboratory services delivery have drawn attention to the need for a clinical laboratory science (CLS) practitioner of a new ilk.[1,2] The doctorate in CLS (DCLS) is the unique and clinically-based degree defining this new healthcare practitioner that will afford an unprecedented opportunity to coordinate laboratory information among all providers to better organize patient care and case management efforts for the entire interdisciplinary healthcare delivery team. Since utilization of laboratory information is foundational to the practice of all other healthcare providers, the DCLS will coordinate the integration of laboratory services as needed into the practices of other healthcare professionals and for the direct management of patients.

Postgraduate degrees are valued in the clinical laboratory industry from masters degrees in basic science, health education, and clinical laboratory management to doctorates (PhD) in specialty areas within the clinical laboratory such as immunology, biochemistry, and microbiology.[3,4] Missing from these specialty degrees is the doctoral-level CLS generalist who is prepared by a clinical laboratory-focused, patient-centered, and clinically-oriented curriculum to function in leadership roles in all aspects of the clinical laboratory industry. The ASCLS, through the DCLS Committee, continues to develop and implement educational programs for the DCLS accessible nationally and for the entire international community. The DCLS practitioner will be credentialed for practice at the doctoral level after graduating from an accredited program and successfully completing a certification examination.

Summarizing progress toward the goals of development and implementation, task forces of the American Society for Clinical Laboratory Science (ASCLS) and the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) developed competencies in an iterative process referencing an extensive review of competency requirements of other doctoral-level healthcare practitioners. These competencies were validated by a qualitative process involving thematic analysis of interviews with current practitioners self-identifying as "advanced practitioners" functioning in patient care roles for which they were prepared by experience and formal education.[5]

Standards for accreditation of DCLS programs were then written by NAACLS and reviewed by the profession in open hearings throughout the country. Considering the scope of the DCLS competencies as well as doctoral curricula from other healthcare disciplines and biomedical science programs of comparable rigor, the DCLS program of study was set at a minimum 90 semester credit hours beyond the baccalaureate CLS degree. Additional admissions requirements, e.g., minimum scores on standardized proficiency examinations, minimum grade point averages, and prerequisite course work, are not specified, but are to be addressed by individual institutions and their program admissions committees. Practice and expertise areas addressed by the competencies have been reported previously.[5]

An ASCLS task force concurrently developed the DCLS model curriculum comprised of course descriptions, instructional objectives, and a course sequence based on the baccalaureate CLS foundation. The DCLS curriculum is not technical in the traditional CLS interpretation. Rather, the doctoral curriculum is based on new competencies related

to post-graduate biomedical sciences; patient interactions, communication, and patient case management; CLS diagnostics and therapies; evidence based practice; and clinical services delivery. The course content, competencies, and objectives of these curricular areas have been reported in detail elsewhere.[5]

Together, the five curricular areas describe content designed to prepare practitioners with an educational base of science, technology, communication skills, diagnostic decision-making, and research applied to practice (evidence-based practice). Institutions may offer these five accredited curricular areas as the clinical (professional) doctorate or as the doctor of philosophy in clinical laboratory science.

As it is envisioned, DCLS practice will be focused by demand for patient and provider clinical laboratory consultative services when the DCLS practitioner is fully integrated into healthcare delivery. In daily practice, the DCLS, the "advanced practitioner" of CLS, will fill an integrative role among other healthcare practitioners, thus contributing to a true interdisciplinary approach to patient care. Further, the role of the DCLS will impact the roles of the CLS (baccalaureate degree clinical laboratory scientist) and CLT (associate degree clinical laboratory technician) as application of evidence (downstream effects of laboratory information) suggests more efficient use of skills at each practitioner level.[6]

In order to prepare DCLS students for their practice role, clinical applications will be addressed in all curricular areas. In the basic science curricular theme, clinical applications will be, for example, physiologic and measurement (diagnosis) oriented with database analysis of trends related to diagnosis and prognosis, etc. But in the clinical internship curricular theme, i.e., clinical practice courses, DCLS students will perform internship duties that will prepare them for practice upon program completion. Table 1 summarizes the process steps in the development of internship experiences.

DCLS internships targeted for development first are pharmacy (infectious disease, transfusion therapeutics), hospital medicine (risk management, utilization review), internal medicine (oncology, pediatrics, geriatrics, family medicine), emergency medicine, surgery (elective, trauma), and clinical laboratory. In each of these clinical experiences, DCLS students will interface with other health professionals as members of the healthcare team during patient interviews, rounding, and follow-up consulting. DCLS students will collate, summarize, and present laboratory information related to patients chosen according to the process described in Table 1. For medical questions outside the scope of practice of clinical laboratory science, DCLS students will participate in medical decision-making by providing interpretation of laboratory information for physicians and other healthcare professionals and suggesting consults for clinical pathologists. During the clinical laboratory internship, DCLS students will work closely with clinical pathologists, other clinical laboratory (specialty) doctoral scientists, baccalaureate CLS, and other clinical laboratory staff to monitor patients' critical paths, evaluate and introduce new technology, develop quality indicators, and create and analyze testing algorithms.

Types of internship experiences available can and will vary among clinical partners depending on patient mix, services provided, and level of care so that students may study at multiple clinical facilities to complete their internship objectives. Irrespective of which collaborating subspecialties are

Table 1. DCLS internship development process

- Identify collaborating healthcare subspecialties.
- Identify high risk, high frequency, and high cost procedures and diagnoses as well as quality indicators in each of the subspecialties.
- Identify high risk, high frequency, and high cost CLS tests, procedures, and/or diagnoses as well as related quality indicators for each of the subspecialties.
- Compare high risk, high frequency, and high cost tests, procedures, diagnoses, and quality indicators in the subspecialties to those in CLS. Investigate patient cases related to procedures, diagnoses, and quality indicators common to both.
- Round and consult on patient cases related to tests, procedures, diagnoses, and quality indicators common to both CLS and subspecialties.
- Analyze ordering and utilization data to inform patients, the healthcare team, and practice guidelines development.

identified at a given clinical partnering institution, the basis of patient and healthcare team interactions, like rounding and consulting, will be communication of the impact of laboratory information on high risk, high frequency, and high cost diagnoses and quality indicators. DCLS students (and practitioners) will build creditable roles on the healthcare team by interpreting/summarizing CLS information, suggesting medical staff-approved testing algorithms, apprising admitting physicians of potentially helpful specialty consults, and providing information for decision-making to both patients and consulting providers. Not only will CLS evidence be used in clinical decision-making, but these ordering and utilization data can be analyzed to inform development of best practices, practice guidelines, benchmarks, and quality indicators to decrease errors, increase patient safety, and communicate CLS evidence for practice improvement.

A prototype of this internship and DCLS practice can be found in transfusion services. The position of Transfusion Safety Officer (TSO) is commonly found in Canada and the United Kingdom. The TSO is an experienced CLS who oversees transfusions by providing education to primary transfusionists, interacting with those providers managing transfusion therapy, and conducting compliance functions like transfusion observations, audits, and so on. The professional holding this position also reviews orders with respect to established utilization criteria, thus reducing the incidence of unnecessary transfusion, which justifies both the position and salary.[7]

Another current "advanced practice" which informs the development of DCLS internships and post-graduate practice is the answering of patient, caregiver, and healthcare practitioner questions on laboratory testing by the ASCLS Consumer Response Team through the "Lab Tests Online" website (http://www.labtestsonline.org/comments/index.html), the first interactive, non-subscription based, international service for consumers seeking interpretation of laboratory information. In operation since 1997, questions for CLS professions via the website have increased from less than one per day to the current level of 32,000 per year (86 per day average).[8]

Consumers and health professionals alike interact with CLS professionals, asking for information about test results with which they are unfamiliar. Answers focus on the scope of practice of clinical laboratory science and CLS professionals often refer consumers back to their physicians for additional follow-up. From a recent survey of consumers' satisfaction with the online service, it is reported that not only were responses timely, private, and understandable, but they were very beneficial in providing information that helped shape questions for future patient-physician discussions and consumer health decision-making.[8]

The view of DCLS practice emerging from these prototypes is one with patient-centered focus and interaction. In venues in which the impact of laboratory information is determined to be most critical to patients' well-being, the DCLS will collate, interpret, and summarize clinical laboratory information and consult with patients and other healthcare providers to optimize services delivery and desirable health outcomes. Working backward from prototype practice to DCLS educational programs, internships will be designed to expose students to clinical experiences providing the greatest opportunity to develop the skill set necessary not only to utilize evidence in clinical decision-making but also to generate and communicate data-supported practice guidelines.

Continue to monitor our professional literature and the ASCLS website (www.ascls.org) for progress updates. Please post general comments to the ASCLS Forums. (You can find the Forums from the "About" link on the title bar of the ASCLS Homepage). For further information on the status of DCLS programs and/or to enter your contact information into the DCLS Applicant Database, please contact Dr. Kenimer Leibach at ekenimer@mcg.edu.

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