A Model for Educational Enrichment and Employment Recruitment for Clinical Laboratory Science Students

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An educational partnership was initiated between a pharmaceutical company and a university-based clinical laboratory science program to achieve mutually beneficial objectives. This external enrichment site provides a unique educational experience for the students that cannot be duplicated any where else in the community. The framework for the educational experience was established with a full day's schedule of visits and presentations guided by a list of twenty learning objectives. Clinical laboratory science students interact with laboratory professionals who are employed by the pharmaceutical company and assigned to a variety of traditional and non-traditional roles. During the visit, pharmaceutical company employees observe student interactions in small group settings and assess the learners' interest in the work environment and specimen testing process. Employee feedback may be applied to future employment decision making. This article describes how employer outreach goals and initiatives and educational enrichment objectives can be met through cooperative team work.

ABBREVIATIONS: GLPs = good laboratory practices; RIA = radioimmunoassay.

INDEX TERMS: alternative careers; employment recruitment; partnership; pharmaceutical industry; off-site enrichment.

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The constant emphasis on cost efficiency combined with the shortage of qualified laboratory personnel in today's hospital laboratories presents a challenge to laboratory science education program administrators in securing adequate clinical education sites. Cearlock and others described a major curriculum revision effort motivated by the need for additional clinical sites.[1] While the most desired clinical education sites are well-equipped hospital laboratories with some diversity in their patient populations, programs frequently pursue educational opportunities that are outside the routine laboratory testing environment to facilitate and augment student learning. External educational sites that fit into this latter category include molecular diagnostics laboratories, newborn screening clinics, public health facilities, sexually transmitted disease clinics, blood centers, private diagnostic laboratories, rural community hospitals, contract research organizations, and pharmaceutical research laboratories. Vittetoe summarized learning outcomes from rural hospital enrichment sites to include work environments, institutional philosophies, healthcare, and career opportunities.[2] Ackall described deployment of clinical laboratory students to primary care settings in underserved communities to participate in multidisciplinary healthcare teams. In this setting, students enhanced their skills in phlebotomy, interpersonal communication with patients and team members, instrument trouble-shooting, and participation in research projects.[3] This manuscript describes a model developed as a joint venture between a pharmaceutical company (Lilly Research Laboratories) and a university-based clinical laboratory science program (Indiana University) to increase exposure of students to traditional and non-traditional employment opportunities for clinical laboratory scientists.

DISCUSSION

The Clinical Laboratory Science Program at the Indiana University School of Medicine in cooperation with Eli Lilly Research Laboratories offers students an inside view of pharmaceutical research and potential employment opportunities for graduates. Small groups of four or five students, accompanied by a program representative, spend one day at the Lilly Research Laboratories. To prepare for the visit, students participate in two lectures presented at the program facility by a Lilly Veterinary Clinical Pathologist. This individual also serves as host for the students' visit to the pharmaceutical research laboratories. The lectures are titled Introduction to Toxicology with a Focus on Animal Models for Drug Development, and Comparative Veterinary Hematology. Emphasis is placed on understanding the role of the clinical laboratory scientist in the drug development process. To avoid concerns with advertisement to a captive audience, no Lilly products are included in any aspect of this program, and advertising for such is not offered. The integrity of the educational process is maintained throughout the event. The program has been in existence for six years, and a total of 81 students have participated in the educational experience.

Students interact with clinical laboratory scientists employed in traditional and non-traditional positions within a large pharmaceutical company. While students do not participate in or work on actual toxicity studies, they gain valuable knowledge through demonstrations, observations, and small group interactions with the various employees of the Departments of Pathology and Non-clinical Safety Assessment within the Toxicology Division.

While the National Accrediting Agency for Clinical Laboratory Science does not require written objectives for environments that are clearly identified as enrichment sites,[4] the host site personnel developed a list of twenty educational objectives to guide staff presentations for the day's events and to assure consistency among the groups. Students receive the objectives and schedule prior to the visit. The two documents provide learners with a preview of the day's events as well as the sponsor's expectations. The objectives serve as a guide for the staff to use in discussions with the students and focus on content such as principles of instrument operation, species variation in peripheral blood smear findings among research animals, and issues related to sample collection and method development for animal studies. A post-visit quiz was developed from these objectives.

Prior to the students' entry into the first laboratory setting, the host impresses upon the student the absolute necessity of consistently wearing protective eye wear in all laboratory settings, and each student is provided with a pair of style-dependent safety glasses, based on whether he/she wears eyeglasses. Students begin the day in the clinical pathology laboratory with a discussion on the unique challenges of specimen processing for animal subjects and compare and contrast how these requirements differ from human subjects. Following this introduction, students rotate to hematology, coagulation, and urinalysis testing sections of the laboratory. Students review principles of cell counting instrumentation (e.g., Advia systems) and cellular variations that are unique to research animals (rats, dogs, and monkeys). In addition, students are introduced to urinalysis testing using online reagent strip readers and to coagulation testing using Diagnostica Stago instrumentation. The instruments noted here are not available to students in the hospital laboratories where most of the clinical education occurs (Figure 1).

In the chemistry testing area, students learn that testing methods for numerous routine analytes, while accomplished on Hitachi instruments, use many of the same chemical reactions that are found in hospital laboratories (Figure 2). Frequently, only the sample sizes and reference intervals for selected analytes vary. In addition, species-specific differences in clinical chemistry analytes are identified, and students are exposed to alternative test selections that might not occur in a hospital setting.

In the clinical pathology laboratory, students have an opportunity to interact with the laboratory supervisor and examine

Figure 1. Cathy Durbin AS MLT(ASCP) (right) explains proper use of the STA coagulation instrument to clinical laboratory science students.

how the supervisor's role in a research setting compares with the similar role in a hospital setting. The supervisor provides unique information regarding the challenges of providing clinical pathology services for toxicity studies and clinical trials. Discussion topics often include sample volume limitations associated with laboratory animals, sample collection methods, appropriate scheduling for sample collection at toxicology study termination and challenges associated with analyzing large numbers of samples efficiently, laboratory testing capacity, and efficient flow of work within the clinical pathology laboratory. Clinical laboratory science students often take this occasion to inquire about opportunities for employment in the non-hospital setting. They frequently ask about specific types of jobs available for clinical laboratory scientists in the pharmaceutical industry, qualifications needed for application and any additional training that might be beneficial to application, and prior student experiences that might provide an additional incentive to hire clinical laboratory science graduates.

Species-specific assays used in toxicology testing are one area of focus for the special procedures laboratory, where the clinical laboratory scientist emphasizes radioimmunoassay (RIA) methods, Luminex, and Flow Cytometry analyses. While many hospital laboratories continue to reduce their reliance on RIA methodologies in favor of other types of immunoassay procedures, RIA is often the method of choice in the pharmaceutical testing environment where samples from multiple species of animals need to be analyzed accurately in a time limited manner, and where procedures and data documentation comply with good laboratory practices (GLPs) guidelines. The Bio-plex workstation uses a fluorescent-dyed polystyrene bead-based microplate system equipped with flow cytometric detection that accommodates simultaneous analysis of as many as 100 different analytes (Figure 3). This technology is particularly useful for volume-limited samples.[5] Point-of-care cardiac readers that perform troponin T analyses are also discussed.

Students spend time with the scientist who coordinates all study protocols and monitors progress to assure adherence to timelines. They learn the importance of organizational as well as written and oral communication skills. The importance of written communication skills is emphasized in their discussion with a technical writer, also a clinical laboratory scientist (Figure 4).

The quality assurance officer discusses the importance of establishing and maintaining quality to meet and exceed regulations of global regulatory authorities. Emphasis is placed on compliance with GLPs throughout the preclinical study process. The details of GLPs are not emphasized by many clinical laboratory science programs, and these types of interactions expand the students' knowledge of the regulatory compliance issues involved in laboratory testing for drug development.

Figure 2. Bruce Beechler BS MT(ASCP)(right), lead medical technologist in the clinical chemistry section, discusses the chemical reactions used in the Hitachi Clinical Chemistry Analyzer and similarities and differences compared to other chemistry analyzers.

Figure 3. Connie Powers BS MT(ASCP) (left) describes use of the Luminex in the special procedures laboratory. She emphasizes the difficulties incurred when analyzing specimens of small volume.

Students close out the day with the host veterinary clinical pathologist (who is also a clinical laboratory scientist) (Figure 5). Using selected cases with clinical pathology data sets, tissues, blood smears, and body fluid preparations from animals used in pre-clinical studies, he conducts an interactive session that helps students gain a global view of the important contribution that clinical laboratory scientists make in animal studies used for drug development. Clinical laboratory science students are challenged to apply principles of medical technology, to integrate knowledge from numerous disciplines (hematology, clinical chemistry, coagulation, urinalysis, histopathology), and to practice a variety of skills learned in the clinical laboratory science training program to assure safety in drug development.

Throughout the educational program, students learn about various agencies that regulate hospital operations. At Lilly Research Laboratories, students are reminded that the Food and Drug Administration plays a major role in regulating pharmaceutical research laboratory operations. In addition, the roles for other regulatory agencies including the United States Department of Agriculture, Public Health Services, Environmental Protection Agency, and Association for Assessment and Accreditation of Laboratory Animal Care, are discussed. Students are given an overview of GLPs as they pertain to laboratory testing. Students are reminded that the intention of the GLPs is to document quality and validity of test data. GLPs encompass all study organizational processes including study planning, test performance, monitoring of the study progress, and recording and reporting of results. Each Lilly Research Laboratory employee who shares an area of expertise with the students holds education and certification credentials as a laboratory practitioner. Approximately 16 members of the toxicology division are involved in the program. This program was initiated at the request of Lilly Research Laboratories. This opportunity for the clinical laboratory science students is one of several included in the Pathology Academic Outreach Program. Other educational offerings include the Lilly Fellows (a three year research postdoctoral training endeavor), Pathology Internship (summer research program for medical professionals), Veterinary Student Externship (one month rotation in Pathology and Laboratory Animal Medicine designed for students in the third and fourth years of veterinary school), and Resident/Graduate Student Visitations (one or two day visits within the Department of Pathology shadowing a Veterinary Clinical or Morphologic Pathologist.) These programs serve to achieve a goal of educational outreach to the community, and the students provide a well educated and trained prospective pool of future employees for the organization.

For the clinical laboratory science students, the venture offers an opportunity to observe the laboratory testing environment of a premier place of employment, to interact with a group of laboratory practitioners assigned to diverse roles, and to

Figure 4. Kathy Piroozi BS MT(ASCP) (center right), toxicology study director, explains the necessity of excellent oral and written communication skills to clinical laboratory science students visiting in the toxicology division.

Figure 5. Eric Schultze DVM PhD Diplomate ACVP MT(ASCP) (left) discusses the importance of blood smear morphology assessment in the conduct of toxicology studies in animals.

develop an understanding of how their individual interests and skills might fit into the research environment. Students have expressed an appreciation for the opportunity to visit the facilities, to interact with numerous laboratory professionals at work, and to learn how employment in a pharmaceutical company contrasts with employment in a hospital laboratory. For example, students encountered non-traditional employment opportunities available to clinical laboratory scientists, technology and laboratory instrumentation not commonly found in hospital laboratories, and work practices that strictly follow GLP guidelines. A brief multiple choice quiz is administered by the Indiana University Clinical Laboratory Science Program faculty to assess student learning from the experience. The 2004 class average on the quiz was 85%, the 2005 class average was 97%, and the 2006 class average was 92%.

After the day's activities are completed and students have left the premises, the Lilly Research Laboratory staff members who interacted with the student group complete an informal evaluation with particular emphasis on each student's perceived interest in and attitude about the work processes as well as his/her oral communication skills. The evaluation summary serves as a future reference in the event that the student applies for employment at the host site. When asked for feedback on the value of the educational experience, pharmaceutical employees noted that student questions provided scientific stimulation and that participation in the event gave a sense of greater pride in each individual's work and a feeling of ownership of the effort.

CONCLUSION

This educational partnership furnishes a unique learning experience for the clinical laboratory science students through the opportunity to interact with laboratory professionals employed in a variety of positions in a pharmaceutical organization. These interactions occur as the pharmaceutical employees engage in their daily work tasks, giving students an authentic view of the challenges of the workplace. Additionally, students' knowledge of analytic options is broadened when they encounter testing instruments and technologies not included in the hospital laboratories that serve as clinical education sites. The positive feedback provided by students in an informal exit question-and-answer period and student performances on the post-visit quiz suggest that students are achieving the goals agreed upon by the partnership entities.

The pharmaceutical host also receives benefits. In addition to addressing a community educational outreach goal, individuals responsible for participating in the initial employment decision-making can evaluate how each student interacts in small group settings as well as assess the student's interest in the work environment and testing processes. This evaluation summary becomes a valuable tool in future employee selection processes. Hence, the endeavor achieves mutually beneficial objectives for both the corporate and educational institutions.

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