Clinical Laboratory Educators Conference 2002 Abstracts

POSTERS

Authors listed in bold face type will be the presenters.

An Ethnographic Report of Laboratory Practitioners

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As the initial step in a multi-method approach to conducting a practice analysis of medical technologists (MTs), medical laboratory technicians (MLTs), and phlebotomy technicians (PBTs), these practitioners were observed and interviewed in their practice settings. This ethnographic, i.e., describing the characteristics of a group, report provided the qualitative data for a survey instrument that will be used to validate the performance domains of MTs, MLTs, and PBTs. The method of gathering this data was direct observation (n = 160). Certified medical technologists observed and conducted structured interviews in three geographically diverse regions of the U.S.—California, Florida, and Illinois. Practitioners in these states represented those with and without licensure requirements. California was also chosen because there is licensure of MTs, but not MLTs. The areas observed in 22 different facilities included, but were not limited to the traditional areas of a clinical laboratory, research, industry, and educational institutions. As expected, the tasks performed by these professionals did vary depending on location and type of facility. Although task analyses for these laboratory professionals have been performed in the past, a practice analysis has not. This ethnographic report shows that although MTs perform routine tasks as well as high complexity testing and research, there was still a clear distinction of duties between them and the MLTs. In most cases the PBTs did more than specimen collection. Type of tasks performed differed by region of the country, type of practice setting, and under what conditions the practitioner worked.

The peer-reviewed Clinical Practice section seeks to publish case studies, reports, and articles that are immediately useful, of practical nature, or demonstrate improvement in the quality of laboratory care. Direct all inquiries to Bernadette Rodak MS CLS(NCA), CLS Clinical Practice Editor, Clinical Laboratory Science Program, Indiana University, Fesler 409, 1120 South Avenue, Indianapolis, IN 46202-5113. brodak@iupui.edu

A CLT Program's Assessment of Regional Laboratory Shortages and Salary Comparisons of Allied Health Professionals

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A regional survey was conducted by Allegany College of Maryland, the last public institution in Maryland offering the clinical laboratory technician (CLT) curriculum. The purpose of the survey was to accurately document regional employment and salary data. The response rate to the survey was 60%. The survey data is being used to establish the future workforce needs in our area as well as to compile accurate salary information for recruitment publications. The data are essential for the development of future survival strategies. The survey asked respondents to provide salary data on laboratory professionals as well as other healthcare professionals. The regional survey included personnel categories that were based on the National Occupational Employment and Wage Estimates. This national data shows the CLT to be the lowest paid healthcare employee with an associate degree credential. Many of our local clinical laboratory employees have felt underpaid compared to other regional allied health professionals as well as to the national laboratory salary averages. In regard to the average salary data for the laboratory categories, the survey revealed strong parallels to the 1999 National Occupational Employment and Wage Estimate data as well as to the 2000 ASCP Wage and Vacancy Survey. In regard to the average salary data for the other healthcare salaries, the regional survey revealed the nursing scale to be the highest and the CLT salary to be the lowest as the national data had suggested. The regional survey showed that some institutions have the same salary scale for ancillary services like respiratory, radiology, and the laboratory. In other institutions, the laboratory has fallen behind the scales of similar ancillary service areas. The salary survey also revealed that the regional CLS average is below the national average. In addition to salary information, the respondents were also asked to identify the number of laboratory employees in each category according to age. The regional data confirmed suspicions that the regional laboratory workforce is older. Therefore, a recruitment plan to attract future laboratory personnel is necessary. The information collected in the survey was disseminated to regional laboratories.

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Designing Web-based Courses in CLS: A Team Approach

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The concept of offering courses via the Web has become more acceptable as people are challenged with the difficulty of taking time away from work to complete a degree. The World Wide Web, a desirable educational resource that can enhance and augment student learning, is increasingly being used to deliver courses in clinical laboratory sciences (CLS). However, designing and teaching a Web-based course is a new endeavor for most faculty. Faculty need to consider issues such as instructional design, faculty-student interactions, technology skills, and student learning outcomes. To address these issues, the faculty at the UTHSCSA developed Web-based advanced level CLS courses using a team approach. The team consisted of CLS faculty, an instructional development specialist, an instructional program designer, a Web designer, a graphic artist, and an audio-TV staff. This team collaboratively worked out strategies in designing and delivering a template course. Student focus groups helped the team design the template. The first course completed is a case-based course in medical microbiology that incorporates multimedia technology and a Web-based discussion software program for on-line discussion. Pre-implementation student evaluation survey results indicated approval of the course content organization and design, ease of navigation, and appropriate incorporation of images. In conclusion, implementing Web-based instruction in CLS requires shared efforts of a multidisciplinary team. Strategies developed by a team helped address and minimize faculty's and student's anxieties regarding telecommunication, faculty-student relation, and student performance in the course.

Developing a Biotechnology Option within a CLT Program

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The clinical laboratory technician (CLT) program at Allegany College of Maryland developed a truly integrated biotechnology option within an existing CLT curriculum. Biotechnology is usually an expensive stand-alone curriculum that competes with CLT programs for students interested in science fields. The biotechnology and CLT skills and knowledge base are similar; therefore, a biotechnology option was designed that shares CLT courses. This combination track allows career flexibility between both curriculums. Graduates of the CLT curriculum can add a biotechnology certificate or degree within one year. The biotechnology graduate can also finish the few missing CLT courses in one year; therefore, a student could finish an associate in applied science degree in both options in three years. The benefits of developing the biotechnology curriculum in this integrated fashion include: cost savings to the college, increased enrollment in clinical laboratory technology courses, infusion of biotechnology techniques into the CLT courses, a mechanism for existing CLT practitioners to complete a biotechnology certificate, and decreased start-up time when biotechnology is started as a program option rather than a new stand-alone program.

Development and Implementation of a Course for Medical Students Focused on Bedside Procedures and Related Clinical Laboratory Testing

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Medical students and residents are required to perform specific bedside procedures involving the collection of specimens for laboratory analysis. Unfortunately, they rarely receive any formal education on the proper technique involved in specimen collection and handling and in the interpretation of laboratory results. Through a collaborative effort between clinical laboratory science and medical school faculty we have developed and implemented a course designed to provide second year medical students the opportunity to perform specific medical procedures and examine and discuss the role the laboratory plays in analyzing patient specimens. A patient case study approach is used to introduce each topic. After reviewing the patient history and physical findings, students learn the appropriate way to prepare the patient for the procedure. The use of universal precautions and aseptic technique is emphasized along with proper collection and transport of specimens such as CSF, blood, urine, and other body fluids. The laboratory analysis of specimens collected by each student from models and cadavers is discussed to ensure that students develop an understanding of what occurs in the clinical laboratory and the impact the quality of the specimen has on patient results. Students have the opportunity to learn to interact with laboratory personnel who can assist them in the interpretation of results and in ordering additional tests. It is anticipated that this course will better prepare future physicians to provide appropriate specimens for laboratory testing and establish a rapport with the clinical laboratory with the ultimate goal of improving patient care.

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Development and Implementation of a Model On-Campus Blood Bank Rotation in Response to Declining Clinical Practicum Sites

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In an attempt to address the decreasing opportunities for clinical practicum sites, the 2+2 medical technology/clinical laboratory science program at Old Dominion University modified an existing blood bank practicum course with the goal of providing some of the clinical training on campus. This pilot course was initiated in the fall of 2000 and repeated in the summer of 2001. The on-campus practicum course is structured to offer six weekends of simulated clinical work followed by a two-week rotation at clinical sites. The curriculum plan, evaluation issues, costs, mechanisms for ensuring student competence, and the assessment of the effectiveness of this non-traditional approach to clinical education are addressed. The shortened clinical time resulted in an increase of clinical sites willing to take program students because of the reduced time commitment on their part. The preliminary feedback from both instructors and students has been very positive. Students have indicated that they are very satisfied and instructors have found the students to be "well prepared" and the "program effective". This on-campus practicum course serves as a model for MT/CLS program faculty to address the decline in clinical practicum sites.

Development of a Survey to Assess the Need for a Baccalaureate-Level Program in Molecular Diagnostics

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Since the late 1980s, the field of molecular diagnostics has evolved into a multitude of sophisticated testing strategies to diagnose inherited, acquired, and infectious diseases. Programs currently available for training individuals competent in molecular diagnostics are limited to post-baccalaureate certificate programs and existing medical technology or cytogenetics programs that have integrated molecular diagnostics into the curriculum. In July 2001, the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) published the *Molecular Essentials* as a guideline "for the development and evaluation of molecular diagnostic science and molecular biotechnology programs". As the first step to program development, the present study aimed to determine the need for a baccalaureate level program in molecular diagnostics in the northeast United States. A 24-item survey was developed to assess: 1) the need for individuals specifically trained in molecular diagnostics; 2) the requirements for training on molecular procedures based on current and future laboratory utilization; and 3) the impact of trends, e.g., insurance coverage, automation, medical advances, and ethical issues, that will impact the future of molecular diagnostics. The survey underwent content validation by three experts in the field of molecular diagnostics and clinical laboratory education, as well as pilot testing. Survey results from a mailing to directors of 247 molecular and cytogenetic laboratories in the United States and Canada (listed in the Association of Genetic Technologist's Laboratory Directory) will provide direction on the development of a comprehensive educational program in molecular diagnostics.

Diversification of a CLS Program: Meeting Student and Institutional Needs

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During the years 1994 to 2001, 149 CLS/MT programs have closed their doors, with many pointing to the lack of student numbers and the cost-effectiveness ratio. Florida Gulf Coast University's clinical laboratory science program was designed from its conception with diversification in mind, diversification that fulfilled both student and institutional needs. Student needs are fulfilled by offering a baccalaureate degree in clinical laboratory science, with a choice of three concentrations: clinical laboratory technology, biotechnology/pre-professional and forensic science. The department currently also offers two post-baccalaureate certificate programs in molecular biology and clinical laboratory technology. This year additional certificates in forensic science, pre-medical/pre-professional education, infection control, occupational health and safety, and public health microbiology will be offered. Institutional needs of increasing student enrollment are also fulfilled by giving the department flexibility and stability when there are fluctuations in demand for traditional clinical laboratory science majors. By having diverse choices for students, the department taps into varied student populations including traditional baccalaureate seeking students, articulating associate degree students, and post-baccalaureate students seeking certification and licensure to practice or continued education for entry into professional schools of medicine, veterinary medicine, dentistry, or physical therapy. Other educational opportunities await the criminal justice student desiring coursework in crime scene evidence analysis, and the professional community seeking continuing education and career advancement.

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Educating Pre-Medicine Students about the CLS Curriculum and Profession

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The gap between clinical laboratory science practitioners, and their effective use as part of the healthcare team, exists primarily due to inadequate education of the healthcare team members. Primary care providers such as physicians, nurse practitioners, physician assistants, and nurses are unaware of the clinical laboratory scientist's expertise and ability to contribute to the quality and efficiency of healthcare. This work was done to address and find solutions to this problem by reaching the pre-medicine students enrolled at Indiana State University. Several approaches were taken to this problem including faculty participation in freshman biology laboratories, encouraging use of the Clinical Laboratory Science Special Topics course as a pre-medicine elective, and clinical laboratory science alumni addressing the pre-medicine advisement group within the University. Participation in the freshman biology laboratories resulted in establishing a connection with the pre-medicine majors as well as an increase in undecided majors committing to a clinical laboratory science major. Working with pre-medicine students through the Clinical Laboratory Science Special Topics course was very beneficial to the student and the faculty member with positive results beyond this single course experience. Addressing the pre-medicine advisement group was similar to high school recruitment and yielded no known positive effect. The most effective avenue for educating the pre-medicine students was through the use of the Clinical Laboratory Science Special Topics course as a pre-medicine science elective. Small strides in education, such as this, can result in increased clinical laboratory practitioner involvement with the primary care provider.

Effective CLS Education—Facilitation via Use of International Student Exchange Programs

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The specific problem addressed is that there are virtually no educational experiences that train biomedical/clinical laboratory scientists for the workforce of the future, which will be transnational in nature. Knowledge and work are no longer reserved within national boundaries. Although presently we do not educate biomedical/clinical laboratory scientists internationally, health issues are international in scope. American health science education has suffered from isolation. European health science practitioners have had limited opportunities to learn about the unique American experience. Since knowledge is universal and learning does not recognize international boundaries, students as well as faculty can gain from international exchanges. There have been limited opportunities in the health sciences to engage in exchanges because of the very structured nature of the academic curricula with ultimate control exerted by government ministries; academic accrediting agencies; and licensure boards. Because of these conditions, very few educators have tried to form such linkages. We have established a student exchange program with several European institutions in England and Norway. Here we present our on-going results on these exchanges in terms of the students' experiences. To date we have hosted more than fifty British and four Norwegian students in this program with a similar number of University of Kentucky allied health students sent in exchange. Students rotated through clinical facilities, attended didactic lectures for academic credit as well as conducted independent research under faculty supervision. These research projects have produced student presentations done locally, nationally, and internationally. We are encouraged with the progress made to date with this program and are actively recruiting more students and institutions to participate in this international initiative.

Entry-Level Skills for CLSs in Arkansas

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Many forces drive curriculum changes, including new accreditation standards, improvements in technology, changes in student preparation, and shifts in employer expectations. Our profession is one that is under continual pressure to change—now perhaps more than ever before. As our program seeks to adapt our curriculum to present and future needs, we sought to match the entry-level skills to the expectations of our graduates' future employers. To accomplish this task clinical laboratory managers in Arkansas completed a questionnaire on expected entry-level skills for clinical laboratory scientists. The entry-level skills on the survey were based upon the July 2001 draft of the National Accrediting Association for Clinical Laboratory Sciences' Essentials for CLS/MT programs. The survey instrument was designed for data tabulation using Remark® software. Descriptive statistics were used to analyze the data generated. Of the 125 surveys returned, 122 were usable for a 22.5% return rate with 95% from either hospitals (34%) or POLs (61%). Small laboratories predominated with 74% of the respondents performing less than 250,000 tests/year. Over 80% of the respondents rated entry-level skills in test performance and interpretation; decision making; quality assurance; application of regulations, and demonstration of ethics and professionalism as important or very important. However, less than half of the respondents rated entry-level skills in new instrument research, development, evaluation, and implementation; financial management; marketing; personnel management; and career planning as either important or very important. Information collected will be

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used to help with planning changes and/or additions to the curriculum in our CLS-level program.

Integrating Point of Care Testing with Multiple Management Activities

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In response to increased emphasis on management in CLS programs, we recognized the need to develop creative methods to teach management principles. At the same time, an opportunity to perform cholesterol testing at health fairs arose. Strategies to integrate the health fair clinical experience with management projects in a realistic patient care setting were investigated. Point of care testing (POCT) instruments for cholesterol assay were purchased for use at two health fairs. Health fair participation allowed students to interact with patients, gain more experience performing finger sticks, work with classmates as a team, and educate patients about laboratory test results. Prior to the health fair, method evaluation was performed to compare the POCT method with traditional cholesterol testing and cost analysis was used to estimate revenue potential. Students performed workload time studies while setting up workstations and performing tests at the health fairs. Revenue generated was used to help defray costs of reagents and pay students' expenses for the state professional society meeting. Students learned by realistic application of management techniques through the health fair experience rather than passive classroom lectures. This community outreach project allowed development of confidence in working with actual patients and enhanced professionalism. POCT can be used for multiple management as well as clinical learning experiences and also to generate revenue for student projects. Instrument costs are minimal and easily justified by the benefits achieved. In addition, correlation of multiple management activities with real life clinical experiences exposes students to practical uses of management techniques.

Investigation of the Application of Learned Generic Skills by CLS/MT Graduates and Practitioners Working in Non-Traditional Jobs

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During the past decade, the economic climate of corporate mergers and position freezes changed job opportunities for CLS/MT graduates and practitioners. Consequently, individuals were driven from laboratory bench work to alternate jobs within healthcare and other industries. A cohort of CLSs/MTs who considered themselves working in non-traditional jobs (NTJ) were differentiated from a larger sample group of technologists whose career paths were being studied by the ASCP–BOR Research and Development Committee. Individuals were asked whether they applied the following generic skills: problem solving, decision making, troubleshooting, analytical reasoning, data correlation, precision studies, research, quality assessment, communication, teaching, technical writing, computer use, utilization review and supervision to their current NTJ; and whether they learned these skills as CLS/MT students and/or practitioners. Comparisons for both learning and applying the skills were made between graduates of NAACLS approved CLS/MT programs, and individuals holding other baccalaureate degrees. The response rate was 48% (50/103). Chi square analyses indicated a statistically significant difference ($p < 0.05$) between CLS/MT majors and Non-CLS/MT majors for learning problem solving, correlation, precision, research, analytical reasoning, and troubleshooting. Frequencies for CLS/MT majors learning was higher for all skills except teaching and utilization studies. There were no significant differences between doing the skills in the NTJ and being a CLS/MT major. The results indicate that generic skills learned as CLS/MT students and/or practitioners are applied to a variety of NTJ. Furthermore, CLS/MT majors learned these generic skills at least as well, if not better, than laboratory practitioners with baccalaureate degrees in other areas.

Involving CLS Students in Establishing and Monitoring Quality Compliance of Point of Care Testing

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For many years, point of care testing (POCT) was performed outside the clinical laboratory without oversight. Now, the Joint Commission on Accreditation of Health Care Organizations has focused on control of POCT performed in all areas of the healthcare organization. During their clinical rotations, CLS students have little or no exposure to POCT competency assessment activities. One of our affiliate clinical laboratories had no extra personnel for a scheduled POCT competency assessment activity. Since the senior CLS students at UTHSCSA needed the experience, they participated in the "POCT Competency Assessment Fair". Student preparation involved lectures, assignments, and audio conferences. They evaluated a rapid group A strep kit and wrote a procedure and competency checklist for the test. During the "Fair", nursing personnel rotated through various competency assessment stations and teams of students were responsible for verifying competency of the staff in glucose testing, group A strep testing, spun hematocrits, pregnancy testing, and chemical urinalysis. Students also posed questions concerning the procedures, specimen collection, and trouble-shooting. Students indicated it was a worthwhile project and they came to appreciate that not all healthcare work-

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ers know the importance of quality control in patient testing. The quality and compliance manager related that she received only positive comments. Nursing personnel stated that the testing was non-threatening and their learning needs were addressed at the appropriate skill level. The project was so successful that competency assessment of nursing personnel by CLS students will be provided in the fall of 2001 and spring of 2002.

Job Task Mix of the Same Medical Technologists: 1993, 1995, 1997 and 1999 Compared

Kory Ward-Cook PhD FACB, Donna Surges Tatum PhD, Laura Culver Edgar MA, ASCP Board of Registry, Chicago IL

In 1993, the ASCP Board of Registry (BOR) began a ten-year prospective study of the careers of medical technologists (MTs). The aim of this report is to describe the self-reported changes in job responsibilities of the same group of MTs certified by the ASCP Board of Registry from 1993 to 1999. The objectives were to map the frequency of various job tasks over time, determine if the frequencies of core, managerial, and advanced technical tasks varied significantly as MTs careers progressed, and to determine if job responsibilities between genders, ethnic groups, facility location, and job titles changed significantly during the seven-year period. The survey instrument consisted of a laboratory responsibility scale developed by the BOR Research and Development Committee. The MTs in the study (n = 293) were asked to rate how frequently they performed each of the 29 tasks (core, managerial, and advanced technical). All respondent data was converted into an objective unit of measure, called logits, using Rasch analysis. Once the objective measures were obtained, differential statistics were applied to detect differences between tasks at each time period. Five years later MTs still performed core tasks more frequently than managerial or advanced technical tasks. However, in 1999 MTs performed both management and advanced technical tasks more frequently, compared to core tasks. Differences in the task mix were influenced by gender, job title, schedule (full-time vs. part-time), and shift.

Making Critical Connections to Increase Enrollment

A Janelle Gohn MA CLS (NCA), Cincinnati State Technical and Community College, Cincinnati OH

This session presents innovations that have led to enrollment growth in a clinical laboratory technician (CLT) program during a period of increasing competition for qualified students in health programs and well-documented shortages of laboratory practitioners. Since 1997, the enrollment in this mid-western urban community college program has doubled due to connections made with the program, employers, and a certificate program. In 1998, with program retrenchment a possibility, the advising of CLT students who needed remediation became the responsibility of the Program Chair. Direct personal contact is the most effective means to attract and retain students. Three-quarters of incoming students need remedial coursework, but the early and continued contact keeps them connected to the program. Connecting students with employers as they enter the program has increased retention. One-third to one-half of incoming students are employed as laboratory support personnel as they begin their studies, which acclimates them to the field and provides motivation for coursework. These student employees accrue benefits, including tuition reimbursement. One large hospital group and a rural hospital offer substantial scholarships in exchange for two- to three-year work commitments after graduation. Even with financial assistance, some students are unable to enroll full-time, but are anxious to enroll in clinical laboratory classes. The 1998 introduction of a clinical assistant certificate that parallels the associate degree has enabled students to get started in the field, and become employable as phlebotomists and processors while earning an associate degree over a three-year period. The certificate is responsible for 20% of retained students.

Management Competencies Expected of CLSs at Entry Level and Beyond

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This study was undertaken to evaluate the level of education required to perform tasks related to laboratory management. The 560 respondents to the national survey included educators, managers, and practitioners who reviewed a list of 44 tasks and indicated whether the task would be expected of a CLS at entry level, in the first three to five years of practice with no additional education, or in the first three to five years of practice with additional education. The percent of respondents classifying a task in each educational category was tabulated. Tasks were further grouped into one of four major management functions: laboratory operations, human resource management, financial operations, and communications and consultation. All tasks classified as expected at entry-level were laboratory operations functions, e.g., routine testing and explaining test principles. With three to five years of experience but no additional education, expectations in laboratory operations included tasks that went beyond testing and encompassed the total testing process, e.g., turn around time studies. In this educational category, graduates were also expected to have a high level of communication and consultation skills. The laboratory operations tasks classified as expected with three to five years of practice plus additional education included specialized testing and tasks that require an understanding of the healthcare system, e.g., developing compliance programs. Most of the tasks in human resource management and financial management areas were in this educational category. Educators can use this information to select the appropriate level of instruction for competencies in the CLS curriculum.

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Multiple Site Clinical Experiences for Students in a CLS Program

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The merging of laboratory services, downsizing of healthcare facilities, introduction of core laboratories, and laboratory personnel shortages have forced clinical education coordinators to seek various clinical sites for placement of students. The medical technology program in the Department of Biotechnical and Clinical Laboratory Sciences at the University at Buffalo assigns students to multiple sites for clinical training. In this program, students rotate at the clinical sites during the second semester of the senior year. The rotation schedule is divided into five blocks of a three-week duration. Students experience one block each of clinical chemistry, microbiology, hematology, and blood banking at different facilities. The fifth block is an elective, and students are placed in a variety of settings based on individual interests. Examples of elective rotations include: a police department laboratory, public health nuclear medicine laboratory, milk cooperative testing laboratory, student health laboratory, and experience in departments of virology, flow cytometry, cytogenetics, or histopathology. During the elective rotation, students also have a phlebotomy experience. Clinical sites affiliated with the University at Buffalo include hospital laboratories, a health maintenance organization laboratory, and a physician group laboratory within the greater Buffalo area. Hospital laboratory sites include government and community hospitals. Students are exposed to a variety of methodologies and automation, and also interact with many laboratorians. This approach is advantageous to both the students and the clinical affiliations. The students have the opportunity to experience different clinical settings and observe differences in organizational structures among the various government and community facilities. Students work on many different laboratory instruments that provide them with a vast technical background that they may not have received if placed in one clinical setting for their entire clinical experience. Students make more contacts for employment opportunities and job references when placed in multiple clinical settings than the student placed in only one setting. Satisfaction with clinical rotations was highly rated by the students upon their exit questionnaire. The clinical laboratories benefit by having students placed in multiple settings. During times of personnel shortage, laboratory remodeling, or equipment installation a student will not be placed in a particular clinical setting. This relieves the clinical faculty of teaching duties and allows time to take care of other priorities. Any given clinical faculty has the opportunity to observe the performance of most students in the program. This enables the sites with a large pool of applicants for employment.

Partnering with Industry to Provide a State-of-the-Art, Cost-Effective, CLS Molecular Diagnostics Course

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Clinical laboratory science (CLS) programs must provide an up-to-date curriculum to prepare graduates for an ever-changing healthcare environment. To that end, the University of Wisconsin's CLS program undertook an extensive curriculum revision; part of the revision included a new course in molecular diagnostics. Because of budgetary constraints, we sought industry support. Madison WI is fortunate to be the home of Promega Corporation, a nationally and internationally recognized biotechnology company. As part of its educational mission, Promega was interested in partnering with the University to provide an introductory course in the principles and practices of molecular diagnostics. Discussions were undertaken with the intent to design a model partnership. The CLS program faculty and Promega collaborated to plan appropriate course content and materials, laboratory experiences, exams, and evaluation procedures. The entire 40-hour course is conducted in Promega's facilities and taught by their MS and PhD scientists. The CLS program pays Promega $250 for each student to offset the cost of reagents used in the laboratory sessions. To date, over 50 CLS students have completed the course. Students benefit from the knowledge and expertise of highly qualified instructors and the opportunity to view an industrial setting first hand. Promega is able to fulfill its educational mission, including its desire to partner with the University. The CLS curriculum includes a state-of-the-art molecular diagnostics course at a cost far less than would be incurred on the University campus. Consequently, this arrangement has proven to be a synergistic "town and gown" collaboration.

Program Recruitment in CLS Programs

Janelle M Chiasera MS, The Ohio State University, Columbus OH

There is a current shortage of our professionals available for employment. Our accredited CLS programs have steadily decreased to almost half over the past ten years resulting in a substantial decrease in the number of our students graduating from our programs and entering the profession. Concurrently, the bureau of labor statistics anticipates the need for 93,000 more CLS professionals by the year 2008, which is 57,000 (17%) more jobs than in 1998. This renders program recruitment a necessity to assure the survival of our programs and the growth of our profession. Surveys were sent electronically (55%) or by mail (45%) to program directors of NAACLS- and CAAHEP-accredited CLS programs across the country to gather information about program recruitment at their institutions. We sent a total of 265 surveys

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and received 152 that yielded a response rate of 57%. Of the responses, 47% were from university-based programs and 50% were from hospital-based programs. Ninety-seven percent of respondents stated that they needed to recruit with 84% of them actively recruiting. Twenty-five percent of those that did recruit had a mean allotted budget figure of $2000. Of those that do not recruit, over half reported that they lack funds and personnel to support program recruitment. From the data we collected, it will be possible to identify recruitment efforts that worked best at programs across the country so that time and money can be focused on only a few efforts that have proved to be successful at other institutions.

Recruitment Strategies and their Effect on Program Recruitment in a University-Based CLS Program

Janelle M Chiasera MS, The Ohio State University, Columbus OH

In general, clinical laboratory science (CLS) programs are under tough scrutiny by academic administrators because of low enrollment and high cost per student. Many programs over the years have been closed, and those that remain are at an increased risk for closure. In an effort to remain viable, our university-based CLS program has been involved in active aggressive student recruitment for the past year. Our recruitment efforts over the past year included: campus career days, dormitory presentations, letters to recent college graduates, campus-wide fliers, mailbox stuffers, e-mail messages to undecided undergraduates, counselor information days, updated website, campus advertisement, and the development of a CLS club. In addition, we created a database to monitor the effectiveness of each recruitment effort so we can focus our energy in the future on those activities that generated the best return on investment. We found that flyers, word of mouth, and pre-allied medical profession student letters generated the most amount of inquiries (24%, 25%, and 17% respectively). Career/job fairs, undergraduate letters, and table tents generated the least amount of inquiries (2%, 2%, and 1% respectively). Therefore, our program will focus primarily on a combination of flyers, word of mouth, and pre-allied medical profession student letters as our source of recruitment activities.

Report on the State of Washington Laboratory Personnel Shortage Workgroup

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A laboratory personnel shortage workgroup (WLPSW), composed of representatives of laboratory professional organizations, training program directors, and members of the Department of Health Advisory Council, was formed in September 1999. The goal of the workgroup was to determine if a shortage of clinical laboratory personnel exists, the extent of the shortage, and the actions to address any shortage. A survey of laboratory managers found an average vacancy rate of 3.7% for CLS/MTs and 8.9% for CLT/MLTs. The six training programs reported declining numbers of applicants. A targeted mailing was sent to all high school counselors and science teachers describing the clinical laboratory professions and a questionnaire assessing their knowledge of the professions. Counselors and teachers were invited to an educational session at the Northwest Medical Laboratory Symposium. A website for the clinical laboratory profession was established, www.labcareers.org. A statewide salary survey was conducted to obtain current salary information. Recruitment materials including posters and flyers were updated. An article was written for the state professional society newsletter describing how laboratories can become a training site for an educational program. To follow up on these activities, a new survey of training programs showed that enrollments increased by approximately 65%. There were also more facilities interested in becoming clinical sites for the training programs. In summary, the WLPSW has successfully increased knowledge about the clinical laboratory profession and is beginning to reverse the laboratory personnel shortage.

The Sensitivity and Specificity of the Allied Health Professions Admissions Test

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The purpose of this study was to set criteria for the Allied Health Professions Admissions Test (AHPAT) (The Psychological Corporation, San Antonio TX) to be used as predictors of success in the University of Washington Medical Technology Program (MTP). The sensitivity and specificity of several cutoff schemes were calculated for 183 students admitted to the MTP between 1990 and 2000. Failure was defined as first-try failure on the BOR or dismissal from the MTP for low scholarship. The cutoff schemes consisted of combinations of the following limits: AHPAT total: 100 or 150; Verbal subsection: no cutoff or 5; Biology subsection: no cutoff or 10. True negative was defined as a failure that fell below the cutoff, false negative as a success below the cutoff, true positive as a success above the cutoff, and false positive as a failure above the cutoff. The scheme that primarily eliminated the fewest successes (sensitivity) while secondarily identifying the most failures (specificity) was a requirement where the applicant must exceed two of the following three criteria: AHPAT total: 150; Biology: 10; and Verbal: 5. Sensitivity for this cutoff was 100%, and specificity was 26.7%. When applied to the database, no students who succeeded would have been eliminated, while five of 13 failures would have been admitted. While other criteria would have eliminated more of the failures (higher specificity), they would have also eliminated some of the successes. These new criteria were applied for the first time for applicants for Autumn Quarter, 2002.

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Statewide Management Symposium for CLS Students

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Knowledge of laboratory management, laboratory utilization, the healthcare environment, and professionalism is essential for today's clinical laboratory science (CLS) graduates. Typically, this content is delivered in individual programs at various levels of quantity and quality due to the difficulty in identifying content experts who are available to teach relatively small groups of students in each program. In an effort to present up-to-date and relevant content in these areas in an efficient, cost-effective, and high quality manner, CLS educators in New Jersey and in Virginia developed two to three day management symposia that were conducted for all the CLS students in each state. The topics were approved by the faculty of the various programs and included human resource management; laboratory finance including costs, budgets and reimbursement; laboratory accreditation, laws and regulations; and trends in healthcare and laboratory practice including managed care. Experienced faculty, highly recognized at the state and national level, were identified to serve as presenters as well as role models. Participation among the CLS Programs in each state was high, and the feedback from students and faculty was excellent. An added benefit was the input of faculty from various programs into the content and the opportunity for student interaction and networking across programs. Plans are to continue this activity into the future.

TECHNOLOGY DEMONSTRATION

Course Management Computer Programs: Comparison of WebCT with Prometheus

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CLS instructors are continuously challenged to provide additional educational experiences with minimal increases in funding for faculty positions. The search for innovative resources is essential. Course management programs represent a means to improve instructor efficiency while enhancing student-learning. A variety of Web-based course management computer programs exists. Most of the programs provide components that allow students to access course materials on a 24/7 basis, communication opportunities among students and faculty, links to other Web sites, student assessment with immediate feedback, and grade book management. A problem arises in deciding which of the programs may be most appropriate to meet the needs of instructors and students. Two computer management programs currently available to educators include WebCT and Prometheus. The integration of these programs into the laboratory course curriculum will be demonstrated. Interaction with each of these two programs will allow participants the opportunity to compare functional components of the programs and to identify advantages and disadvantages of each program. Individuals will gain a foundation upon which to make more informed decisions concerning course management programs.

Reaching the Rural Frontier and Beyond…MED Net: Connecting Outside the Box

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The CLS program at the University of North Dakota School of Medicine and Health Sciences encompasses four states, eight higher education institutions, and over 40 medical centers. Continuing education opportunities currently provided span a global spectrum, reaching across North America to as far as the Middle East. Opportunities exist for undergraduate and graduate students and also the adult learner. MED Net (Medical Education and Distance Learning via the Internet) was created primarily to offer continuing education opportunities to the rural professional. However, additional benefits include enhanced quality of instruction, improved communications, and increased program efficiency. MED Net is a complete Internet access system in a box. It consists of a metal carrying case, a high-speed laptop, and a video conferencing camera. Connectivity options allow the user to connect via telephone, DSL, Ethernet, or wireless router. An internal firewall provides facility protection. The system is completely mobile and weighs less than 35 pounds. CLS program faculty in conjunction with the UND SMHS Medical Instructional Technology faculty have developed a curriculum designed to meet the needs of the

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distant learner. MED Net allows for asynchronous learning yet provides face-to-face communication opportunities, which further enhances the learning process.

Web-Enhanced Instruction for Laboratory Sciences

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Our purpose in demonstrating this technology is to exemplify the advantages of integrating laboratory instruction via computer utilization. Web-enhanced instruction is incorporated into the clinical component of the CLS student program. This direction is achieved by posting objectives on our internal Web site (http://www.cedars-sinai.edu/pathology/MTCourseDescription.htm), with relevant Web pages and images linked to specific learning task objectives. Students are directed to Internet sites that offer both image (photos and graphics) and explanatory (primarily text) information. These Web pages may be authored inside and outside of our respective institutions (the latter widening our scope of instruction). In the laboratory, students can access voluminous material directly related to the bench procedure at hand, using already-in-place bench top computers without having to concern themselves about amassing a large library of contaminated texts and other learning materials. Students and instructors also may interact at any time in a dedicated computer discussion room, enabling students and licensed technologists alike to learn from each other's questions and answers. Likewise, students can be outside of the hospital or classroom, and can greatly expand their information by accessing computer-based material. The goal of this type of enhanced instruction is to enable a closer, more comprehensive connection between the practical and the didactic aspects of laboratory learning. Exercises are dispersed throughout allowing the instructor to assess learning by the students' ability to demonstrate specific performance skills, evaluate data, and apply cognitive knowledge relevant to the skill.

ASCLS ANNUAL MEETINGS INFORMATION

Forms for submitting program proposals and abstracts for future ASCLS Annual Meetings will be available on the ASCLS Web site under meeting information. The Web site address is: http://www.ascls.org/

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