Clinical Laboratory Educators Conference 2007 Abstracts

POSTER PRESENTATIONS

Presenters are listed in bold face type.

A Comparison in Academic Performance between Distance and On-campus Students in Allied Health Education

Barbara L Russell MHE MT(ASCP)SH, *Medical College of Georgia, Augusta GA.*

The purpose of this study was to determine the differences in academic performance between distance learning and on-campus students in allied healthcare education. Data were collected from students in three academic programs: clinical laboratory science, health informatics, and nuclear medicine technology from a medical university. A causal-comparative research design was utilized to answer the research questions and anecdotal data including age, gender, previous academic performance, final GPA scores, and certification scores were collected on 252 students. It was established that there was no statistically significant differences between distance and on-campus students for gender or previous academic performance. However, there was a statistically significant difference in age between the two groups; on average the distance students were older than their on-campus counterparts. No statistically significant differences in final GPA scores or in certification pass rates between the two groups were found. When the three allied health programs were looked at individually, there were no statistically significant differences in final GPA scores within the three programs. There were also no statistically significant differences in certification scores between the two groups for clinical laboratory science and health informatics programs. In the case of nuclear medicine technology, campus students scored significantly higher then distance students on the certification examination. This research shows that distance learning can be a viable alternative for traditional on-campus education. Still, more research needs to be conducted, with larger sample sizes, and utilizing more disciplines to determine whether distance learning is successful for all allied healthcare programs.

Development of an Advanced Practitioner Program Using a Clinical Microbiology Model

James L Vossler MS CLS(NCA), *SUNY Upstate Medical University, Syracuse NY.*

Clinical laboratory scientist (CLS) programs provide educational opportunities within in the laboratory. Enhancing the role of the CLS will require the development of clinical skills designed to increase the knowledge and understanding of the diagnosis and treatment of patients. Recently, there has been increased interest in the development of a curriculum at the graduate level which results in individuals with advanced clinical skills and knowledge.

A program with advanced courses and clinical rotations in one of the major areas of the laboratory was developed to achieve these goals. The program culminates in a master's of science degree in medical technology with a concentration in one of the major laboratory disciplines. This thesis-based program has been piloted in the area of clinical microbiology.

To develop advanced clinical skills, the curriculum provides enhanced experiences in the laboratory as well as clinical rotations with the infectious disease service and infection control division. Rotational activities include daily "rounding" with the infectious disease service and the infection control practitioners, daily monitoring of communicable disease, investigation, data analysis of epidemiological trends, and participation in a number of hospital committee meetings. In total, students spend 12 weeks of advanced clinical rotations equally divided among the three areas.

Upon graduation, individuals enrolled in the program will have an advanced knowledge base and skill set that will allow for increased collaboration with physicians and other members of the healthcare team in the ordering, interpretation, and correlation of laboratory tests, thus enhancing patient outcomes.

The peer-reviewed Clinical Practice Section seeks to publish case studies, reports, and articles that are immediately useful, are of a practical nature, or contain information that could lead to improvement in the quality of the clinical laboratory's contribution to patient care, including brief reviews of books, computer programs, audiovisual materials, or other materials of interest to readers. Direct all inquiries to Bernadette Rodak MS CLS(NCA), Clin Lab Sci Clinical Practice Editor, Clinical Laboratory Science Program, Indiana University, Fesler 409, 1120 South Avenue, Indianapolis IN 46202-5113. brodak@iupui.edu.

Development of a Diagnostic Molecular Science Program
Heather Flowers PhD CLS (NCA), David Fowler PhD CLS (NCA), *Libby Spence PhD CLS (NCA), University of Mississippi Medical Center, Jackson MS.*

Current NAACLS standards now require incorporating molecular diagnostics into the clinical laboratory science (CLS) curriculum. Challenges in meeting these requirements include a limited number of faculty and faculty expertise. To address these issues we sought out courses currently offered by the University of Mississippi Medical Center and other educational materials that provided the content needed to meet the accreditation guidelines. Our university's course descriptions were reviewed for content to determine the relativity to the subject area. An Internet search revealed few courses available that addressed basic molecular biology and clinical applications. The initial effort to incorporate the molecular content into the CLS curriculum led to the idea of developing a diagnostic molecular science (DMS) program using currently offered courses and clinical and research labs within the metropolitan area. The results provided a medical genetics course and an introductory course in molecular diagnostics. Students who are interested may take additional coursework in advanced and clinical molecular courses to prepare them to sit for the certification examination in molecular biology. The DMS program is also available as a post-baccalaureate certificate program for students who have received an undergraduate degree in science. We are currently in the process of NAACLS accreditation for the DMS program.

A Flow Cytometric Exploration of Biomarkers in Patients Suffering from Acute Hypereosinophilic Syndrome
Travis Price, *Weber State University, Ogden UT.*

Acute hypereosinophilic syndrome (HES) is a devastating medical condition brought about by an unexplained overproduction of eosinophils. HES is classified by an unexplained eosinophil count that exceeds 1500 eosinophils/μL of whole blood, lasting at least six months.

Initial studies have shown the drug Mepolizumab, a humanized monoclonal anti-interleukin 5 antibody, to be extremely effective at reducing eosinophil counts. This efficiency coupled with a sustained reduction in eosinophil counts, even after discontinuation of the drug, has sparked an interest in the molecular mechanisms of the anti-IL5 antibody. To assess this, whole blood was obtained from patients diagnosed with HES, at time points ranging from baseline to thirty six weeks. These patients were given either Mepolizumab or placebo and all researchers were blinded to this information. Blood was also collected from healthy volunteers to serve as a control group. Within twenty-four hours of collection, cells were immunofluorescently stained using a variety of biomarkers. Four-color flow cytometry was then performed and data was obtained and analyzed. A careful look at the expression of each biomarker, as well as combinations of biomarkers, is currently underway. It is hypothesized that a significant biological difference will be evident between the patient populations and the population comprised of healthy individuals.

Muscular Dystrophy Proteins: What is the Role of the Clinical Lab?
Amy L Thompson PhD, *Austin Peay State University, Clarksville TN.*

The term muscular dystrophy describes a grouping of skeletal muscle diseases that result from the absence or mutation of several different proteins. In skeletal muscle, basic helix loop helix (bHLH) transcription factors regulate the development of many skeletal muscle genes that are changed or absent in muscular dystrophy. In my work presented here I describe the selective role of one of the bHLH factors, MRF4, in controlling the expression of the adult skeletal muscle Na^+ channel, Na_V 1.4, as well as a subset of associated genes including dystrophin, which is absent in Duchenne muscular dystrophy and truncated in Becker's muscular dystrophy. Using the MRF4-null mouse model, expression of the Na_V 1.4 Na^+ channel, dystrophin, and nitric oxide producing nNOS are all decreased, whereas structural protein β-actin is increased. These data demonstrate the importance of MRF4 and suggest its potential as a therapeutic agent. The changed proteins can be detected using Western blotting, which is a method commonly utilized in the research lab and carried out by many specialty clinical labs. Clinical labs have an important role in identifying the proteins that are involved in muscular dystrophy and skeletal muscle disease and in monitoring the response of these proteins to new and existing therapies.

"Trouble in Springfield"- A WebQuest on Viral Hepatitis
Linda Jeff MA MT (ASCP), *University of Alabama at Birmingham, Birmingham AL.*

A new teaching method was utilized in a case-based clinical correlations course in order to decrease monotony in assignments and increase students' interest, interaction, and learn-

ing. A WebQuest based on "The Simpsons" was developed to review and extend CLS students' knowledge of viral hepatitis. WebQuests are problem-based activities in which some of the resources used are on the Internet. In this WebQuest a problem was provided (citizens were diagnosed with hepatitis), a task was given (teams were assigned to investigate each case and prepare a Power Point presentation on the type of hepatitis involved), the process was described (roles of microbiologist/epidemiologist, immunologist, chemist, and physician's consultant were delegated with specific duties for each), guidance was provided (lists of web links for each role), and evaluation methods were described (rubrics for oral presentation and written questions). The mean grades on oral presentations were higher than on previous assignments (significant at .05 level using t-test). Students' reactions to the WebQuest were very positive with 100% of students responding that they enjoyed the WebQuest and it helped them learn new concepts and correlate information. The majority of students liked the WebQuest better than the typical method of case presentation and stated that it encouraged team interaction. WebQuests are interesting and effective methods of presenting material in a problem based format. Different types of WebQuests may be used effectively in CLS courses to review, extend, and integrate knowledge or to lead students in the acquisition of new information.

Use of ASM "MicrobeLibrary" Resources in Teaching Microbiology to Clinical Laboratory Science Students

Rebecca Buxton MS MT(ASCP), *University of Utah, Salt Lake City UT; Mary Lux PhD MT(ASCP), University of Southern Mississippi, Hattiesburg MS.*

Because teaching in the twenty-first century demands the use of a technology-enhanced classroom, a constant challenge for an instructor is the availability of high-quality images for use in PowerPoint and other visual teaching formats. Additionally, because of ubiquitous access to the Internet, many instructors have become eager to exchange and share classroom resources with their colleagues around the globe.

MicrobeLibrary (ML) was established by the American Society for Microbiology (ASM) to "…be an electronic journal of peer-reviewed educational resources for the teaching community." More than 1400 learning objects contributed by scientists worldwide include still and animated visual resources; science and education feature articles and journal papers; reviews of books, videos, software and websites; and curriculum resources.

This poster presentation highlights how the authors and their colleagues have used the ML curriculum and visual resource areas in their classrooms. Class websites, examples from PowerPoint presentations, and handouts for classroom exercises are portrayed. Because of increased concern and regulation of highly infectious organisms in teaching, some ML resources have filled the gaps and enabled us to continue presenting a broad diversity of organisms effectively. Although no outcomes assessments have been performed on these specific additions to our curricula, course evaluations have steadily improved with the addition of enhanced visual technology in our classrooms. The ready accessibility of high-quality legally-available microbiology images has greatly contributed to our successes.

Most academic institutions recognize the peer-reviewed status of ML. As such, ML is a great opportunity for publication within the clinical microbiology education community. A further goal of this presentation is to encourage conversation and collaboration between clinical microbiology educators and the greater microbiology education community.

Use of Online Technology to Support a Classroom-based Clinical Correlations Course

Margaret Fritsma MA MT(ASCP) SBB, *University of Alabama at Birmingham, Birmingham AL.*

We describe a clinical correlations course that combines case-based classroom activity with online materials delivery and team communication. Students assigned to one of four teams are given seven progressive clinical cases to develop and present at two-week intervals throughout the course. The cases illustrate concepts in clinical chemistry, transfusion medicine, microbiology, hematology, body fluids, hemostasis, immunology, management, and education. Teams investigate the epidemiology, pathogenesis, clinical features, treatment, and prognosis of the condition, with emphasis placed on laboratory testing, quality assurance, interpretation of results, test limitations, sources of error, and significance of abnormal results. Initial case information is distributed to team members and classmates online. Members review the initial information and select appropriate resources before meeting to discuss the case. Teams research ongoing cases and prepare their presentations through online discussion groups or team meetings. Each week, two teams alternate presenting their completed cases in a 45-minute oral presentation to classmates and faculty. The PowerPoint presentations may also include web-based animations and video clips. The format may be lecture or an innovative technique, such as a simulated

news presentation, TV show (*CSI, House*), or panel discussion. Following the classroom presentation, the case, slides, handouts and web-links are posted on the course website. By the course end, twenty-eight cases are posted for downloading by students for future review for certification exams. Online delivery of course information, cases, slide presentations, handout material, and web-links multiplies our capability to provide educational information to students, and provides practice in using online communication tools.

Wake Up! Your PDQ is due!

Beverly Barham PhD, *Lori Woeste Ed D, Illinois State University, Normal IL.*

Did you ever wonder if students removed the shrink wrap from their textbooks or just left the books unopened hoping that by showing up in class and digesting the PowerPoints they would be successful in the course? The pre-discussion quiz (PDQ) was implemented as a tool for enhancing student engagement. PDQs were delivered via WebCT in pre-professional practice immunology and chemistry CLS courses. Each PDQ was available for students to take as early as 48 hours before the class discussion and up to 15 minutes before. Once the deadline for submission had passed, PDQs were made available as a study tool. PDQs, each covering one or two chapters in the text, were timed at one minute per question with a range of eight to 15 questions. Students were only allowed to take the timed PDQ once. Points achieved on the PDQs were added to the total points for the course. Student participation for the PDQs ranged from 70%-100% in the beginning of the semester with 100% being the standard after the first three weeks of the semester. Where previously the instructors were simply lecturing with minimal student engagement, subsequent discussions were filled with comments and questions from a variety of students. By implementing this timed open book quiz before class, student engagement in CLS courses increased significantly. Perhaps the entire PDQ experience is best summed up in the student quote "I had to read the whole chapter to know the answers to that little PDQ".

TECHNOLOGY DEMONSTRATIONS

Development of Web-based Virtual Mycology Laboratory Sessions for Clinical Laboratory Science Students

Ryan D McGough MS MT(ASCP), *Lara Kolar MT(ASCP), Erin Rumpke MT(ASCP), Jarrod Fortwendel PhD MT(ASCP), Charity Accurso PhD MT(ASCP), Gideon Labiner MS MT(ASCP)CLS(NCA), Linda Graeter PhD MT(ASCP), University of Cincinnati, Cincinnati OH; Deborah Josko PhD SM(ASCP), University of Medicine and Dentistry of New Jersey, Newark NJ.*

The Clinical Laboratory Science Program at the University of Cincinnati utilizes a course model that includes a variety of learning activities. Didactic material in both on-campus and distance learning courses is supported by digital images, simulations and graphics, real time chat sessions, recorded lectures and demonstrations, advanced clinical rotations, and virtual laboratory exercises. In delivering the Virtual Laboratory component, a primary goal was to ensure that the exercises were interactive and facilitated the development of critical thinking skills while supporting the concomitant lecture materials. The Virtual Laboratory exercises that are presented here were initially developed to fulfill this need in the clinical mycology distance learning course, but could likewise be applied to any clinical mycology course whether on-campus or via distance learning.

The sessions were developed using stock fungal cultures from the CLS student laboratory at the University of Cincinnati, a Nikon DS-5M scope-mounted digital camera, and Microsoft PowerPoint, Producer, and FrontPage software in the spring of 2006. A student "focus group" was utilized during the development process to ensure user-friendliness and ease of navigation. The four clinical mycology Virtual Laboratory sessions presented here each include three phases: a "review" phase consisting of a narrated PowerPoint presentation reviewing key concepts; a web-based "case study" phase, which allows students to make a series of decisions on a particular case; and a "worksheet" phase where students are able to assess and reaffirm their knowledge. This technology demonstration will display all three phases, in addition to initial student feedback.

Educating the Educator: Teaching Students How to Teach

Yasmen Simonian PhD CLS(NCA) MT(ASCP), *Weber State University, Ogden UT.*

Constant changes in providing health care, budgetary constraints, and the shortage of clinical laboratory personnel have all greatly impacted the employment opportunities and job descriptions of clinical laboratory scientists. Baccalaureate degree laboratorians are replacing bench-work with more administrative roles and responsibilities. One such responsibility is that of an educator. Recently hired personnel require quality training. Residents and the interns in the hospitals and clinics need information on newly developed

laboratory tests; and our veteran colleagues are required to complete certain continuing education credits by attending in-service refreshers, workshops, and presentations. The objective of this technology demonstration is to provide a design for quality teaching methodologies included in a senior capstone course for a clinical laboratory sciences (CLS) BS degree programs. The new technologists need to be able to teach others; therefore the capstone project was developed giving students an opportunity to learn how to teach and to develop teaching materials. The design includes projects analyzing needs, target populations, tasks objectives, and current training and resources. In addition, implementation plans, course design documents and evaluation plans will de demonstrated.

Examples of teaching projects on PowerPoint Presentations developed by senior CLS students both online and on campus will also be demonstrated. These projects have been presented to laboratory personnel, interns, and residents in various hospitals and clinics. The presentations have been a great avenue to introduce the students early on to the entire health care team and review the role and the value of clinical laboratory scientists in providing quality health care.

Let's See That One More Time!

Linda A Smith PhD, *Shirlyn B McKenzie PhD, University of Texas Health Science Center, San Antonio TX.*

The clinical laboratory science (CLS) curriculum continues to expand and educators struggle to fit basic and new concepts into limited course time. Complex topics such as antibody panel 'cross-off', identification of fungal agents, and the coagulation cascade, that normally would have been taught in extended lecture times are compressed. While students struggle to master these concepts in shortened classroom presentations, some clinical affiliates take students for less time in practicums or have ceased to perform certain types of testing. This, in turn, reduces time for application or reinforcement of the concepts. Interactive learning modules requiring input by students and providing them with direct feedback are a good adjunct to traditional lecture presentations and provide an opportunity for repetition until the concept is learned. While faculty have the content expertise, few have time or expertise to develop these modules. CLS faculty at the University of Texas Health Science Center hired a high school student with exceptional computer skills in several different program applications to help develop learning modules that could be incorporated into lecture or provided to students by computer access. Faculty provided the creative concepts and flow while the student incorporated it into the computer format. These practice or reinforcement modules use a variety of interactive methods including immediate feedback to student responses. This technology demonstration will include several completed modules including one for the coagulation cascade, and one for antibody panel workups and a fungal identification module under development.

National Tuberculosis Curriculum Consortium Technology Products

Sandra Latshaw MA, *University of Nebraska Medical Center, Omaha NE;* ***Kathleen Mugan MEd,*** *University of Arkansas for Medical Sciences, Little Rock AR;* ***Maribeth Flaws PhD,*** *Rush University Medical Center, Indian Head Park IL.*

Tuberculosis (TB) is currently on the decline in the US, however, it is imperative that all medical disciplines remain alert to the detection, identification, and treatment of this deadly disease. Therefore, the National Tuberculosis Curriculum Consortium (NTCC) was established in October 2003 under a contract from the National Heart, Lung and Blood Institute of the National Institutes of Health (N01-HR-36157). One mission of the NTCC is to create access to educational and training opportunities for CLS/CLT students. This technology demonstration will highlight curricular products created by the NTCC for TB education in CLS/CLT programs. A sampling of all completed or preliminary work products will be demonstrated including test questions, competencies, computer-based learning objects, PowerPoint presentations, and computerized case studies. These educational products are available to all CLS/CLT programs at no cost through the NTCC website (http://ntcc.ucsd.edu/) as they are developed. Although TB testing may be sent to reference laboratories, it remains important content for clinical laboratory students. The NTCC technology products can supplement and or update current TB teaching materials. By developing active learning modules to enhance current TB curriculum for CLS/CLT students, it is the hope that TB infection rates will remain low in the US.