

ASCLS Annual Meeting 2013: Official Abstracts of Submitted Papers, Case Studies and Posters

Houston, TX

The following abstracts have been accepted for presentation at the 2013 American Society for Clinical Laboratory Science (ASCLS) Annual Meeting and Clinical Laboratory Exposition to be held July 30 through August 3 in Houston, TX. Abstracts are reviewed by members of the ASCLS Abstract Review Committee. They are the final authority in selecting or rejecting an abstract.

Papers, case studies and posters will be presented during the following times at the annual meeting.

POSTER PRESENTATIONS

Tuesday and Wednesday, July 30 and 31, 9:30 am-5:00 pm at the George R. Brown Convention Center; *Authors will be present on Wednesday, July 30 from 10:30am to Noon to discuss their work and answer questions.*

ORAL RESEARCH PRESENTATIONS

Wednesday, July 31, 3:30-5:00pm at the George R. Brown Convention Center

Poster Presentation Abstracts

Blood Ammonia Stability Revisited

William Korzun, PhD, Jack Hester, MS, Lara Mabry, MS, Virginia Commonwealth University, Richmond, VA

Many years ago, medical laboratory scientists established specific specimen collection and handling procedures for the measurement of plasma ammonia concentration, due to the instability of ammonia in whole blood and plasma. In light of the improvements in analytical automation and specimen delivery systems over the past few decades, the purpose of this study was to determine the stability of ammonia in samples held at room temperature versus samples held on ice. Forty outpatients' plasma ammonia concentrations were

measured after heparinized whole blood specimens from each subject were held for 5, 15, and 30 minutes at room temperature and "on ice". The ammonia concentration from whole blood maintained "on ice" for 5 minutes was designated the "reference value" for that subject. Ammonia concentrations obtained after whole blood was maintained "on ice" for 15 or 30 minutes prior to processing were not significantly different from the corresponding "reference values" (15 min., $p=0.196$; 30 min., $p=0.512$). Ammonia concentrations from whole blood maintained at room temperature for 5, 15 and 30 minutes prior to processing were also not significantly different from the corresponding "reference values" ($p=0.961$, 0.610, and 0.948, respectively). These results suggest that reliable plasma ammonia concentrations may be obtained from heparinized whole blood maintained at room temperature for up to 30 minutes.

Characterizing Invasive Properties of Clinical Candida spp.

April L Harkins, PhD, Anna Frazier, Matthew Ralls, Marquette University, Milwaukee, WI

Infections caused by the yeast *Candida spp.* have increased significantly due to the emergence of medical advances such as immunosuppressive therapies and prosthetic devices. In the United States, *Candida spp.* is the 4th most common hospital acquired blood stream infection (BSI) isolate. The ability for this yeast to form biofilms on indwelling prosthetic devices plays a role in its overall pathogenicity. In this study, clinical isolates of *Candida albicans*, *Candida glabrata*, *Candida parapsilosis*, *Candida tropicalis*, and *Candida krusei* were analyzed for the ability to develop biofilms and the adherence was correlated with the ability to invade human fibroblasts. Biofilm development was measured by quantifying the adherence to silicone and the biofilm thickness by confocal microscopy. Invasion of fibroblasts were imaged with confocal microscopy and

measured by the isolation of colony forming units from the co-cultures. The yeast that showed the highest amount of adherence positively correlated with the yeast that displayed the most invasive properties. These results indicate a predictive value of the pathogenicity of *Candida spp.*

A Comparison of Slide Preparation Methodologies for Smears Analyzed on the Cellavision DM96

Kyle Riding MLS(ASCP)^{CM}, Stefanie Mattson MLS(ASCP)^{CM}, Rebecca Timmons MLS(ASCP)^{CM}, Boston Children's Hospital Boston, MA

A quality assurance project aimed to investigate the accuracy of white blood cell differentials performed using the Cellavision DM96. The instrument manufacturer (Cellavision AB, Sweden) recommends mechanical slide-makers be used to produce consistently well-made wedge smears. Our facility utilized two mechanical slide makers: The Hemaprep Slide Maker (J.P. Gilbert Company, Pennsylvania) and Advia Autoslide (Siemens Healthcare Diagnostics, New York). To investigate if differences in slide-making methodologies impacted results, two slides on 50 randomly chosen samples were made: one via the Hemaprep method and one via the Advia Autoslide method. This resulted in a total of 100 slides being made. These slides were analyzed using the Cellavision DM96. Due to poor slide quality the Cellavision DM96 flagged 9 (18%) slides as having invalid results. The 9 samples that these slides were made from were rejected for analysis. The Rumke method of manual differential was used to compare relative neutrophil, lymphocyte, and monocyte counts obtained on the remaining 41 samples. This analysis showed that 12 (29%) samples had results with disagreement between smears made on the Hemaprep and Advia Autoslide. There was found to be a statistically significant ($p=0.01$) increase in smudge cells on the smears made using the Hemaprep amongst these 12 samples. In conclusion, this led to more frequent cleaning and changing of Hemaprep blades and the development of an algorithm that better equipped staff to judge how smudge cells may be impacting the results of a white blood cell differential when utilizing varying smear-making techniques.

Compliance of Patients with the Prescribed Dosage of

Antidepressant Medications

Ayan Guled, MLS(ASCP), Suhaila A. Ghuloum, MRC Psych, Mohamed Osman Abdel Rahman, MRC Path, Victor A. Skrinska, Ph.D., DABCC, Hamad Medical Corporation, Doha, Qatar

Previous studies estimated fewer than 50% of psychiatric patients follow medical advice. Some studies reported that 13% of patients treated with antidepressants never refilled their prescription in the first 6 months and 49% refilled their prescription at least once, but did not satisfactorily comply with the treatment. The purpose of this study was to determine the compliance of patients under treatment for depression with amitriptyline at Hamad Medical Corporation in Doha, Qatar. Serum concentrations of amitriptyline were measured on a TDxFLx by fluorescence polarization immunoassay to determine compliance. Amitriptyline has a long half-life of 21 hrs with a therapeutic window of 80 - 250 ng/mL. Patients with serum levels near or above 80ng/mL were considered compliant; those with <50 ng/mL, partially compliant; and those with undetectable levels, noncompliant. Random serum samples were collected from 17 patients (12 female, 5 male) with an age of 49 ± 13 years. Sixteen were of Middle Eastern and 1 of Philippine decent. All patients self-reported compliance with their prescriptions. Twelve patients (70.6% of the population) were compliant with expected serum levels. Four patients (23.5%) were partially compliant and 1 patient (5.9%) was noncompliant. One partially compliant patient was prescribed a high dosage and a supplemental antidepressant. This study suggests there is high level of compliance in Qatar. Nevertheless, it also suggests that self-reporting is not reliable and it is helpful to measure serum concentrations of antidepressants to determine compliance in patients who are not responding to therapy before prescribing additional medications or increasing dosage.

Do Different Generations of MLSS/MLTs Have Dissimilar Job Perceptions?

Rob Kendall, MHS, Anne Ranne, PhD, MT(ASCP), Lester Pretlow, PhD, C(ASCP)^{CM}, Georgia Regents University, Augusta, GA

Currently there is a shortage of Medical Laboratory

Scientists and Medical Laboratory Technicians (MLSs/MLTs) and it is expected to increase. The purpose of this project is to evaluate the job perceptions of MLSs/MLTs in three generations of employees. Finding differences may help lab management in recruitment and retention of MLSs/MLTs. The hypothesis of this research was that there are differences in job perceptions among the Baby Boomer, Generation X, and Generation Y MLSs/MLTs. The study population consists of Georgia MLSs/MLTs that currently work in the clinical laboratory and are members of either the Baby Boomer, Generation X, or Generation Y groups. The study design is behavioral and utilizes the Retention for Clinical Laboratory Personnel Practitioner Survey to measure the job perceptions of the generations being studied. The first part of the survey consists of 30 Likert-like statements that relate to job perceptions. The second part of the survey retrieves demographic information. The results will be analyzed with one-way ANOVA and descriptive statistical analysis. Significant differences in job perceptions were found in two statements of the survey. Generation Y feels more "stuck" in their jobs and the Baby Boomers feel the least likely that there is room for advancement. This study found that there are possible differences in job perceptions based on generation, but a larger sample size is needed. More studies need to be performed to gain more insight into this area of research. Also, research needs to be performed specifically on reasons for turnover.

Drug Induced Immune Hemolytic Anemia Case Study

Denene Lofland, PhD, MT (ASCP), Floyd Josephat, EdD, MT(ASCP), Charlotte Bates, MEd, MT(ASCP), Armstrong Atlantic State University, Savannah, GA, Julia Schachter, MLS(ASCP)^{CM}, St. Joseph's/Candler Hospital, Savannah, GA

A jaundiced 63-year-old female presented to the emergency department complaining of fatigue and shortness of breath. Laboratory studies revealed decreased hemoglobin, increased total and indirect bilirubin, decreased unsaturated iron binding capacity, increased ferritin and positive direct antiglobulin test (DAT). The DAT demonstrated a 3+ reaction with polyspecific antihuman globulin, 3+ reaction with anti-IgG and 1+ reaction with anti-C3. Patient history was significant for previous transfusion of two units of

packed red blood cells and administration of the cephalosporin cefotetan. Identification of a cefotetan antibody in the patient's plasma using cefotetan-treated red blood cells confirmed the diagnosis of drug induced immune hemolytic anemia (DIIHA). The patient's condition improved after receiving three units of O negative packed red blood cells, methylprednisolone, immunoglobulin and folic acid. She was discharged from the hospital five days later. DIIHA is characterized by a rapid decrease in hemoglobin due to drug-related destruction of red blood cells. Cephalosporin drugs are commonly implicated offenders. Clinical symptoms typically appear 10-14 days after exposure to the drug. Patients exhibit intravascular hemolysis with rapid decrease in hemoglobin, hemoglobinemia and hemoglobinuria. Jaundice, anemia, splenomegaly and dark urine are frequent findings. Immunohematology results consist of a positive DAT with a reaction to anti-IgG. Patients respond well to treatment which includes discontinuation of the drug, transfusion and steroid therapy.

The Effects of Metformin and Insulin on the Fertility of Females with Type 2 diabetes and PCOS

Lacey Campbell, MHS, Lester Pretlow, PhD, C(ASCP)^{CM}, Nathan Hongyan XU, PhD, Li Fang Zhang, MS, Georgia Regents University, Augusta, GA

Polycystic ovarian syndrome (PCOS) associated with Type 2 Diabetes (T2D) is a serious condition found in 4-18% of women in which multiple cysts are found on the ovaries. For treatment, many doctors recommend the drug Metformin (Glucophage) to regulate the sex hormones and blood sugar in these women. The purpose of this study was to investigate the association between taking Metformin versus Insulin and the lifetime fertility of women diagnosed with Type 2 diabetes and/or PCOS. The investigators used ICD 9 codes to request medical record numbers (MRNs) of female patients who had been diagnosed and prescribed the Metformin and/or Insulin. Using the MRNs, the investigators retrieved data from the hospital information system of Georgia Regents Health System. The investigators collected data on age, race, weight, and diagnosis of PCOS and/or Type 2 Diabetes. The Metformin and Insulin were the independent variables. The fertility related effects in females were the dependent variables categorized as 1) never pregnant, 2)

pregnant with a still-born or spontaneous abortion, or 3) pregnant with a live birth. The co-variants were race, age, and weight of the patient. Unadjusted odds ratios were used to calculate the association between fertility and treatment to include the significance of the association. The results showed that most women took Metformin rather than Insulin; however, there was no statistical difference between fertility in these groups. Age and race were significant factors in live-births. Overall, the study showed that there was no advantage in taking Metformin to increase live-births.

Evaluation of the Serial Sampling of Troponin I in the Misdiagnosis of AMI

Rebecca Russell, MHS, Brett Rice, MHS, Vimalkumar Patel, MHS, Lester Pretlow, PhD, C(ASCP)^{CM}, Jim Dias, PhD, Patricia Hall, MS, Greg Passmore, PhD, Scott Wise, MS, MT(ASCP), Georgia Regents University, Augusta, GA

The misdiagnosis of Acute Myocardial Infarction (AMI) remains an ongoing patient safety issue in emergency departments (ED) across the United States. The purpose of this observational study was to determine the percentage and potential explanatory variables of patients with a misdiagnosed AMI at Georgia Regents Health System ED from January 2009 thru December 2011. This retrospective records review analyzed the completeness of the ED's Chest Pain Pathway Troponin I serial testing, and assessed the co-variables of sex, age, race, geographical area, insurance status, and hypertension. The investigators used ICD 9 codes to request medical record numbers (MRNs) of patients who had been diagnosed with chest pain and AMI. Using the MRNs, the investigators retrieved data from the hospital information system of Georgia Regents Health System. Relative risks were used to model the primary outcome, AMI diagnosis, and its association with a completed Troponin protocol. Results showed a misdiagnosis rate 0.3% over the three year period. No patients were misdiagnosed who had completed serial sampling of troponin as stated in the testing protocol. Seven patients were misdiagnosed for the period reviewed; these patients had incomplete serial sampling of troponin when compared to the protocol. The relative risk of a misdiagnosis with an incomplete protocol was 1.09. This represented an approximate 10% increase in risk of misdiagnosis when the troponin

protocol was not followed.

A Final Report of Carriage Rates of Methicillin Resistant *Staphylococcus aureus* in Nursing Students

Thomas L. Patterson, MS, MT(ASCP), Gerald D. Redwine, MEd, MT(ASCP), Rodney E. Rohde, PhD, SV, SM(ASCP)^{cm}MB^{cm}, Barbara Covington, PhD, RN, Bob Vasquez, PhD, Emillio Carranco, MD, Texas State University, San Marcos, TX

The increase in prevalence of methicillin resistant *Staphylococcus aureus* (MRSA) has recently become a serious concern in the United States. The purpose of this study was to evaluate and characterize MRSA carriage and conversion rates in nursing students across clinical semester rotations. There have been few longitudinal studies that assess of the potential of healthcare professionals to become colonized with MRSA during their daily contact with numerous patients over time. Most studies have been one-time snapshots of carriage rates of healthcare professionals and or patients. Eighty-seven nursing students were periodically cultured for MRSA during their clinical rotations over a two year period. Self-administered questionnaires were collected from each student to assess demographic factors that may have contributed to colonization. MRSA colonization did not increase during this study; however, there was a fairly stable level of *S. aureus* (17% to 26%) and a very significant increase in *Staphylococcus* species other than *aureus* (9.2% to 82.3%). The following associations were found to be statistically significant: boil or skin infections with *S. aureus* (OR = 2.94, $p < 0.01$), working or volunteering in a healthcare facility with species other than *S. aureus* (OR = 4.41, $p < 0.01$), utilizing gym and sports facilities with other *Staphylococcus* (OR 2.45, $p < 0.01$). The investigators concluded that MRSA did not increase in nursing students during the longitudinal study. *S. aureus* colonization remained fairly stable. However, there was a significant increase in non *S. aureus* species (e.g. *S. epidermis*, *S. haemolyticus*) during clinical rotations.

Flexibility of the Piccolo[®] xpress for Field Studies

Christine Toennis, Deborah Sammons, Barbara MacKenzie, Jerome Smith, Centers for Disease Control and Prevention/National Institute for Occupational

Safety and Health, Cincinnati, OH

The Piccolo® xpress is a portable analyzer that provides point of care clinical chemistries using small volumes of whole blood, plasma or serum. The device is simple to use yielding results in 12 minutes and requires minimal training. We evaluated the flexibility of taking the Piccolo® xpress into the field. We assessed the stability of three blood matrices, with regard to time and storage conditions, using the comprehensive metabolic panel: whole blood collected in lithium heparin, plasma and serum. Manufacturer's recommendations were followed with minor time adjustments: whole blood analyzed directly after time of draw and after 90 minutes at room temperature (RT) and then plasma extracted and analyzed after 120 minutes and 5½ hours (RT); plasma analyzed directly after extraction and 5½ hours (RT); serum analyzed directly after extraction from whole blood, 5 ½ hours (RT), 48 hours at 4°C, 5 weeks and 8 months at -80°C. For all analytes, the total percent coefficient of variation (%CV) among all matrices was less than 10%; %CV for all storage time points was less than 10%, except for alanine aminotransferase (ALT). These results show that the three blood sample matrices provide comparable results with regard to sample type, time and storage conditions which are a valuable option in field research.

The findings and conclusions in this abstract have not been formally disseminated by the National Institute for Occupational Safety and Health (NIOSH) and should not be construed to represent any agency determination or policy. Mention of company names and/or products does not constitute endorsement by NIOSH.

Gastrointestinal Infections: The Relationship Between Fecal Lactoferrin Results and Stool Culture Results

James Bryan II, MLS (ASCP), Daniel S. Anderson, Barbara Russell, EdD, MLS(ASCP)^{CM}, SH^{CM}, Georgia Regents University, Augusta, GA

Lactoferrin assay has become one of the major tests in the clinical laboratory used to screen for inflammatory conditions of the gastrointestinal tract. The purpose of this study was to assess agreement between fecal lactoferrin and stool culture results. Secondly, for those specimens that had both a positive lactoferrin and positive stool culture result, an attempt was made to establish which organisms were isolated most

frequently. Upon IRB approval, data, collected retrospectively by medical chart review, included qualitative lactoferrin results, stool culture results, and demographic information from 724 patients who visited a hospital in the southeast United States from November 2011 to November 2012. Of these, 457 were positive for lactoferrin and 267 were negative. For stool culture results, 118 were positive, 489 were negative and 117 had no stool culture performed. The null hypothesis, that there was no agreement between positive lactoferrin and positive stool culture results, was accepted due to Cohen's Kappa(κ) statistic $\kappa = 0.098$. The most frequent organism isolated from patients that had a positive lactoferrin and positive stool culture was *Salmonella* species, with frequency and percent values of 31 and 32.3% respectively. The next most frequent groups of organisms isolated were yeast, followed by *Streptococcus* and *Staphylococcus* species. Based on these findings, it is not clear whether the qualitative lactoferrin assay can be used as a predictor of stool culture positivity. Further studies need to be performed with larger sample sizes to assess the relationship between lactoferrin results (qualitative and quantitative) to positive stool cultures.

Modifying Sample Processing to Reduce Overall Turn Around Time of Ammonia Analysis

Randi Sullivan, MLS (ASCP)^{CM}, Boston Children's Hospital, Boston, MA, Lawrence De Koning, PhD, Calgary Laboratory Services, The University of Calgary, Calgary, Alberta, Canada

A quality assurance (QA) project was initiated to reduce the turnaround time (TAT) for ammonia samples. These samples must be processed in a timely manner to assure accurate results. A detailed review of the TAT data discovered that excessive time was being lost during transportation and processing of samples. To reduce the amount of time lost during the pre-analytical phase, a procedure was developed that relocated the processing of ammonia specimens to where the specimens were analyzed and the centrifugation time was reduced from 10 minutes to 2 minutes. This allowed for faster processing of the samples. Correlations were run to confirm that there were no clinically significant changes in the ammonia results by the implemented change in the centrifugation process. The data showed a strong correlation ($R^2=0.98$) between the ammonia results

obtained by the two centrifugation procedures. After the new procedure was implemented the TAT was monitored on a monthly basis for one year. Comparison of summary statistics from before and after the processing changes showed an increase in the percentage of samples being processed in the recommended time frame from less than 25% to greater than 65%. Furthermore, ANOVA was performed and determined a significant decrease ($p < 0.001$) in the total time between specimen collection and receipt within the laboratory. A significant difference ($p < 0.0001$) in draw time to perform time was also found. In conclusion, the changes made during this QA project helped decrease the cancellation of samples and reduced the recollection rate of samples from pediatric patients due to excessive time lost to processing.

Reducing Laboratory Processing Time using Lean Six Sigma Tools

Jesse Frank Locklear, MLS (ASCP)^{CM}, Catherine A. Hammett-Stabler, PhD, DABCC, Connie Bishop, MT(ASCP)^{SH}, Tina Leonard, MLS(ASCP), Erin M. Neal, MLS(ASCP), Marilee S. King, MLS(ASCP), Mike Rogers, MT(ASCP), Cyndy Levtzow MT(ASCP), University of North Carolina Health Care, Chapel Hill, NC

The Core Laboratory uses several tools including automation to handle the >4000 samples received daily. For post-automation quality initiative, a Lean-Six Sigma Green Belt project was conducted to reduce lab specimen processing time (defined as “*from specimen arrival in laboratory to receipt in the laboratory information system*”) to < 30 minutes. Using the DMAIC methodology, the Six Sigma Team derived efficiencies through root cause analysis. Pre-barcoded samples were placed directly from the tube station onto the automation and a “First In First Out” (FIFO) process of handling specimens was instituted. Employees’ were reassigned to sort samples from the tube station to go into the automation or a FIFO container for processing. A CSF processing chart was created as a job aid to reduce processing time by having all aliquot labels, tubes, and sample volumes for quick reference. Using the Lean tools the work area was redesigned to include a central restocking station as well as the addition of an ergonomic sorting table. All shifts saw a reduction in the percentage of specimens >30

minutes: days 20.7% to 0.87%, evenings 27.7% to 2.04%, and midnights 1.8% to 0%. These data represent process sigma changes of 2.34 to 3.87 (days), 2.09 to 3.6 (evenings), and 3.6 to 6 (midnights). Efforts of our 11-month project have been sustained in daily monitoring by supervisors and customer call logs. The decreased processing time has contributed to a reduction in total turn-around time thus improving patient care, as well as enhancing customer and patient satisfaction.

Repeat Testing for Glucose Point of Care Values in Hypoglycemic Patients Using the Accu-Chek Inform System

Tangelia Walker, MHS, Marion Cofer, MHS, Victoria Bailey, MHS, Scott Wise, MS, MT(ASCP), SBB, Lester Pretlow, PhD, C(ASCP)^{CM}, Jennifer Waller, PhD, Georgia Regents University, Augusta, GA

The purpose of this research was to verify that health care professionals were following the established point of care (POC) protocol in regards to critical hypoglycemic patients. Previous studies have demonstrated that the ACCU-Chek meter has +/- 20% error difference associated with its lower-limit of detection. The protocol requires that glucose results less than 40 mg/dL be repeated on the Accu-Chek meter. If the result is still critical, the physician should be notified. With the first critical result, a sample should be sent to the Clinical Pathology Laboratory.

For this study, records of previously hospitalized patients at Georgia Regents Health System were analyzed. The date and time of the first critical value, and whether there was a repeat within the first 30 minutes was collected. Also collected was whether a specimen was sent to the lab within 90 minutes and when treatment was delivered.

All percentages were calculated based on a sample size of 412 except for the patients being treated following a repeated test which was 279. 67.7% of the subjects had a repeat test performed. Only 12.6% of patients had their test confirmed with the central laboratory. Nearly 25% were treated following the first test, only 12.2% were treated following the repeat test and 0.5% was treated following the lab confirmation.

This study indicates a need for continuing education and monitoring of personnel using POC devices. Understanding the need to treat hypoglycemic patients according to the values determined by the lab confirmation enhances patient safety.

Reported Values for Oligoclonal Bands in an Electronic Medical Record System

Mary F. Davis, Subramamian Sriram, MD, William S. Bush, PhD, Joshua C. Denny, MD, Jonathan L. Haines, PhD, Vanderbilt University, Nashville, TN

Using a de-identified electronic medical record (EMR) database at Vanderbilt University Medical Center (VUMC), we extracted 5,789 individuals with multiple sclerosis (MS) using ICD-9 codes, medications, and text key words. We are interested in identifying if patients have oligoclonal bands in the cerebrospinal fluid, the presence of which is highly indicative of MS. Laboratory values are easily extractable from the EMR as they are reported in structured fields. However, the drawback to using EMR-derived data for laboratory values is that if the test was not performed at VUMC, it will not be included in a structured field. Only 24% of the patients we evaluated had a value in the structured fields, although the test was likely performed for most patients. Fortunately, the result of the test is often written out in the text of the clinic note because of its importance. We created an algorithm to extract this result from the text of clinical notes, which identified 1,023 individuals with positive or negative results for oligoclonal bands. Compared to a manual review of these records, recall is 71%, precision is 87%, and specificity is 97%. We compared results extracted from the text to results in the structured field for tests performed at VUMC (481 individuals) and found 97.1% concordance. These results show that our algorithm to extract laboratory results for oligoclonal bands from narrative text produces accurate data that concurs with the physician notes and structured laboratory results.

Stat Urinalysis Workflow Improved by the Use of Value Stream Mapping (VSM)

Jacqueline R Jabczynski, MT (ASCP), Denise M. Smith, MT (ASCP), Gaurav Sharma, MD FCAP, Department of Pathology and Laboratory Medicine,

Henry Ford Hospital, Detroit, Michigan

Value Stream Mapping (VSM) is a graphical tool that is used to improve workflow by identifying process delay(s) and studying movement of information and material. We applied this tool to the urinalysis workstation in our core/stat laboratory which performs standard automated urinalysis (chemistry and microscopic examination) and shares urine specimens with the outpatient laboratory. The goal was to optimize processes at this workstation. VSM of pre-, post- and the analytical processes was performed and analyzed over 3 eight-hour shifts (1 weekend, 2 workdays) by a technologist. Specimens were randomly selected and tracked through each step. The VSM metrics lead time, cycle time, and takt time (available time divided by demand, a reflection of the pace of a process) identified the points of process delay. Corrective actions aimed at process transformation were planned and executed. Analysis of VSM metrics for 180 specimens yielded a lead time of 136 minutes, a cycle time of 6.2 minutes and a takt time of 7.6 minutes/specimen. Three points of delay were identified (waiting for receipt, delivery and decanting for analysis), of which receipt of urine in cups (31% of total specimens) was the most significant cause of delay (76.98 minutes).

With VSM, we identified points of delay on the urinalysis workbench processes and gathered metrics on movement of material and information. Consequently, the laboratory switched to instrument-ready urinalysis tubes as the preferred collection device. Our conclusion is that clinical laboratories should utilize VSM to design efficient processes, decreased turn around times and enhanced productivity.

Tools to Create a Supervisors Guide: A Way to Train Ourselves

Khaldee Lindsey Davenport-Landry, MLS(ASCP)^{CM}, Veterans Affairs Health Care System, Iowa City, IA

As the Medical Laboratory Profession continues to see an aging population ready for retirement and not as many experienced professionals to assume leadership roles, the need for an effective way to pass on knowledge in a useful way has become more evident. The tools are examples of how to organize daily duties,

create a checklist, and create a supervisory guide. The purpose of the guide is not to be all inclusive; the tools are basic and require a leader to do an ongoing review and update to a working document. This is done until there is a guide which can be utilized by a successive leader to seamlessly perform the basic functions of the job. The examples of the tools and guides indicate appropriate items to include in the guide, how to organize the guide, and what details need to be included. Creating a guide can give insight into what mentoring and succession planning may need to occur in the laboratory by allowing visualization of who is currently capable of performing the tasks assigned to the position. The guide may also be utilized for planned or unexpected absence. The examples have been created and utilized in the VAHCS Iowa City Laboratory. The guide has been implemented and allows for tasks to be accomplished when there is an absence of the author.

Unusual Case of Bacterial Prostatitis Caused by Methicillin-Resistant *Staphylococcus aureus*

Deborah Josko, PhD, Rutgers, The State University of New Jersey, School of Health Related Professions, Newark, NJ

A healthy, 51-year old male presented with acute prostatitis 8 days after returning from a business trip to New Mexico. He was prescribed levaquin which he took for 8 days but did not improve. Unable to urinate, he was catheterized and sent home. Two days later he was admitted to the hospital with a temperature of 102.5°F where several IV antibiotics were administered. The WBC count was elevated at $22 \times 10^9/L$ and one set of three blood cultures was positive for Methicillin Resistant *Staphylococcus aureus* (MRSA). A CT scan and ultrasound revealed a large abscess on his prostate which required a transurethral resection of the prostate (TURP). Purulent exudate from the abscess was positive for MRSA along with his urine. Antimicrobial therapy was changed to IV vancomycin and daptomycin. Although subsequent blood and urine cultures tested negative for MRSA as a result of the antimicrobial regimen, complications occurred: a right pleural effusion and development of pulmonary emboli. After three weeks of hospitalization and various procedures, the pleural effusion was resolved along with dissolution of the blood clots. The patient was sent home on oral Coumadin for six months and ultimately resumed his

normal lifestyle.

MRSA infections, whether hospital or community acquired, pose a serious threat to the patient if not treated promptly. Bacterial prostatitis caused by MRSA is rare with only a few documented cases in the literature. Prognosis depends on the patient's immune status and the administration of the appropriate antimicrobial regimen at the onset of infection.

West Nile Virus in a Liver Transplant Patient

Denene Lofland, PhD, MT (ASCP), **Floyd Josephat, EdD, MT(ASCP)**, **Charlotte Bates, MEd, MT(ASCP)**, Armstrong Atlantic State University, Savannah, GA, **Mary Gillespie, MLS(ASCP)^{CM}**, Mayo Clinic, Jacksonville, FL

West Nile Virus (WNV) is one of the most important emerging infectious diseases of the 21st century. Since the introduction of the virus into the United States in 1999 it has rapidly spread and is now endemic in 48 states. WNV is located within the genus *Flavivirus*, which includes other arboviruses such as Dengue, Yellow Fever and St. Lewis Encephalitis Virus. The virus is spread through the bite of an infected mosquito and can present as asymptomatic, febrile or neuroinvasive disease. While the pathogenic mechanism employed by the virus to cause neuroinvasive infection is not fully understood, neuroinvasive disease is often found in an immunocompromised host. This case study describes a 69-year-old male with a history of a liver transplant secondary to alcohol-induced cirrhosis. The patient presented to the emergency room with a two-week history of malaise, weakness and cough. He also complained of vomiting and diarrhea resulting in an 8-pound weight loss. On admission, laboratory results showed a normal white blood cell count and elevated liver enzymes. Spinal fluid analyses revealed increased protein and white blood cell count. Serological testing of the fluid was positive for WNV IgG and IgM. The patient's neurological condition deteriorated but eventually improved before discharge to a rehabilitation facility. For patients with West Nile Fever or neuroinvasive WNV infection, treatment options are minimal and primarily palliative and supportive.

Why Normalize the Dilute Russell Viper Venom Time Screen/Confirm Ratio?

David L McGlasson, MS, MLS(ASCP)^{cm}, 59th Clinical Research Division, JBSA Lackland, TX, **George A Fritsma MS, MT (ASCP)**, Laboratory Medicine, University Of Alabama at Birmingham, Birmingham, AL

The dilute Russell viper venom time (DRVVT) lupus anticoagulant (LA) clotting assay is expressed as a ratio of low- to high-phospholipid reagent results in seconds; the DRVVT screen/confirm (S/C) ratio. Experts advocate S/C normalization to improve efficacy. This study determined if normalizing improves clinical interpretation for six commercial DRVVT S/C systems: Diagnostica Stago (DS), Precision Biologic Inc (PBI), Siemens Healthcare (SH), TCoag (TC), Instrumentation Laboratories (IL), and Sekisui Diagnostics (SK). Mean of reference interval (MRI) was computed for each using 42 local LA-negative donors. Subsequently, 43 local LA-positive plasmas were assayed and reported as S/C ratios normalized using the MRI, pooled normal plasma (PNP) ratio, or were not normalized. The mean action limit, MRI +3SD, derived from the 42 normal plasmas was 1.2, but the p value was <0.001, indicating heterogeneity. When SK ratios were excluded the action limit remained 1.198 but the p was 0.14. S/C ratios computed from LA-positives were 1.91–2.04 for reagent systems other than SK, unchanged by normalization to MRI or PNP. DI and IL correctly categorized 100% of the normal and positive plasmas; PBI, SI, and TC, 95%; and SK 71%. Categorization was unchanged by normalization. Except for SK, the reagent systems were comparable. In conclusion normalization of the DRVVT S/C ratio did not change clinical efficacy in this cohort.

Oral Presentation Abstracts

Building Future Leaders: A Focused Approach to Soft Skill Development

Janelle M. Chiasera, PhD, MT(ASCP), The University of Alabama at Birmingham, Birmingham, AL

Working in healthcare requires mastery of hard skills such as technical and psychomotor competence which employers assume are obtained when professionals become credentialed. However, it also requires mastery of soft skill development, a cluster of personal qualities, habits, and attitudes that enhance interpersonal

relationships, job performance, and career prospects. While hard skills remain necessary for employment, employers are increasingly screening, and promoting employees for soft skills. The National Association of Colleges and Employers indicated that the top 5 desirable candidate skills are soft skills (communication skills, work ethic, teamwork, initiative, and interpersonal skills). Academic programs are skilled at delivering high quality academic experiences promoting technical and psychomotor competence; however, consistent emphasis on soft skill development is lacking. To fill this gap, the clinical laboratory science program at the University of Alabama at Birmingham developed a professional development experience required of all students that spans the entire curriculum. The experience focuses on 4 core areas of soft skill competence including professional presentation, communication, networking, and development. The experience is program-wide, begins at program entry, is emphasized throughout the curriculum, and culminates with the development of a professional portfolio. Students are grouped into interdisciplinary teams to promote cohort-identity binding and role value and industry leaders/experts were recruited to aid in content delivery. An average of 93% of all students attended the professional development activities with 83% responding that the experiences were valuable to their future development as a professional. Professional development experiences can be successfully developed to promote value-added professional development skills.

Collaborations with Nursing: A “Provide the Face” Goldmine

Mary Ann McLane, PhD, MLS (ASCP)^{cm}, **Veronica F. Rempusheski, PhD, RN, FAAN, FGSA**, University of Delaware, Newark, DE

Everyone within medical laboratory science (MLS) recognizes the importance of our field in delivering patient care. We also know that other healthcare colleagues have little knowledge of our expertise. The University of Delaware (UD) School of Nursing (SON) and the Department of MLS have shared resources in three efforts for the benefit of students and patients. An opportunity to participate in a gerontology consortium Federal grant application with a SON faculty member enabled this MLS investigator to contribute the preparation of six digital productions focusing on

geriatric-centered clinical laboratory topics: arthritis, cancer, reference ranges, coagulation, specimen collection, urinary tract infections, lipids, and the electronic health record, all available at no cost at <http://epadgce.jefferson.edu>. A pilot testing of the session on reference ranges with family medicine staff at Thomas Jefferson University resulted in 50% of attendees noting they would change their professional/clinical practice as a result of experiencing the content. Additional collaborative efforts at UD include developing the CLIA-compliant guidelines for testing and quality control at the Nurse-Managed Health Center, with junior/senior MLS students monitoring compliance each semester, and our faculty now being considered the best resource for questions involving diagnostic testing issues. Our faculty also teaches SON students a microbiology course with a more clinical orientation than that taught through biology. In a recent course evaluation, 87% of students responding rated the course “good” to “excellent”, and felt successful in increasing their knowledge/skills.

Competencies Needed for Doctorial Clinical Laboratory Scientists to Meet the Evolving Demands of Our Health Care System

Karen K. Hunter, PhD, MT(ASCP), University of Arkansas for Medical Sciences, Little Rock, AR

Interdisciplinary health care teams decrease costs, improve patient satisfaction, and reduce morbidity and mortality through patient safety and error reduction. Advances in medical laboratory technologies have increased the need for an individual with a doctorate in clinical laboratory science (DCLS) to be positioned on the interdisciplinary health care team. Inclusion of an individual with a DCLS on the interdisciplinary team would positively affect patient outcomes since clinical laboratory scientists provide approximately 70% of the information used by other health care practitioners to make critical diagnostic decisions for patient care. Several roles for an individual with a DCLS were discussed in the literature and recommendations have been made for defining the role of a DCLS prepared practitioner. This qualitative case study was designed to identify the competencies required of a DCLS prepared clinical laboratory scientist at a tertiary care academic health care center. Using purposeful stratified sampling techniques twelve participants, including pathologists,

administrators, and clinical laboratory scientists, were selected to participate. One-on-one interviews utilizing open-ended interview questions were completed for data collection. The data collected for this study yielded themes identifying the competencies of a DCLS prepared practitioner. Results of this study indicated to meet the evolving demands of our health care system a DCLS prepared practitioner would be required to provide additional knowledge in clinical laboratory science, correlate laboratory-testing results, provide patient specific interpretations, and communicate effectively with patients and physicians.

Optimizing Learning to Create a Well-Rounded Professional

Brianna Miller, MS, MLS(ASCP)^{cm}, Janelle Chiasera, PhD, MT(ASCP), University of Alabama at Birmingham, Birmingham, AL

Historically, educating professionals has focused on the development of strong analytical and psychomotor skills with limited emphasis on interacting with patients and other healthcare providers. However, the future healthcare workforce demands professionals which also have focused training on the full patient care model and how to effectively communicate with all members of the healthcare team to promote better patient outcomes. To fill this gap, the Clinical Laboratory Science program at University of Alabama at Birmingham has developed a unique student experience that optimizes learning by engaging students in an environment that promotes these life-long learning skills. The CLS program partnered with an innovative education and wellness facility (HealthSmart) which aims to improve the health of people who live and work nearby by providing services geared toward prevention of diseases. All students participated by providing direct client laboratory testing while attaining experience of the total testing process. This included initial contact with the client, height, body composition, blood pressure, obtaining personal and/or family health history in order to determine further screening test(s) to be performed, and collaboration with other members of the healthcare team. Students agreed that this method of instruction engaged them more fully into the overall team-based patient care model (95% agreement, n=19), built a strong base of interpersonal skills (100% agreement, n=19), and allowed them to better understand the full

patient care model (100% agreement, n=19). This model of training will produce graduates ready to take on the advanced clinical roles needed in the future.

A Survey Study of Benefits and Limitations of using CellaVisionDM96 for Peripheral Blood Differentials

Sandra J. VanVranken, MS, MLS(ASCP)SH, Sally V. Rudmann, PhD, MLS(ASCP)SBB, Kathy V. Waller, PhD, MLS, The Ohio State University, Columbus OH

In most clinical laboratories, hematologists rely on the microscopic analysis of stained blood films to accurately classify cells, aiding in the diagnosis and monitoring of a variety of disorders. Use of the microscope, although considered the gold standard in performing white blood cell differentials, presents a variety of limitations such as eye strain, lack of comparability among scientists and difficulties in training personnel. Digital image technology can facilitate a variety of essential job functions in clinical hematology such as referencing an abnormal cell and training new staff members. A questionnaire was developed to survey medical

laboratory professionals about their perceptions regarding the benefits and limitations for using digital images in clinical hematology. The questionnaire was sent in March 2012 to a list of current CellaVision™ DM96 (CellaVision AB, Sweden) consumers. A response rate of 46% was obtained (37/81). Background information on participants, 5-point Likert scale averages, percentage agreement (strongly agrees and agree), and disagreement (strongly disagree and disagree) were calculated and analyzed. The benefits of using the CellaVision™ DM96 rated the strongest by respondents included: decreased eyestrain, consistency among patient results and advantages in training personnel. Respondents reported notable limitations as being: restrictions with accurately estimating platelets and red cell morphology. Digital image software is currently being utilized in clinical hematology and offers potential benefits. With upgrades in slide scanning features and improved capabilities to view platelet and red cell morphology, a transition to digital image technology from the conventional method for performing peripheral blood cell differentials is possible.

2014 Annual Meeting Call for Abstracts

The deadline for abstracts for poster presentations, oral research and case studies at the 2014 ASCLS Annual Meeting is April 1, 2014.

Submission instructions and the proposal form may be found at www.ascls.org/ascls-meetings. The completed proposal form and abstract must be submitted electronically by the deadline.

The 2014 Annual Meeting will be held July 29 – August 2 in Chicago, Illinois. Additional meeting information will be available at www.ascls.org/ascls-meetings.