

11-20-2015

Proceedings of 2015 Aurora Scientific Day

Follow this and additional works at: <https://aah.org/jpcrr>



Part of the [Medical Education Commons](#), and the [Public Health Commons](#)

Recommended Citation

Proceedings of 2015 Aurora Scientific Day. J Patient Cent Res Rev. 2015;2:202-218. doi: 10.17294/2330-0698.1250

Published quarterly by Midwest-based health system Advocate Aurora Health and indexed in PubMed Central, the Journal of Patient-Centered Research and Reviews (JPCRR) is an open access, peer-reviewed medical journal focused on disseminating scholarly works devoted to improving patient-centered care practices, health outcomes, and the patient experience.

Proceedings of 2015 Aurora Scientific Day

The following abstracts were presented at the 41st annual Aurora Scientific Day research symposium, held May 20, 2015, at Aurora Health Care Conference Center in Milwaukee, Wisconsin. Aurora Scientific Day provides a forum for original research conducted by residents, fellows, students, teaching and research faculty, and other allied health professionals at Aurora Health Care, a private nonprofit health care provider with 15 hospitals, 150 clinics and 70 pharmacies integrated throughout eastern Wisconsin and northern Illinois.

FIRST PLACE ORAL PRESENTATION

Model Assessment and Development of Risk Stratification of Surgical Site Infection Following Cesarean Delivery for a High-Risk, Urban Population

Dakisha N. Lewis, Nicole P. Salvo, Kiley A. Bernhard, Danielle M. Greer

Department of Obstetrics and Gynecology, Aurora Sinai Medical Center and Aurora UW Medical Group; Center for Urban Population Health

Background: Surgical site infection (SSI) remains a major cause of morbidity despite efforts aimed at prevention and treatment. Risk stratification tools identify patients at greatest risk of SSI. Two models of stratification are: 1) the Centers for Disease Control and Prevention's National Healthcare Safety Network SSI Risk Index (NHSN), which assigns risk based on surgery duration, surgical wound contamination and physical status; and 2) the New Risk Stratification Schema (NRSS). The NRSS aimed to improve upon NHSN by incorporating five variables: diabetes control, body mass index (BMI), chorioamnionitis, methods of placental extraction and skin closure.

Purpose: Our objectives were to: 1) compare and evaluate NHSN and NRSS in terms of risk stratification outcomes in a high-risk urban population; and 2) develop a risk stratification model appropriate for assessing SSI risk in our population.

Methods: Data-related risk factors were gathered through chart review of all women who underwent cesarean delivery from September 2012 to October 2013. Using NHSN and NRSS models, we classified patients by risk of SSI following cesarean delivery. Logistic regression model effects represented 12 a priori risk factors in SSI, including BMI, diabetes, chorioamnionitis, delivery indication, use of chlorhexidine, preoperative antibiotics, timing of antibiotics, manual placental removal, antibiotic re-dosing, incision closure via staples, number of people present and surgery duration. Model-derived predicted values of SSI were used to stratify patients into low-, moderate- and high-risk categories. Strength of associations between SSI outcome and classified risks were examined. Agreement in risk classification between NHSN and NRSS, and each with our model, were assessed.

Results: Patients were normally distributed across the low- (21.3%), moderate- (55.9%) and high-risk (22.9%)

categories of NHSN, but under NRSS were restricted to moderate- (33.6%) and high-risk (66.4%) categories. While both methodologies produced results strongly associated with SSI ($P < 0.0001$), agreement in SSI risk occurred for only 46.3% of patients. Modeling efforts established chorioamnionitis, BMI and surgery duration as the three most significant predictors of SSI.

Conclusion: While both NHSN and NRSS produced results strongly associated with SSI, distribution of patients was shifted toward high-risk in the NRSS arm. Our stratification model is a simplification of the NRSS, utilizing only three highly significant predictors: chorioamnionitis, BMI and surgery duration.

SECOND PLACE ORAL PRESENTATION

Operating Room First Start Efficiency Throughout a Large Urban Hospital System

Callie Cox Bauer, Kiley A. Bernhard, Danielle M. Greer, Scott Kamelle

Department of Obstetrics and Gynecology, Aurora Sinai Medical Center; Center for Urban Population Health; Gynecologic Oncology, Aurora Health Care

Background: Operating room delays decrease health care system efficiency and increase hospital costs. Data on delays in a multihospital system are sparse.

Purpose: In an effort to improve our operating room efficiency, we investigated operating room delays, the causes and the impending financial impact.

Methods: A retrospective analysis on first case-of-the-day surgeries at three hospitals during 2013 was conducted. Delays were defined as in-room time being after scheduled surgery start time. Length of delay and causes were recorded. Patient demographics, body mass index, hospital facility, total number of procedures, provider specialty and time of patient arrival were incorporated into a logistic regression model to identify significant variables. Hosmer-Lemeshow was used to measure goodness-of-fit and predictive power. Cost was calculated using published estimates.

Results: 5,607 cases were examined and 88% were delayed. Surgeons (21%), anesthesiologists (6.17%), patients (5.42%), staff (3.60%), facility (2.10%) and other (2.35%) were identified as causes. Mean time for patient arrival to surgery was 104.57 min. Mean time between arrival and

room placement was 127.38 min. The average delay time from scheduled surgery start was 24.26 min. Logistic regression identified hospital facility ($P<0.0001$), surgical specialty ($P<0.0001$), patient age ($P=0.0004$) and late patient arrival ($P=0.0005$) as significant predictors of delay. Operating room delays were responsible for \$444,074 in lost revenue.

Conclusion: In our study, 88% of first start cases were delayed, the majority of which were caused by the surgeon. However, hospital facility, surgical subspecialty, patient age and arrival time also significantly affected delays. Correction of operating room delays can significantly reduce hospital costs.

THIRD PLACE ORAL PRESENTATION

Assessing the Effectiveness of Implementation of Unified Workflow in Improvement of Medication Reconciliation for Aurora St. Luke's Family Medicine Residency Outpatients

Katherine Meyers, Jessica Konarske, Jessica J.F. Kram, Dennis J. Baumgardner

Department of Family Medicine, Aurora UW Medical Group, Aurora Health Care; Center for Urban Population Health

Background: Medication errors are the most common errors occurring in hospitals. Preventable adverse drug events are linked with 1 in 5 injuries or deaths; 23% of medication errors in primary care occur due to inaccuracies in the medication list. Quality improvement projects designed to improve accuracy of outpatient medication reconciliations may decrease the number of medication errors and increase patient safety by preventing adverse drug events.

Purpose: To determine whether a unified workflow for medication reconciliation improves the accuracy of ambulatory, electronic medical record (EMR)-based patient medication records.

Methods: Retrospective study of random sample of patients from Aurora Family Medicine Residency Clinics before (prior to March 31, 2014) and after (December 10, 2014) improvements to the medication reconciliation process ($n=80$ and $n=77$, respectively). Aurora pharmacy medication lists were obtained and compared to that of the EMR. To preserve patient and caregiver confidentiality, charts were assigned arbitrary identifiers. Two-sample t-tests were used to compare pre- and post-medication reconciliation. An additional patient chart audit on pre- ($n=51$) and post- ($n=45$) workflow implementation to assess utilization of workflow was conducted; Fisher's exact tests were used to gauge changes ($P<0.05$).

Results: When comparing pre- and post-medication reconciliation implementation, there was a significant decrease in the number of EMR medications not on the pharmacy list (mean 0.475 vs. 0.208; $P=0.022$). Number of providers reviewing the EMR medication record improved significantly by 30.4% ($P=0.045$). A downward trend in the number of

unintentional medication duplicates also was observed by a 13.3% decrease ($P=0.07$).

Conclusion: Implementation of systematic workflow and care team education led to overall improvement in accuracy of EMR medication reconciliation. This quality improvement project led to identification of multiple barriers to accuracy. Future areas of focus would include continued education around current workflow and additional attention to medication compliance via out-of-date prescriptions.

FIRST PLACE POSTER (tie)

Using an Automated Model to Identify Older Patients at Risk for 30-Day Hospital Readmission and 30-Day Mortality

Ariba Khan, Mary L. Hook, Maharaj Singh, Marsha Vollbrecht, Aaron Malsch, Michael L. Malone

Department of Geriatrics, Aurora UW Medical Group; Knowledge-Based Nursing Department, Aurora Health Care; Aurora Research Institute, Aurora Health Care; Senior Services, Aurora Health Care

Background: A real-time electronic health record (EHR) predictive model that identifies older patients at risk for readmission and mortality may assist the health care team in improved patient care.

Purpose: This study was performed to generate an automated 30-day readmission and 30-day mortality risk model using data from the EHR in hospitalized older adults.

Methods: This was a retrospective cohort study. Included were patients age 65 years and older admitted to the hospital from July 2012 to December 2013. An automated predictive model was derived from variables collected from the EHR including socioeconomic factors, medical diagnoses and health care utilization. The study sample was randomly divided into derivation (70%) and validation (30%) cohorts. Multiple logistic regression analysis was performed to derive a prediction model. A scoring system was developed for estimating risk of 30-day readmission.

Results: The study included 11,223 patients in one hospital, of which 46% were male, 20% were age > 85 years, 6.2% were black, 60% required emergency admission, 2.8% required an ICU stay and 62.7% were discharged home. Overall 30-day readmission and mortality rates were 13.7% and 1.5%. The risk model predicted 30-day readmission, with c-statistics of 0.62 (95% confidence interval [CI]: 0.61–0.64) and 0.62 (95% CI: 0.60–0.65) in the derivation and validation cohorts, respectively. A readmit risk score was developed that ranged from 0 to 20. The readmission rate increased as the score increased: score 0–4, readmission rate=8.38%; score 5–9, readmission rate=13%; and score >10 , readmission rate 20% ($P<0.0001$) in the derivation cohort. Results were similar for validation cohort. The risk model predicted 30-day all-cause mortality with c-statistics of 0.81 (95% CI: 0.77–0.86) and 0.73 (95% CI: 0.66–0.81) in the derivation and validation cohorts. The variables associated with mortality included discharge to nursing home, urgent admission status, social

worker consultation and diagnoses of respiratory issues and dementia.

Conclusion: A promising automated model generated by EHR data to predict 30-day readmissions and mortality among hospitalized older adults, these findings will be used by the health care system to incorporate a real-time alert into physician workflow. Efforts to improve care will include interventions targeted at the highest-risk group.

FIRST PLACE POSTER (tie)

See page 217 for citation.

SECOND PLACE POSTER

See page 217 for citation.

THIRD PLACE POSTER

Echocardiographic Predictors of Admission Among Patients With Heart Failure With Reduced Ejection Fraction

Chi C. Cho, Yang Shi, Robyn Shearer, Nasir Z. Sulemanjee, Dianne L. Zwicke, T. Edward Hastings, Omar M. Cheema, Vinay Thohan

Aurora Research Institute, Aurora Health Care; Aurora Cardiovascular Services, Aurora Health Care

Background: Congestive heart failure afflicts 5.7 million people in the United States with annual incidence of 600,000 and mortality of 280,000. Heart failure accounts for greater than 1 million hospitalizations annually and the single largest inpatient Medicare expense. As the U.S. population ages and greater emphasis is placed on population health as a means to bend projected health care expenditures, large health care organizations will need to develop algorithms to identify patients at high risk with heart failure and possibly preempt hospitalizations. Doppler echocardiography is routinely performed in clinical assessment of severe heart failure.

Purpose: We sought to determine echocardiographic parameters that predict 1-year cardiac events among ambulatory patients diagnosed with heart failure with reduced ejection fraction.

Methods: A retrospective single-institution investigation identified 485 patients aged < 75 years with left ventricular ejection fraction < 35%. Kaplan-Meier method was used to identify parameters that corresponded with primary endpoint of hospitalization, emergency room visit or death.

Results: High risk of primary endpoint could be segregated into four groups by presence of one or more of the following parameters (0, 1, 2, 3): mitral inflow E/A ratio > 1.5, mitral E-wave deceleration time < 160 ms or peak tricuspid regurgitant (TR) velocity > 3 m/s. Event-free survival was significantly lower in high-risk group compared to low-risk group (P=0.002). The 30-day hospitalization rates among those with all three factors compared to those without was 37.5% and 17.3%, P=0.018.

Conclusion: Presence of routine echocardiographic parameters, including E/A ratio > 1.5, E-wave deceleration time < 160 ms and TR velocity > 3 m/s, is associated with high cardiovascular event rates among nonhospitalized ambulatory patients with reduced ejection fraction heart failure.

RIESELBACH DISTINGUISHED PAPER #1

Cardiopulmonary Exercise Testing-Based Algorithm and Its Usefulness in Clinical Cardiology

Mirza Nubair Ahmad, Syed Hasan Yusuf, Rafath Ullah, Mary Ellis, Haroon Yousaf, Timothy E. Paterick, Khawaja Afzal Ammar

Aurora Cardiovascular Services, Aurora Health Care; Division of Pulmonary and Critical Care Medicine, Medical College of Wisconsin

Background: Only cardiopulmonary exercise (CPX) testing provides information on the ability of the cardiovascular system to meet the body's metabolic demands in terms of oxygen consumption (VO_2) and carbon dioxide production (VCO_2). However, CPX testing is underutilized by cardiologists due to complex diagnostic algorithms involving up to 30 variables as well as lack of validation studies. In addition, CPX also provides oxygen (O_2) pulse as a continuous measure of stroke volume, which is its superiority to other stress modalities in which systolic function is measured at peak stress and rest. In the literature, it has been recommended that a composite criterion (combining peak O_2 pulse with O_2 pulse curve pattern) should be used to assess the cardiac function. Furthermore, the operating test characteristics and optimal cutoff of O_2 pulse for distinguishing cardiac from noncardiac causes of exercise limitation also are unknown.

Purpose: We tested whether a 6-variable algorithm would discriminate cardiac from noncardiac causes of dyspnea when compared with comprehensive CPX testing to promote its use by cardiologists. We also tested several cutoff points along with the composite criterion against the clinical standard to define the optimal O_2 pulse cutoff point.

Methods: Consecutive patients (n=54) referred for dyspnea underwent CPX test consisting of pulmonary (VO_2 , VCO_2 , 22 additional variables and invasive measurement of lactate and blood gases at peak and baseline) and cardiac (exercise ECG, heart rate and blood pressure response) components as well as medical record evaluation. Patients were categorized as normal or abnormal by an experienced pulmonologist. Abnormal patients were further categorized according to cause of dyspnea (cardiac, pulmonary, deconditioning, poor effort and miscellaneous). Subsequently, the 6-variable algorithm was applied by a cardiologist blinded to all of the information from CPX tests, and the patients were categorized similarly. The 6 variables used were peak O_2 uptake, peak respiratory exchange ratio, O_2 pulse, heart rate reserve, breathing reserve ($1 - [\text{peak ventilation (VE)} / \text{maximal voluntary ventilation}]$) and ventilatory efficiency (VE/VCO_2). Seven O_2 pulse reference cutoff points

included nongender-based (<15 ml/beat), gender-based (<15 ml/beat for males and <10 ml/beat for females) and < 80% of O₂ pulse based on five different definitions of predicted VO₂ max. The optimal cutoff obtained was then used to create the composite criterion. For the purpose of evaluating this composite criterion, the study population was recategorized as: noncardiac group (n=18), normal patients according to the composite criterion; or cardiac group (n=13), abnormal patients according to the composite criterion. Patients who were normal by only one component of the composite criterion were categorized as borderline (n=23). Data were analyzed against the comprehensive CPX test by first excluding the borderline patients and then by including them with either the cardiac or noncardiac group.

Results: The 6-variable algorithm performed well against comprehensive CPX test in discriminating cardiac from noncardiac causes of dyspnea, with 94% sensitivity, 92% specificity, 84% positive predictive value (PPV), 97% negative predictive value (NPV) and 93% accuracy. The results remained consistent for gender and referral source. O₂ pulse, as defined by Wasserman, had the highest accuracy, specificity and PPV and therefore was used to define the composite criterion. The composite criterion had an accuracy of 87%, PPV of 77%, NPV of 94%, sensitivity of 91% and specificity of 85%, when borderline patients were excluded. Including borderline patients in the cardiac group (n=36) improved sensitivity (94%) and maintained NPV (94%) but greatly decreased specificity (46%), PPV (44%) and accuracy (61%), whereas including these patients in the noncardiac group (n=41) improved specificity (92%) and maintained similar PPV (77%) and accuracy (81%) but decreased sensitivity (59%) and NPV (83%).

Conclusion: This is the first study to validate a diagnostic algorithm for patients undergoing CPX testing as well as demonstrate that a simplified 6-variable algorithm applied by a cardiologist without prior CPX experience is quite accurate to evaluate the optimal O₂ pulse value at peak stress for discrimination of cardiac and noncardiac causes, and to provide the operating test characteristics for the common clinical practice of using composite criterion to diagnose cardiac versus noncardiac causes of dyspnea.

RIESELBACH DISTINGUISHED PAPERS #2–4

See page 217 for citations.

SELECT ABSTRACTS

Score Big for Decreasing Mortality: ICD Risk Score Model

Linda Francaviglia, Rachel Petersen, Maria Stone, M. Eyman Mortada

Departments of Cardiovascular Data Services and Quality Management, Aurora Cardiovascular Services, Aurora Health Care

Background: Aurora Health Care, a system of 14 acute care hospitals in eastern Wisconsin, has been a long-time

participant in the American College of Cardiology's National Cardiovascular Data Registries, submitting data to its ICD Registry™ since 2005. Our system's implantable cardioverter-defibrillator (ICD) procedure volume averages 930 cases annually. During 2012 we experienced an increase in in-hospital mortality/morbidity for ICD cases.

Purpose: A single-center study examining in-hospital mortality/morbidity post-ICD implant before and after changes in practice and patient selection.

Methods: ICD implants and generator changes discharged from January 1, 2009, to December 31, 2012, were included in developing a risk model predicting in-hospital mortality/morbidity. The risk score was shared with physicians for clinical input. A point system was developed, including those factors with highest risk. Using the defined factors, a risk score > 14 was used to indicate those at highest risk for morbidity/mortality. The risk score model was fit on the development group (2009–2012), and then re-run for the intervention cohort from January 1, 2013, to June 30, 2014. Logistic regression was used in the risk model development and validation. Continuous variables were compared using Student's t-test, and categorical variables were compared using chi-square test.

Results: From 2009 to 2012, 3,417 ICD implants and generator changes were performed and included in risk model development. Of those, 200 (5.9%) patients were indicated as high risk with a score > 14. From January 2013 to June 2014, 1,057 implants and generator changes were performed, with 41 (3.4%) patients indicated as high risk with a score > 14. In the development phase, mean age was 67 years and 70% of patients were male. Post-model development, mean age was 66 years with 72% male. For patients indicated as high risk, in-hospital mortality/morbidity dropped from 20 (10%) to 2 (4.9%), though the decrease was not statistically significant (P=0.39).

Conclusion: Awareness of high-risk patients and changes in patient selection can lead to improvement in in-hospital mortality/morbidity among those high-risk patients. Although the improvement was not statistically significant, this was most likely due to low volumes and we will continue to monitor outcomes among these patients.

Geographic Distribution of Infant Death During Birth Hospitalization and Maternal Group B *Streptococcus* Colonization: Eastern Wisconsin

Jessica J.F. Kram, Dennis J. Baumgardner, Kiley A. Bernhard, Melissa A. Lemke

Center for Urban Population Health; Department of Family Medicine, Aurora UW Medical Group; TRIUMPH, University of Wisconsin-Madison

Background: Neonatal death rate in the United States is 4/1,000 live births; infant death rate is 6/1,000. Group B *Streptococcus* (GBS) may be transmitted from a colonized mother (rates vary from 15% to 35%) to the newborn during a vaginal delivery, and may contribute to neonatal death.

Purpose: To explore the geographic distribution and associated risk factors for maternal GBS colonization and infant death prior to discharge in eastern Wisconsin births.

Methods: Retrospective study of institutional data from PeriData.net, a comprehensive birth registry, utilizing data from 2007 through 2013 at all Aurora medical centers. Categorical variables were analyzed with chi-square tests, and ordinal or continuous variables by Mann-Whitney or two-sample t-tests. Binary regression was used for multivariate modeling.

Results: Population demographics (N=99,305) were mean age 28 years, 59% married, 64% white, 42% government-insured, 39% nulliparous, mean prepregnancy body mass index (BMI) of 27, gestational age of 39 weeks, birth weight of 3,296 g and 26% C-section rate. The GBS colonization rate was 22.3%. Among ZIP codes with > 100 subjects, 8 ZIP codes had a GBS-positive rate > 30% (7 in Milwaukee, 1 in Kohler). GBS colonization was higher in blacks (34%) than whites (20%; $P<0.0001$), in unmarried women (26% vs. 20%; $P<0.0001$), with increasing BMI (mean BMI 27.3 if GBS-positive vs. 26.6; $P<0.0001$) and based on ZIP code group ($P<0.0001$); and was predictive of neonatal antibiotics for sepsis (26% if GBS-positive vs. 22%; $P<0.0001$). In multivariate analysis, unmarried status, higher BMI, race and ZIP code were predictive of GBS colonization. Rate of infant death during birth hospitalization was 0.57% ($n=558$) and varied by ZIP code group. GBS colonization was negatively associated with infant death (0.25% in GBS-positive vs. 0.66%; $P<0.0001$; $N=98,065$ with lethal anomalies and stillbirths excluded). This association remained when controlling for gestational age. In multivariate analysis, death rate was associated with one ZIP code group, no prenatal care, preterm labor, vaginal bleeding, hydramnios, oligohydramnios, lower gestational age and maternal GBS (negative predictor).

Conclusion: Geographic characteristics are associated with infant death during birth hospitalization and maternal GBS colonization. Demographic characteristics are only associated with maternal GBS colonization. It is unclear if maternal GBS colonization is “protective” against infant demise due to increased surveillance.

An Automated Model Using Electronic Health Record Data to Identify Delirium Among Hospitalized Older Adults: A Pilot Project

Ariba Khan, Maharaj Singh, Hina Singh, Ayesha Maria, Michelle Simpson

Department of Geriatrics, Aurora UW Medical Group and Aurora Sinai Medical Center; Aurora Research Institute, Aurora Health Care

Background: Delirium is a serious change in mental status with adverse outcomes, but remains underrecognized. The electronic health record (EHR) may assist in the identification of delirium.

Purpose: This study was performed to generate an

automated delirium identification model using data from the EHR among hospitalized older adults.

Methods: Inpatients 65 years and older were included in this cross-sectional study. The researchers used “confusion assessment method” as the gold standard to identify delirium. Four categories of variables were obtained from the EHR on the day of and the day prior to researcher assessment: 1) hypoactive delirium (any one of the following: nurse’s assessment of motor retardation or reduced level of consciousness or decline in activities of daily living [ADL] score); 2) hyperactive delirium (any one of the following: use of restraints or antipsychotic medications or nurse’s assessment noting a change in mental status or poor attention or motor agitation or poor thought process or anxiety); 3) patient factors (any one of the following: dementia, age, mean blood urea nitrogen and serum creatinine); and 4) health care-associated factors (any one of the following: urinary catheter, surgical procedure, brain imaging). Relationships were analyzed using chi-square or Fisher’s test as appropriate. Statistical significance was set at $P<0.05$.

Results: Ninety-two participants in three hospitals were included in the analysis. Of these, mean age was 77 ± 8.8 years and 54% were female, 70% had a Morse fall score > 45, and mean ADL score was 10 of 12. The prevalence of delirium was 17%. In the univariate analysis, variables associated with delirium included abnormal mental status (94% vs. 41%; $P<0.0001$); reduced level of consciousness (69% vs. 9%; $P<0.0001$), motor retardation (50% vs. 13%; $P<0.0007$), motor agitation (38% vs. 7%; $P=0.004$) abnormal attention (81% vs. 12%; $P<0.0001$), abnormal thought process (56% vs. 11%; $P<0.001$), dementia (31% vs. 11%; $P=0.03$), age (82 vs. 72 years; $P=0.02$), number of medications (10 vs. 12; $P=0.0313$), use of antipsychotic medication (31% vs. 7%; $P=0.004$), mean Braden score (15 vs. 18; $P=0.0038$) and Morse fall score > 45 (94% vs. 59%; $P=0.02$). In the multivariate analysis, factors associated with delirium included reduced level of consciousness and abnormal attention (area under curve 0.920).

Conclusion: This pilot study demonstrates that variables present in the EHR may be used to develop an automated model to identify delirium in hospitalized older adults. These findings need to be validated in a larger study and define if the model performs well in predicting clinical outcomes.

Prognostic Indices for Hospitalized Older Adults: A Meta-Analysis and Systematic Review

Ariba Khan, Ayesha Maria, James Hocker, Maharaj Singh, Michelle Simpson

Department of Geriatrics, Aurora UW Medical Group and Aurora Sinai Medical Center; Aurora Research Institute, Aurora Health Care

Background: A prognostication predictive model incorporated into the electronic health record (EHR) may be useful in assisting the health care team in accurately predicting mortality and may be used in appropriately

allocating palliative care services.

Purpose: To systematically review and summarize current medical literature regarding the factors predictive of mortality in an inpatient population above 65 years of age.

Methods: Nondisease-specific prognostication indices that predict 1-year mortality in an inpatient population of adults over age 65 were included. We excluded studies that estimated intensive care unit, disease-specific or in-hospital mortality. A MEDLINE, CINAHL, Ovid and Cochrane literature search of English-language articles that developed and/or validated a prognostication index to predict mortality was performed. Review of 3,600 citations revealed 53 articles that reported variables associated with mortality. Based on the inclusion criteria, 9 studies were included in the final analysis. Data was extracted from the 9 studies using the following parameters: adequate method of description of population, nonbiased selection of patients, low loss to follow-up, adequate prognostic factor measurements, adequate outcome measurements and methods of validation. We performed qualitative analysis on 5 studies and 4 studies were pooled for a quantitative meta-analysis.

Results: The 1-year mortality rate for the 21,338 patients included in all the studies was 31% (95% confidence interval [CI]: 31.3–32.6); mean age was 80.6 years. Factors significantly associated with mortality included male sex (odds ratio [OR]: 1.25, 95% CI: 1.09–1.42; $P<0.001$), congestive heart failure (OR: 0.41, 95% CI: 0.37–0.45; $P<0.001$), chronic obstructive pulmonary disease (OR: 3.2, 95% CI: 0.42–24.9; $P=0.26$), myocardial infarction (proportion 0.39; $P<0.001$), and cerebrovascular disease (proportion 0.38, 95% CI: 0.32–0.44; $P<0.001$).

Conclusion: One-year mortality for inpatients aged > 65 years was high and associated with male sex, chronic obstructive pulmonary disease and congestive heart failure. Generalization of these findings to all older adults should be made with caution because of insufficient published information. In the future, our results may be used to develop a prognostication tool that draws patient data in real time from the EHR to identify vulnerable older adults in the hospital with end-of-life needs.

Chronic Illness Management in Teams of Urban Multidisciplinary Scholars (CINTUMS) — Part II

John R. Brill, Diane Ames, Christine B. Groth, Helen Yu

Academic Affairs, Aurora UW Medical Group; Concordia University; Pharmacy, Aurora Health Care; University of Wisconsin School of Medicine and Public Health

Background: Diabetes is a major contributor to morbidity and mortality as well as the single most expensive health care condition in the world. Numerous interventions have attempted to improve control of this disorder and reduce its complications. Traditional care for diabetes centers on an individual clinician. More recently, recognition of the central role of the patient has come into vogue. Payors, including Medicare, now cover up to 13 hours of diabetes

self-management and education programs annually. Patient-centered medical home efforts add an aspect of inclusiveness, but retain a medical focus and are being increasingly advocated and trained. To date, no research has focused on the use of interprofessional learning teams simultaneously delivering care and learning to work together.

Purpose: This project contributes to the development and training of interprofessional learner teams to enhance patient care. Intended outcomes include learner attitude and behavior changes and improvement in diabetic patients' biomarkers, empowerment and satisfaction.

Methods: Teams of 6–9 learners from eight fields and three universities work with cohorts of 6–21 African-American diabetic patients. The project includes team training, implementation of a diabetes self-management education (DSME) program and weekly telephone coaching. Learners complete the Centers for Disease Control and Prevention's TeamSTEPPS teamwork attitude questionnaire pre- and postintervention. Patients are recruited from the Aurora Midtown Clinic, which serves a largely Medicare/Medicaid population in Milwaukee's central city. Registries are searched for patients who fall out of quality goals; they are recruited by team members, with a target of 25 to 30 willing patients to complete the five DSME sessions and 4-week phone coaching around SMART goals. Patient biomarker data is tabulated, and pre- and postintervention Diabetes Empowerment Scale completed.

Results: Three cohorts of 42 patients and 23 students have completed the program. Patients demonstrated high attendance rates, improved diabetes knowledge and self-management skills, and a trend in improvement in diabetes control compared to age/gender-matched controls. Students did not show a change in interprofessional attitude.

Conclusion: Challenges included coordinating schedules, demonstrating change of attitude in self-selected students, and discipline-specific supervision requirements. These programs demonstrated feasibility of concept for an interprofessional student-led DSME program to enhance patient care, with high student interest and engagement.

A Meta-Analysis of Incidence and Risk Factors of Trastuzumab-Induced Cardiotoxicity in Breast Cancer

Zeeshan Ali Jawa, Ruth M. Perez, Lydia Garlie, Maharaj Singh, Rubina Qamar, Bijoy K. Khandheria, Arshad Jahangir, Yang Shi

Internal Medicine, Medical College of Wisconsin; Aurora Research Institute, Aurora Health Care; University of Wisconsin-Madison; Medical Oncology, Aurora Health Care; Aurora Cardiovascular Services, Aurora Health Care; Sheikh Khalifa bin Hamad Al Thani Center for Integrative Research on Cardiovascular Aging, Aurora Health Care

Background: A monoclonal antibody, trastuzumab targets the human epidermal growth factor receptor 2 (HER2)

oncogene that is overexpressed in 25–30% of breast cancers. In combination with first-line therapy, trastuzumab resulted in significant improvement in survival outcomes for those with HER2-positive metastatic breast cancer. Due to its improvement in outcome and prolonged survival, trastuzumab has been established as standard of care in both adjuvant and metastatic settings. However, along with common adverse events, trastuzumab has been found to be associated with cardiotoxicity. An estimated 1–4% of patients treated with trastuzumab will develop heart failure and ~10% of patients will experience a reduction in left ventricular ejection fraction (LVEF). Many studies have published on the risk factors of trastuzumab-induced cardiotoxicity (TIC), with some discrepancy. Whereas one study found that of all risk factors accounted for (age, hypertension, LVEF, radiotherapy) only age was significantly associated with TIC, another found that LVEF was the sole factor, and others found that a combination of these were indicative of TIC.

Purpose: This paper aims to consolidate the data and identify potential risk factors from combined data.

Methods: A computer-based literature search using MEDLINE database was executed using the keywords trastuzumab/Herceptin, risk factors, outcomes, cardiac, cardiotoxicity, cardiomyopathy, LVEF and chemotherapy. Only prospective/retrospective human studies were included, with additional studies excluded if they reported a baseline LVEF > 68, a cohort < 50 patients, and/or results were not stratified based on cardiotoxic events.

Results: Data was collected from 17 articles, capturing 6,527 patients. A familial history of cardiac disease (odds ratio [OR]: 3.31, 95% confidence interval [CI]: 1.80–6.08; $P < 0.01$), diagnoses of hypertension (OR: 1.61, 95% CI: 1.14–2.26; $P < 0.01$), diabetes (OR: 1.62, 95% CI: 1.1–2.38; $P = 0.014$), and previous anthracycline use (OR: 2.14, 95% CI: 1.17–3.92; $P = 0.013$) were all shown to be associated with TIC. Age ($P = 0.013$) also was a risk factor.

Conclusion: Additional measures need to be set in place for monitoring cardiac performance in women treated with trastuzumab. Being aware of the potential risk factors along with careful attention to symptoms/LVEF can hopefully minimize the occurrence of TIC in this population.

Delirium Recognition in Hospitalized Older Patients: A Quality Improvement Project

Jodi Punke, Ariba Khan, Michael L. Malone

Department of Geriatrics, Aurora Sinai Medical Center and Aurora UW Medical Group

Background: We noted a low reported prevalence of delirium (3%) in hospitalized older patients at a community teaching hospital in north central Wisconsin.

Purpose: This was a quality improvement project to report recognition of delirium by nurses before and after an educational intervention.

Methods: This project was performed on one medical unit in our hospital. Quality improvement data was collected at

baseline and after the educational intervention. Data collected included observation by a geriatrician attending weekly interdisciplinary rounds to note any mention by nurses of delirium or confusion. The patient's electronic health record (EHR) was reviewed to note delirium assessment by "confusion assessment method for the intensive care unit (Vanderbilt)" (CAM-ICU) by the nurses for 2 days prior to the team meeting. The numbers of positive and total attempted CAM-ICU were recorded. Use of antipsychotics or benzodiazepines was reported as a "delirium marker." Diagnosis of delirium and dementia was obtained from the problem list in the EHR. The educational intervention included Just-in-Time Teaching during weekly Acute Care for Elders rounds during a 1-month period.

Results: In month 1, before intervention, CAM-ICU was performed 140 times in 2 days on 32 patients with an average CAM-ICU performed 2.2 times per patient/day. There were 3 concerning quotes for confusion during team rounds and 0 for delirium by nurses during team rounds. EHR review noted 7 patients had dementia, 2 had a positive CAM-ICU and 3 had a diagnosis of delirium. In month 2, after intervention, CAM-ICU was performed 163 times in 2 days on 35 patients with an average CAM-ICU performed 2.35 times per patient/day. There were 6 concerning quotes regarding confusion and 1 regarding delirium by nurses during team rounds. EHR review noted 1 patient had dementia, 0 had a positive CAM-ICU and 0 patients with delirium diagnosis.

Conclusion: This quality improvement project using Just-in-Time Teaching by a geriatrician during weekly rounds resulted in a modest increase in number of times CAM-ICU was performed, increased discussion of delirium during rounds, but no increase in delirium recognition using CAM-ICU. Areas for improvement include involving more physicians and nursing staff along with more structured delirium education.

Stent Thrombosis: Regional Prevalence, Risk Factors, and Outcomes

Andrew M. Ayers, Chi C. Cho, Robyn Shearer, M. Fuad Jan, Anjan Gupta

Aurora Cardiovascular Services, Aurora Health Care; Aurora Research Institute, Aurora Health Care

Background: Stent thrombosis is an infrequent but catastrophic complication of percutaneous coronary intervention (PCI). Many studies usually involve few stent thrombosis patients, generally less than 60, given its prevalence. While dual antiplatelet therapy has decreased stent thrombosis significantly in the general population, there are still patients who present with occurrence and recurrence of stent thrombosis.

Purpose: We sought to define the prevalence of site-specific stent thrombosis in a larger cohort of patients by specific coronary territories and determine if this had an effect on cardiovascular outcomes. In addition we sought to elucidate the role of previous coronary artery bypass grafting (CABG)

and subsequent PCI to determine if there is increased risk of stent thrombosis in specific post-CABG coronary artery territories and if these altered overall cardiovascular outcomes.

Methods: A retrospective review of our database on all patients presenting with stent thrombosis over the last 5 years was performed. Patients were included based on the accepted Academic Research Consortium definition of stent thrombosis.

Results: From January 2009 to February 2014, 220 patients were found to have had a stent thrombosis. Of these, 110 (50.0%) had left anterior descending (LAD) artery lesions, 82 (37.3%) had right coronary artery (RCA) lesions and 26 (11.8%) had a stent thrombosis in the left circumflex artery (LCx). Prevalences of traditional risk factors were essentially equivalent regardless of which coronary artery developed stent thrombosis. All patients were on dual antiplatelet prior to developing stent thrombosis. Further analysis revealed 38 (17.3%) had a prior history of CABG. A significant difference among the location of stent thrombosis and the history of CABG ($P=0.043$) was seen; 30.8% ($n=8$) of patients with LCx stent thrombosis had prior CABG compared to 10.9% ($n=12$) and 22% ($n=18$) with LAD and RCA stent thrombosis, respectively.

Conclusion: In a large cohort of patients with stent thrombosis, LAD and RCA lesions were predominant, with LAD lesions representing half of all stent thromboses. PCI of these coronary territories thus infers a higher risk of stent thrombosis even in the presence of optimal medical therapy. Once stent thrombosis occurs, no significant difference in outcomes is seen based on location of the lesion alone. Additionally, patients who had prior CABG were significantly more likely to have stent thrombosis in the LCx and less likely in the LAD. This could be due to the fact that the left internal mammary artery graft is more often patent than vein grafts, which are more often anastomosed to the LCx and RCA and are at higher risk of needing stent placement after CABG.

In Vitro Growth Suppression of Renal Carcinoma Cells by Curcumin

Santhi D. Konduri, Madhavi Latha Yadav Bangaru, Phu Thanh Do, Shenglin Chen, Jeffrey Woodliff, Sanjay Kansra

Aurora Research Institute, Aurora Health Care; Medical College of Wisconsin

Background: Malignant clear cell renal carcinoma (ccRCC) is an aggressive tumor that is highly resistant to chemotherapy and radiation. Current therapeutic approaches to management of ccRCC have not significantly improved patient survival, therefore novel therapies are needed. The von Hippel-Lindau tumor suppressor gene is frequently mutated in ccRCC resulting in unregulated transcriptional activity of hypoxia-inducible factors (HIF) 1 α and 2 α . HIF-mediated transcription leads to increased growth factor

expression and growth factor receptor (GFR)-mediated signaling. NF κ B and STAT3 are phosphorylated in response to GFR activation and modulate gene expression, which promotes cell growth and invasion. Activated NF κ B and STAT3 expression is associated with ccRCC pathogenesis.

Purpose: The dietary polyphenol curcumin is a well-documented antitumor agent and a known inhibitor of NF κ B and STAT3 activation. Given the lack of effective therapies that block ccRCC progression, our objective was to examine whether curcumin could suppress the growth and migration of ccRCC cells, and whether this suppression was mediated via inhibition of NF κ B and STAT3 activity.

Methods: Human ccRCC cell lines (769-p, 786-o, Caki-1, ACHN and A-498 cells) were exposed to curcumin to assess the impact of curcumin on ccRCC cell viability. To examine the mechanism by which curcumin induced cell death, we used 769-p cells, a highly aggressive human ccRCC cell line that does not express functional von Hippel-Lindau protein. The impact of curcumin on the phosphorylation status and transcriptional activity of NF κ B and STAT3, in 769-p cells, was determined.

Results: Our results show that in ccRCC cells curcumin decreased cell proliferation and cell viability, abolished clonogenic property, induced apoptosis and blocked cellular migration. The growth suppressive and proapoptotic effects of curcumin were accompanied by decreased phosphorylation and transcriptional activity of NF κ B and STAT3.

Conclusion: The ability of curcumin to induce apoptosis and inhibit migration of ccRCC cells justifies additional studies that explore the potential of developing curcumin or other NF κ B and STAT3 inhibitors as novel therapeutic agents in the management of ccRCC.

Triple Aim for Clinical Teachers (TACT): Faculty Physician Perceptions on Their Ability to Balance Clinical Quality, Trainee Learning, and Teaching Efficiency

Minuja Muralidharan, Anne Getzin, Kjersti E. Knox, Bonnie L. Bobot, Marie M. Forgie, Nicole P. Salvo, Deborah Simpson

Departments of Internal Medicine, Family Medicine, Obstetrics and Gynecology, and Academic Affairs, Aurora UW Medical Group

Background: A common challenge facing teaching physicians is balancing high-quality student and resident teaching with efficient, high-quality care and patient service. Publicly accessible clinic performance reports increasingly affect where patients seek care and demand that teaching clinics rise to consumer expectations while training future physicians to function in the modern health care workplace. Limited information is available to guide physicians to achieve the triple aim for clinical teachers (TACT): clinical quality/patient experience, trainee learning, and teaching efficiency.

Purpose: To understand clinical teachers' TACT-related

experiences, perceptions and preferences for how to learn TACT-associated skill sets to improve their competence as teachers.

Methods: A 7-question needs assessment survey was distributed to teaching faculty members in family medicine, internal medicine and ob/gyn in a health care system. Ranking, rating and free-response item formats were used to determine teachers' prioritization of care management and patient satisfaction metrics within medical education and their perceived skills and limitations in incorporating these factors into medical education. Data was analyzed using descriptive statistics and narrative comments using qualitative thematic analysis. This project was deemed "not human subjects research" by Aurora Health Care.

Results: A 78% response rate was obtained (32/41). Respondents' top 3 teaching priorities were "Meeting specific clerkship objectives/residency milestones," "Impact on your time/teaching efficiency" and "Service quality priorities for the clinic." Respondents ranked learner's evaluation of teaching among their lowest priorities. 63% of respondents reported that they involve learners in improvement efforts (quality, safety, patient experience). Respondents identified a variety of strategies for involving learners in improvement efforts (medical students initiate patient callback, follow up on lab tests, check/address health maintenance items; residents identify a care management target), although time was consistently identified as a barrier to learner involvement.

Conclusion: Survey results confirmed that clinical teachers place value on integrating efforts to enhance clinical quality/patient experience as they teach yet face challenges to TACT goal attainment. Findings will inform description of successful TACT strategies, assessment of their effectiveness and faculty development initiatives.

Reducing Readmission Rates in Acute Pancreatitis Through Patient Education and Risk Assessment

Jordan T. Vulcano

Department of Internal Medicine, Aurora Sinai Medical Center

Background: Early hospital readmissions are a direct burden on both our patients' well-being and health care system as a whole. Acute pancreatitis is a top offender, with countless 30-day readmissions. Studies have showed a consistently higher than average 30-day readmission rates in acute pancreatitis, around 19%. This is significantly higher than the average all-cause readmission rate at Aurora Health Care hospitals. This quality improvement project aimed to reduce the rate of acute pancreatitis 30-day readmission rates at several Aurora hospitals through patient education and a readmission risk assessment tool.

Purpose: To clarify some of the risk factors associated with acute pancreatitis readmissions and reduce 30-day acute pancreatitis readmission rates through patient education and risk assessment to facilitate a safe discharge.

Methods: Project was conducted out of Aurora's Sinai, St. Luke's and West Allis Medical Centers with a total of 18 patients with acute pancreatitis admitted predominantly to the internal medicine teaching service between February 2014 and October 2014. Patients were seen within 1–2 days of admission and provided one-on-one education with a handout on acute pancreatitis. In addition, a 30-day pancreatitis readmission predictor (PRP) score was used to classify patient as low (5%), moderate (17%) or high (68%) risk for readmission via Epic health record's "Dot Phrase." Subsequent readmissions, 14-day follow-up, total hospitalizations and emergency department visits were tracked through present. This was compared to readmission rates of a randomly selected control group of 18 patients admitted with acute pancreatitis.

Results: Patients had PRP scores ranging from 0 to 4, with an average of 1 (rounded from 0.78). Of the 18 patients in the study group, only 2 were readmitted within 30 days for pancreatitis, or 11.1%. The control group had 3 (16.7%) readmissions within 30 days. Patients with alcohol-related pancreatitis were more likely to have a higher PRP (1.0) and readmission rate (20%, 2/10).

Conclusion: A diagnosis of acute pancreatitis places the patient at a significantly higher than average risk of readmission. This project was able to reduce readmission rates from 16.7% to 11.1% by simple patient education and readmission risk assessment. Readmissions are detrimental to both the patient and health care system. This project serves as a starting point for reducing readmissions not only in acute pancreatitis patients but potentially other diagnosis-specific readmission initiatives.

Tertiary Center Experience of Catheter-Directed Thrombolysis for Immediately Threatened Acute Lower Limb Ischemia of Native Vessels and Bypass Graft Thrombosis

Hani Hashim, M. Fuad Jan, Maharaj Singh, Suhail Allaqaband, Tanvir Bajwa, Anjan Gupta

Aurora Cardiovascular Services, Aurora Health Care; Aurora Research Institute, Aurora Health Care

Background: Catheter-directed thrombolysis (CDT) is an effective therapy and a class I indication for patients with acute limb ischemia (ALI, Rutherford categories I and IIa) of less than 14 days duration, and class IIb indication for ALI (Rutherford category IIb) with symptoms more than 14 days duration. However, there is no consensus on the initial management option for ALI (Rutherford category IIb) with symptoms less than 14 days duration.

Purpose: To evaluate the safety, efficacy and outcome of CDT, with or without bailout Angiojet mechanical thrombectomy, in patients with immediately threatened acute lower extremity ischemia (Rutherford category IIb) as a minimally invasive alternative to emergent surgical revascularization.

Methods: We retrospectively reviewed data on 69

consecutive patients (mean age 67 ± 14.15 years, 50.72% women) with ALI (Rutherford category IIb) who underwent CDT only (57.9%) or CDT plus bailout Angiojet mechanical thrombectomy (36.78%) at Aurora St. Luke's Medical Center from January 2004 to October 2014. Data were collected from electronic medical records, procedures reports, laboratory data and billing codes. Continuous variables were expressed as means \pm standard deviation and range; categorical variables were expressed as frequency count and percentage.

Results: Sites of target vessel for CDT were native vessel arterial thrombosis (68.11%) and vascular bypass graft thrombosis (27.5%). Reestablishment of blood flow and clinical success was achieved in 75.4% of patients, while limb salvage at 30 days was achieved in 87.1%. Amputation at 30 days occurred in 12.9%. Surgical embolectomy was required in 15.9%, and lower extremity bypass surgery was required in 8.7%. Time to lysis was 26.12 ± 18.6 hours. Bleeding complications that required blood transfusion occurred in 21% and hemorrhagic stroke in 1.44%.

Conclusion: Catheter-directed thrombolysis for acute limb ischemia with symptoms less than 14 days (Rutherford category IIb) in native artery or bypass graft thrombosis has high immediate clinical success rate and very high limb salvage rate at 30 days. CDT is a reasonable minimally invasive alternative option to emergent surgical revascularization.

PRACTC: Practice Readiness Academic Clinical Training Collaborative — Gap Analysis to Advance Clinical Training for Nurse Practitioner Students

Jennifer Hartlaub, Mary Ann Muzi, M. Jamie Cairo, John R. Brill, James Weese, Kristin Rivera, Susan Hafemann, Ann M. Rohrer, Julia Schumacher, Terri L. Vandenhouten

Departments of Family Medicine and Academic Affairs, Aurora UW Medical Group; Departments of Oncology and Medical Education, Aurora Health Care

Background: Multiple factors have created a perfect storm of health care provider shortages in the United States. Advanced practice registered nurses (APRNs), long established as high-quality, cost-effective health care providers, are meeting health care needs across the nation in a variety of settings, and in Wisconsin will be needed to augment the primary care workforce. With 5.7% of its registered nurses credentialed as APRNs, Wisconsin lags behind the national average of 8.7%. However, current capacity to educate this workforce is strained, requiring innovative data-driven clinical education models.

Purpose: To identify gaps in the current clinical educational framework for nurse practitioner (NP) students within the integrated health system.

Methods: Multiple data sources were used including NP core learning goals achievement, current continuum education/training experience models, health care system

stakeholders' perspectives, and advanced practice provider hiring targets for 2015. NP-partnering universities' curricula and experiences of placing students within the integrated health system were reviewed. Analysis was conducted by an interprofessional team to identify gaps.

Results: Four gaps were identified: 1) structured learning and assessments focused on value-based care models (e.g. population, chronic disease) and tracking competency-based milestone achievement; 2) streamlined NP student placement system and onboarding through centralized one-stop infrastructure; 3) interdisciplinary education to emulate the workplace in which practice-ready graduates will be placed; and 4) number of preceptors with skills and knowledge regarding NP educational curriculum and competencies.

Conclusion: Systematic gap analysis will guide NP student placement and education at large Midwestern integrated health system. A structured clinical academic partnership with local university NP programs (PRACTC) that addresses preclinical preparedness, a structured student placement process, coordinated clinical experiences, preceptor development strategies and a diversity strategy provides a mechanism for accomplishing these goals.

β -Thujaplicin: A Soil Antifungal

Dennis J. Baumgardner

Department of Family Medicine, Aurora UW Medical Group; Center for Urban Population Health

Background: β -thujaplicin (β -Th), also known as hinokitiol, naturally occurs in cedar mulch, is found in personal care products and has in vitro antitumor activities. It is antibacterial and antifungal, but has not been tested on soil. *Scedosporium apiospermum* (Sce) is an emerging "extremophile" fungal pathogen found in built outdoor environments.

Purpose: Pilot β -Th as "natural" soil antimicrobial or for isolation of extremophiles, and to explore β -Th resistance as selective advantage to Sce in mulched landscape.

Methods: A variety of outdoor and indoor environments were used for 2 sets of 24 paired soil samples. Soil/H₂O slurry (0.1 ml) was spread on Sabouraud dextrose agar with titrated β -Th levels of 0, 25, 250 and 500 mg/L at 20° C. Fungal and bacterial growth was semiquantitated with 4-point Likert scale. Wilcoxon signed rank test was used for comparison. A local soil Sce isolate was tested on each β -Th concentration.

Results: There was no significant inhibition of total bacterial growth at β -Th 250 mg/L (mean 1.7/4) or 500 mg/L (mean 1.7) compared to plain Sabouraud dextrose agar (mean 1.6). Purple bacteria seemed to be selected for by β -Th. Fungal inhibition was essentially complete, similar, and significantly different from no β -Th (mean 3.4/4) at levels of 250 (mean 0.1) and 500 mg/L (mean 0.0). There was no significant fungal inhibition at 25 mg/L (mean 3.2, second set samples). Similarly, Sce was completely inhibited at 250 and 500 mg/L, but not inhibited at 25 mg/L.

Conclusion: In vitro, β -thujaplicin profoundly, but

nonselectively, inhibits fungal growth in soil samples at moderately high levels. It does not appear likely that this *Scedosporium apiospermum* strain employs β -Th resistance for selective advantage in cedar mulched landscaping.

Mailed At-Home FIT Intervention to Increase Colorectal Screenings at Sixteenth Street Community Health Centers

Alexander V. Herrera, Brian Hilgeman, Michelle Buelow, Melissa A. Lemke

TRIUMPH Program, University of Wisconsin School of Medicine and Public Health; Internal Medicine and Family Medicine, Sixteenth Street Community Health Center

Background: Mailed at-home FIT intervention kits to increase colorectal cancer screenings at Sixteenth Street Community Health Centers (SSCHC).

Purpose: It is our goal to increase the current SSCHC colorectal cancer baseline screening rate of 23% to 50% within three years of full at-home FIT kit implementation.

Methods: Colon cancer is the second and third most common cause of cancer death in the United States in Hispanic men and women, respectively. Colonoscopy is the most common method of colon cancer screening, even among low-income patients. However, it has been shown in community health centers that mailed FIT kits are a more effective outreach method (40.7% completion) than colonoscopy outreach (24.6%) or usual care (12.1%). We hope to increase colorectal cancer screening in eligible patients at the SSCHC through mailed at-home FIT kits that have FIT materials, instructions and educational materials based on the Health Belief Model.

Results: A trial intervention will assess the potential for annual implementation with hopes of full implementation to all of SSCHC eligible patients in the future.

Conclusion: Application of culturally relevant interventions can be a practical and inexpensive method of increasing colorectal screening rates in community health centers with predominantly Hispanic populations.

Maternal Intuition of Fetal Gender

Michael P. McFadzen, David P. Dielentheis, Ronda Kasten

Department of Obstetrics, Aurora Sheboygan Clinic

Background: Many pregnant mothers feel they have a perception or intuition as to the gender of their unborn baby. There is very little published scientific literature regarding this topic. The study's goal is to determine accuracy of mothers' perceptions as to gender of their unborn babies. Many scientists believe a pregnant woman could not determine her baby's gender by intuition, with a 50% probability of correctly determining the gender. This study

should be considered fun science.

Purpose: To objectively measure a pregnant mother's perception as to the gender of her unborn baby and compare to sonographically proved gender. The study also will measure the percentage of pregnant patients who have this intuition.

Methods: All patients will be presenting for their second-trimester screening ultrasound in the Obstetrics Department of Aurora Sheboygan Clinic and must be 17–23 weeks pregnant. A medical sonographer will describe the ultrasound exam and obtain appropriate consent and medical history. The patient will be asked if they have perception as to the fetal gender; their answer will be logged. Patients with knowledge of fetal gender will be excluded from this study.

Results: Thus far, 128 patients have qualified for the study (with an expected cohort of 400). Approximately one-third of our patient population has “intuition” or “perception” on the gender of their baby. Of these, 47% correctly indicated fetal gender, 53% did not. Within this study, we've started categorizing patients who have a strong intuition of fetal gender. This cohort has correctly indicated gender with 90% accuracy; however, there are not enough participants for clinical relevancy at this point in the study.

Conclusion: Preliminary data indicates mom perception of fetal gender is 47% accurate.

Disease-Management in Family Medicine Clinics Through the Addition of a Health Coach: A Pilot Study

Crystal Y. Cichon, Jessica J.F. Kram, Tiffany A. Mullen, Pamela Voelkers, Kristin J. Magliocco, Kiley A. Bernhard, Dennis J. Baumgardner

Department of Family Medicine, Aurora Health Care; Center for Urban Population Health; Aurora Advanced Health Care; University of Wisconsin School of Medicine and Public Health; Aurora UW Medical Group

Background: In the United States, more than 80% of health care spending is focused on the management of chronic illnesses such as hypertension, diabetes and hyperlipidemia. Controlling these chronic diseases can lead to better health outcomes and decrease the number of preventable deaths. Patient self-management has shown to improve clinical outcomes. In a primary care setting, a multidisciplinary approach can more effectively educate patients on improving their health.

Purpose: To assess the impact of a health coach in a primary care setting as it relates to clinical outcomes.

Methods: Patients from two Aurora family medicine clinics were referred to a health coach by primary care providers. A total of 40 patients participated and paid out of pocket for the health coaching sessions (intervention). Patients had at least one scheduled session with the health coach that covered topics such as healthy eating, weight loss and exercise. Patient data, including glycohemoglobin, lipid panels and blood pressures, were reviewed pre- and postintervention.

Data were obtained 1 year before the intervention date and at least 3 months after. Paired t-tests were used for comparisons.

Results: The study population was predominantly Caucasian (90%) and female (90%) with a mean age of 54 years (range 25–79). The mean patient body mass index (kg/m²) was 37 and ranged from 28 to 63. When comparing pre- and postintervention clinical data, several improvements in laboratory values were noted. Low-density-lipoprotein cholesterol levels decreased from an initial mean of 114 preintervention to 105 postintervention, mean high-density-lipoprotein cholesterol levels increased from 47 to 58, and mean glycohemoglobin levels decreased from 6.5 to 6.1. All improvements in clinical data were not statistically significant, but were clinically relevant.

Conclusion: Patients showed mild improvements in multiple lab values after their first meeting with a health coach. This pilot study was limited by the small number of patients who chose to have a health coaching session. A limiting factor for patient use of a health coach may be secondary to the cost of each clinic visit and follow-up lab work. Cost may have contributed to our demographic mix. To further assess the impact and benefit of a health coach in a primary care setting, a larger, more diverse patient population is needed.

Real-World Relevance of Manual Electrocardiography QT Interval Measurement

Satish Velagapudi, Zahra Nur Khaled, Bilal Omery, Firas Zahwe, Michael Anigbogu, Sarah Zukkoor, Indrajit Choudhuri

Department of Cardiology, Aurora Health Care; Department of Pharmacy, Aurora St. Luke's Medical Center; Aurora Cardiovascular Services, Aurora Health Care

Background: Electrocardiography (ECG) QT interval (QTI) prolongation independently predicts sudden death. Hospitalized patients are commonly exposed to multiple QT-prolonging drugs, and manual measurement of ECG QTI based on identifying the intersection of isoelectricity with the tangent to the terminal phase T-wave slope (QTTTT) is advocated due to inaccuracies in automated detection algorithms that may imprecisely identify QT duration.

Purpose: We evaluated the performance of QTTTT compared to a standard automated (12SL, GE Healthcare) method (QT-12SL).

Methods: Consecutively obtained ECGs of 250 hospitalized patients were reviewed. The QTI in leads II, aVR, V5 and V6 determined by QT-12SL and QTTTT were compared. ECGs in which QT-12SL and QTTTT differed by > 10 ms were further characterized.

Results: The T-wave end was not reliably identified in 6 ECGs (2.4%). Of the remaining 244 ECGs (976 leads), QTTTT differed from QT-12SL by < 10 ms in 52 ECGs (21.3%). QT-12SL differed from QTTTT by > 10 ms in lead II in 140 leads (14.3%), V5 in 149 leads (15.3%), V6 in 152 leads (15.6%) and aVR in 143 leads (14.7%). ECGs with mutually

exclusive lead combinations in which QTTTT differed from QT-12SL by > 10 ms were: 1) II, aVR, V5, V6 (39.8%); 2) V5, V6 (7.8%); 3) II, aVR (4.9%); and 4) II, V5, V6 (3.7%). The expected overestimation of QTI by QT-12SL compared to QTTTT exceeded 10 ms in 105 leads (10.8%), related to T-waves with “normal” appearance, or biphasic (negative-to-positive) morphology; U-wave; and TP segment voltage exceeding PR segment voltage. Compared to QTTTT, QT-12SL underestimated QTI in 479 leads (49.1%), in association with biphasic T-waves (positive-to-negative); atrial arrhythmias; downsloping baseline near the T-wave end resulting in TP segment voltage less than PR segment voltage; and slow return of T-wave terminus to baseline.

Conclusion: Multiple clinical and electrical phenomena impacted automated QTI determination. QT-12SL and QTTTT were comparable across all analyzed leads in only 1/5 of ECGs. Compared to QTTTT, QT-12SL QTI determinations were discordant in 3/5 of all leads, and underestimated QTI nearly half the time. Perhaps most important, for a given ECG, manual review of any of the analyzed leads identified these differences 2/3 of the time.

Aligning Asthma Education Across the Continuum of Physician Education: Impact on Clinical Metrics

Lisa Sullivan Vedder, Deborah Simpson, Jacob L. Bidwell, John R. Brill, Theresa Frederick

Departments of Family Medicine and Academic Affairs, Aurora UW Medical Group; Office of Continuing and Professional Development, Aurora Health Care

Background: All trainees entering family medicine residency training programs after June 1, 2012, must complete the same American Board of Family Medicine (ABFM) Maintenance of Certification (MOC) requirements as practicing physicians. These shared requirements provide an opportunity to align physician education initiatives across the continuum focused around a clinical care topic to improve health care system metrics.

Purpose: To assess the initial effectiveness of an ABFM Asthma Part IV approved MOC module, aligned to meet residency and medical student program accreditation requirements, on health care system metrics.

Methods: An ABFM Asthma Part IV MOC module was implemented for family medicine physicians and residents in April 2014 with open, rolling enrollment for all providers. The module focused on a 20% asthma control test (ACT) improvement as ACT is a potential driver for appropriate use of asthma controller medications (ACM) in persistent asthma and completion of the asthma action plan (AAP). Students rotating on a required primary care clerkship received a 1-hour orientation to quality improvement principles and their role in assuring that an ACT had been completed on their patients. Care quality measures at baseline (January 2014) and 12 months later (December 2014) were compared: ACT use, AAP completion, and percentage of patients on

ACM for two targeted family medicine residency teaching clinics.

Results: Through February 2015, 29 providers systemwide completed the module with 212 in progress. Data from targeted clinics demonstrated system level increases in all metrics over project period, with average increases of 21% in ACT completion, 34% in use of AAP and 7% in ACM use. Participants' evaluations are strong: 80% of module completers rate MOC training as yielding a high return on their time investment; 100% of M3 students report completing an ACT test and an associated impact on their patient's care. Participant comments include: "... since completing this project I will strive to screen all my asthma patients at every visit ... [and] adjust their medications based on it. [It's] an extremely useful clinical tool"; and "I plan on trying to use [the] ACT with more appointments as a way to check up on asthma quickly. Score increased to 44% with minimal intervention."

Conclusion: Aligning physician education opportunities across the continuum with health care system metrics meets board (re)certification requirements, residency and medical student accreditation requirements and improves care for patients.

Incidence of Breast, Colorectal and Lung Cancers and Mortality Among Women Within Midwestern States

Ruth M. Perez, Matthew Rappel, Kathryn Kossow, Maharaj Singh

Aurora Research Institute, Aurora Health Care

Background: Breast, colorectal and lung cancers have been shown to be the most common cancers as well as the leading causes of cancer death among women. Previous studies suggest that the Northeast had significantly higher rates in incidence and mortality than the Midwest, South and Western regions. However, new data indicates that the Midwest now harbors the highest mortality rates. In Wisconsin, the sixth largest state in the Midwest, cancer is the leading cause of death. Differences in incidence and mortality of breast, colorectal and lung cancers have been observed between Wisconsin, other Midwestern states and national data, warranting further investigation.

Purpose: To examine the incidence and mortality of Wisconsin females across breast, colorectal and lung cancers compared to that of the national average along with the individual states that comprise the Midwest (ND, SD, NE, KS, MN, IA, MO, IL, IN, OH and MI).

Methods: Female incidence and mortality rates were retrieved from the Centers for Disease Control and Prevention (CDC) National Program of Cancer registries for the 2011 year, while census data was retrieved from the U.S. Census Bureau for the nation, region and individual states. Data was analyzed using two-sample z-test for proportions with significance set at $P < 0.05$.

Results: Compared to the national incidence of breast cancer

(122 per 100,000), Wisconsin women had a significantly higher incidence ($P < 0.05$). Within the Midwest, Wisconsin had a higher incidence than Indiana ($P < 0.0005$) as well as higher mortality than Nebraska ($P < 0.05$). However, Wisconsin had lower incidence of breast cancer than Minnesota and Ohio ($P < 0.01$) and lower mortality than Ohio ($P < 0.05$). Wisconsin had both lower incidence and mortality than Illinois, Indiana, Iowa and Nebraska ($P < 0.05$) for colorectal cancer. For lung cancer, Wisconsin had a higher incidence and mortality than Minnesota and Nebraska ($P < 0.005$) and lower incidence than Indiana, Michigan and Missouri ($P < 0.05$). No significant differences were noted between Wisconsin and other Midwestern states.

Conclusion: Though variations exist between Wisconsin and other Midwestern states in incidence and mortality, there are no consistent trends between these states and the three most common cancers. As a whole, however, the Midwest had statistically higher incidence and mortality rates than the nation. Further investigations into the regional differences between Wisconsin, the Midwest, and other states with similar demographic composition will be explored.

Fair Weight Loss After Gastric Rebanding for Slippage

Ahmed Dalmar, Maharaj Singh, Sara K. Roloff, Thomas Y. Chua

Aurora Research Institute, Aurora Health Care; Wisconsin Bariatrics

Background: Laparoscopic adjustable gastric banding (LAGB) is one of the most common bariatric surgery procedures performed in the United States. LAGB results in safe and satisfactory weight loss, but it is often complicated with slippage, a complication requiring rebanding (reoperation). There is a paucity of studies and no uniform consensus regarding weight loss after rebanding.

Purpose: This study assessed the effect of rebanding for slippage after LAGB on weight loss up to five years.

Methods: This is a historical cohort study of 865 patients who underwent LAGB from 2001 to 2011. Rebanding was performed in 103 (11.9%) patients. Primary outcome of interest was percent excess weight loss (% EWL), which was categorized as fair (>25 – 50%) and failure ($<25\%$ EWL) after rebanding. Of the 103 patients diagnosed with slippage, 23 were excluded from further analysis because either the band was removed ($n=15$), or they were rebanded twice due to recurrent slippage ($n=2$) or lack of enough data ($n=6$). Of the remaining 80, 76 patients were matched with 76 controls without slippage using propensity matching. Paired t-test was used to compare weights (initial, at reoperation, and 1, 2, 3, 4 and 5 years before and after rebanding). Chi-square test was used to compare EWL rate between groups. Multivariate logistic regression was performed to determine predictive probability for propensity matching of slippage.

Results: The majority of patients were female (82.9%). Mean age was 44.32 ± 11.3 years, mean preoperative body

mass index $48.62 \pm 8.0 \text{ kg/m}^2$ and mean preoperative excess weight $171.28 \pm 52.0 \text{ lbs}$. Median follow-up after LAGB was 63.63 months (range 0.0–162.4) for a total of 4,859 patient-years. During follow-up, 103 patients (11.9%) underwent reoperation for slippage at a median of 54.26 months (range 0.0–160.50) after LAGB. We found a significantly lower weight at rebanding, and at 1, 2, 3, 4 and 5 years after rebanding in patients with slippage compared to their initial weight, and their weight at 1, 2, 3, 4 and 5 years after LAGB. There was a significantly lower excess weight loss failure rate in patients with slippage compared to matching controls (40% vs. 60%, $P=0.0006$) after first year. There were no differences in EWL rate between the two groups after first year. In multivariate analysis only female gender was significantly associated with slippage.

Conclusion: Failure rate of excess weight loss after rebanding for slippage was lower or similar to the failure rate after initial laparoscopic adjustable gastric banding.

Feasibility of Atrial Delivery and Tracking of Stem Cells in a Porcine Model

Nina Garlie, Timothy Hacker, Eric G. Schmuck, Jill Koch, Jayant Khitha, Amish Raval, Indrajit Choudhuri

Regenerative Medicine Center, Aurora Research Institute, Aurora Health Care; Department of Medicine, University of Wisconsin School of Medicine and Public Health; Aurora Cardiovascular Services, Aurora Health Care

Background: Many patients undergoing open heart surgery have sinus node dysfunction and atrial fibrillation, leading to adverse outcomes. Mesenchymal stem cells (MSC) delivered at the time of surgery may have a reparative effect on atrial tissue, thereby improving sinus node function and reducing or preventing atrial fibrillation. Stem cell delivery to the atrium is entirely unstudied. This is a significant gap in medical research, as atrial disease contributes significantly to health care costs.

Purpose: The purpose of this pilot study is to establish a technique to deliver MSC to the atria through an open-chest model, to assess the safety of this technique, and to evaluate the acute retention of the delivered cells.

Methods: All in vivo animal experimentation was approved by the University of Wisconsin Animal Care and Use Committee and took place in the Cardiovascular Physiology Core Facility at UW-Madison. MSC ($3\text{--}5 \times 10^6$ in $50 \mu\text{l}$ per site) were injected intramyocardially during an open-chest procedure in anesthetized pigs. To track the cells in vivo, MSC were labeled with ^{18}F FDG then visualized at 1 and 6 hours postinjection by PET/CT. Pigs were monitored for intraoperative arrhythmia, bleeding and hypotension.

Results: By gently repositioning the heart, both atria were accessible for the injections. The thickest part of each atrium was isolated and stabilized briefly for the injection using a hemostat. The injected cells were visible by PET/CT 1 and 6 hours postinjection. However, when the MSC were

labeled with $10\text{mCi } ^{18}\text{F}$ FDG, the signal was too high, causing a bloom around the areas of injection. So the dose was lowered to $5\text{mCi } ^{18}\text{F}$ FDG, which resulted in a clear signal at 1 hour in both atria. At 6 hours, the right atrial injection was still easy to read, but the left injection was difficult to resolve from background signal. All injections resulted in cell leakage from the injection site and uptake of the signal into the lungs. However, pulmonary function as measured by SpO_2 and EtCO_2 was unchanged. Intraoperative arrhythmias detected during the injections were caused by manipulation of the heart. No additional arrhythmias were detected. No bleeding or hypotension was observed as a result of the injections.

Conclusion: This pilot study demonstrated that atrial delivery of MSC is feasible and safe in an open-chest porcine model and that MSC are retained for at least 6 hours postinjection. Subsequent studies will determine the ability of MSC to downregulate inflammation, decrease scarring and prevent sinus node dysfunction.

Does the Expression of Ki-67, p16 and COX-2 at Initial Diagnosis of Breast Atypia or Usual Ductal Hyperplasia Predict a Second Clinically Significant Event?

Judy A. Tjoe, Philippe Gascard, Jianxin Zhao, Gary F. Neitzel, Maharaj Singh, Brittany Last, James Marx, Thea Tlsty, Sanjay Kansra

Surgical Breast Oncology, Aurora Health Care; Department of Pathology, University of California, San Francisco; ACL Laboratories, Department of Pathology, Aurora Health Care; Aurora Research Institute, Aurora Health Care

Background: Women diagnosed with atypical ductal hyperplasia (ADH) or atypical lobular hyperplasia (ALH) have a fivefold increased risk of developing breast cancer. Because ADH/ALH can be precursors or predictive markers of a subsequent clinically significant event (SCSE), i.e. atypia, in situ or invasive carcinoma, the clinical outcome for these patients ranges anywhere from remission to invasive malignancy. Currently we cannot predict which atypical breast lesion is likely to be associated with future cancer, resulting in aggressive management and, possibly, overtreatment. Kerlikowske et al. reported that a combination of three biomarkers (cell cycle regulator p16INK4a, proliferation antigen Ki-67 and stress response enzyme COX-2) predicted risk of progression for ~50% of women diagnosed with ductal carcinoma in situ and treated by lumpectomy alone.

Purpose: To evaluate whether expression levels of p16, Ki-67 and COX-2 predict risk of development of a SCSE in patients initially diagnosed with breast atypia (ADH or ALH) or usual ductal hyperplasia (UDH).

Methods: Patients with an initial diagnosis of pure ADH/ALH were identified by medical record review and the lesion confirmed by a single pathologist blinded

to original diagnosis. Twelve women who developed a SCSE (cases) were matched to 44 women who did not (controls) at least 5 years after initial diagnosis. Archived tissues were stained for p16INK4a, Ki67 and COX-2 using “multiplex immunohistochemistry,” enabling simultaneous interrogation of expression levels of the three biomarkers in a single tissue section.

Results: Our multiplex analysis revealed that expression levels of Ki-67, p16INK4a or COX-2, either in epithelial cells within the lesion or in stromal cells adjacent to the lesion, either individually or in combination, do not predict the development of a SCSE in women initially diagnosed with ADH/ALH or UDH. However, this analysis identified double- or triple-positive cells in the vicinity of the lesions in some cases and controls.

Conclusion: Expression of Ki-67, p16INK4a and COX-2 is not predictive of a SCSE following initial diagnosis of ADH/ALH or UDH. Further analysis is needed on a larger cohort after longer follow-up after initial diagnosis to confirm our findings and to investigate whether the presence of double- or triple-positive cells (a signature predicted to correlate with poor outcome) is predictive of progression regardless of the expression status of the lesion.

The Effect of Percutaneous Closure of Large Atrial Septal Defects on Right Ventricular Function in Adults

Armaan Shaikh, Alejandro Lopez-Mas, Suhail Allaqaband, Bijoy K. Khandheria, Abraham Getenet, Matt M. Umland, Maharaj Singh, Tanvir Bajwa

Aurora Cardiovascular Services, Aurora Health Care; Department of Internal Medicine, Aurora Sinai Medical Center; Aurora Research Institute, Aurora Health Care

Background: Percutaneous closure of atrial septal defects has been shown to be a safe alternative to surgery. Despite this, past studies have largely been focused on either small- to medium-sized atrial septal defects or percutaneous closure in children and young adults.

Purpose: Our study sought to examine if right ventricular function and size improved after percutaneous closure of large atrial septal defects in the adult population.

Methods: Over a 5-year span, 25 patients underwent percutaneous closure of a secundum atrial septal defect with an occluder device. A retrospective examination was conducted for each patient, including both echocardiography and chart review for postdevice complications/symptoms.

Results: Average patient age was 44.4 years, and mean device size was 28 mm (range: 24–38 mm). Follow-up echocardiography (mean of 134 days) showed tricuspid annular plane systolic excursion was significantly improved (2.11 vs. 2.33; $P=0.013$). There also was a significant reduction in right ventricular diastolic chamber size (31.0 vs. 35.4; $P<0.01$). At 1-year postprocedure follow-up, zero patients had experienced transient ischemic attack, stroke or device perforation/embolization.

Conclusion: Percutaneous closure of large secundum atrial septal defects in adults improves right ventricular function as well as right ventricular chamber size. Percutaneous closure of large atrial septal defects also is a safe, very low-risk procedure in terms of future adverse neurologic, embolic or perforation-related events.

Coronary Aorta Systolic and Diastolic Pressure Indices: Two Novel Indicators for Predicting Significant Coronary Stenosis — A Validation Against Fractional Flow Reserve

Mirza Mujadil Ahmad, Khawaja Afzal Ammar, Mirza Nubair Ahmad, Arsalan Riaz, Fatima A. Husain, Syed Shahab Kazmi, Imran Husain, Anjan Gupta

Aurora Cardiovascular Services, Aurora Health Care

Background: Since most of the coronary flow occurs in diastole, either mean Pd/Pa or iFR has been used to measure the hemodynamic significance of a coronary stenosis. We have observed that a significant pressure gradient exists in coronary stenosis even in systole, which is contrary to general understanding but similar to ankle brachial index. Furthermore, prior studies have evaluated baseline Pd/Pa (mean coronary artery/mean aorta pressure) ratio as well as iFR (instantaneous wave-free ratio obtained during entire period of diastole) to predict fractional flow reserve ($\text{FFR} \leq 0.80$). We hypothesized a simple end-systolic and -diastolic pressure measurement in the coronary artery distal to stenosis may perform adequately to predict FFR, obviating a need to measure Pd/Pa or iFR.

Purpose: We sought to evaluate systolic and diastolic Pd/Pa, and termed them coronary artery systolic pressure index (CASPI) and coronary artery diastolic pressure index (CADPI), respectively, against $\text{FFR} \leq 0.80$.

Methods: After retrospectively identifying 555 moderate stenotic lesions undergoing FFR measurement at a tertiary care center over a 4-year period, we procured original pressure tracings obtained during the cardiac catheterization and manually measured systolic and diastolic pressures in the aorta and in the coronary artery distal to the stenosis, before and after adenosine infusion. Utilizing $\text{FFR} \leq 0.80$, operating test characteristics of CASPI and CADPI were measured and compared to those of baseline Pd/Pa.

Results: In the 555 lesions, mean CASPI (0.97 ± 0.04) and CADPI (0.95 ± 0.08) were similar to baseline Pd/Pa (0.95 ± 0.05). CASPI correlated well with baseline Pd/Pa (Spearman $r=0.81$; $P<0.0001$). Similarly, CADPI was strongly correlated with baseline Pd/Pa (0.86 ; $P<0.0001$). The area under the receiver operating curve (AUC) was lower for CASPI and CADPI, as compared to baseline Pd/Pa (0.80 vs. 0.82 vs. 0.89 , respectively), for predicting the $\text{FFR} \leq 0.80$. For a CASPI < 0.88 there were no false positives with 100% specificity, and for a CASPI > 1.02 , there were no false negatives with 100% sensitivity. Similarly, for a CADPI < 0.8 there were no false positives with 100% specificity, and for CADPI > 1.16 there were no false negatives with 100% sensitivity.

Conclusion: These data demonstrate that contrary to the popular belief, significant systolic and diastolic pressure gradients distal to coronary stenosis exist with a reasonable but lower predictive power towards FFR ≤ 0.80 .

Contemporary Usage of Intra-Arterial Catheter-Directed Thrombolytic (CDT) Power Pulse Spray With Rheolytic Thrombectomy in Failed CDT Alone for Acute Limb Ischemia

Hani Hashim, M. Fuad Jan, Maharaj Singh, Suhail Allaqaband, Tanvir Bajwa, Anjan Gupta

Aurora Cardiovascular Services, Aurora Health Care; Aurora Research Institute, Aurora Health Care

Background: Acute lower limb ischemia (ALI) caused by arterial embolism, thrombosis of native vessels, and/or grafts is a serious condition associated with substantial morbidity and mortality. Peripheral arterial thrombolysis utilizing catheter-directed thrombolytic (CDT) has become established as a useful option in the management of ALI. However, use and outcome of adjunctive power pulse spray with rheolytic thrombectomy (PPSRT) following unsuccessful CDT is underreported in the literature.

Purpose: To evaluate outcome of contemporary use of intra-arterial CDT PPSRT as an adjunct to unsuccessful standard CDT for ALI.

Methods: We reviewed 78 consecutive patients (mean age 69 ± 14.2 years, 48.8% female) who presented to Aurora St. Luke's Medical Center with less than 14 days of ALI from January 2004 to October 2014. All patients had percutaneous transluminal angioplasty procedures as a standard revascularization option for ALI. Data were collected from electronic medical records, and billing codes. Continuous variables were expressed as mean \pm standard deviation and range, and categorical variables as frequency count and percentage. Differences between the groups were analyzed with t-tests or analysis of variance and chi-square or Fisher's test.

Results: 48 patients (Group 1) underwent CDT alone with successful technical and clinical results, while 30 patients (Group 2) who had unsuccessful CDT results underwent adjunctive CDT with PPSRT. There was no statistical significance among both groups in regard to their baseline characteristics. In Group 1 and Group 2, respectively, limb salvage was 87.5% and 86.6% ($P=ns$), amputation at 30 days 13% and 16% ($P=ns$), embolectomy 16.67% and 20% ($P=ns$), emergent bypass graft 8.3% and 13.33% ($P=ns$), distal embolization 14.89% and 17.24% ($P=ns$), 30-day compartmental syndrome 12.5% and 13.79% ($P=ns$), death at 30 days 8.8% and 13.33% ($P=ns$), and bleeding requiring blood transfusion 16% and 14% ($P=ns$). Hemorrhagic stroke occurred in one patient of Group 1. Complete and partial analysis achieved in (Group 2) 73.4%, length of hospitalization was 10.6 ± 6.25 days ($P=ns$).

Conclusion: Adding intra-arterial CDT power pulse spray with rheolytic thrombectomy to unsuccessful standard CDT as an adjunctive procedure is a powerful revascularization

tool for lower extremity acute limb ischemia that achieves success in the vast majority of patients, is not associated with higher complications when compared to successful CDT alone, and obviates the need for emergent surgical revascularization.

Additional Presentations

The following citations reflect additional 2015 Aurora Scientific Day presentations, some of which have been published as abstracts or articles in scientific journals.

First Place Poster (tie): Ali Z, Greer DM, Shearer R, Alemu A, Jahangir A. Androgen suppression effects on heart failure and in patients with prostate cancer. *J Am Coll Cardiol.* 2015;65(10S):A887.

Second Place Poster: Muluneh A, Nfor T, Bajwa T, Biru NY, Parmar HS, Greer DM, Belete HM. Evaluating MACE associated with temporary discontinuation of antiplatelets for acute GI bleeding in patients with coronary stents. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.

Rieselbach Distinguished Paper #2: Forgie MM, Greer DM, Kram JJF, Bernhard KA, Salvo NP, Siddiqui DS. A randomized control trial of Foley catheter placement for induction of labor: stylette versus no stylette. Orally presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.

Rieselbach Distinguished Paper #3: Yousaf H, Ahmad MN, Ammar KA, Yusuf SH, Ellis MK. Operating test characteristics of respiratory exchange ratio as a noninvasive measure of anaerobic threshold. *Circulation.* 2013;128:A13761.

Rieselbach Distinguished Paper #4: Ali Z, Greer DM, Shearer R, Gardezi AS, Chandel A, Jahangir A. Effects of testosterone supplement therapy on cardiovascular outcomes in men with low testosterone. *J Am Coll Cardiol.* 2015;65(10S):A1346.

Shi Y, Cho C, Garlie L, Perez R, Shearer R, Sulemanjee N, Zwicke D, Hastings T, Cheema O, Thohan V. Echocardiographic markers of implantable cardioverter-defibrillator therapy. *J Am Coll Cardiol.* 2015;65(10S):A913.

Honoris L, DeFranco A, Port S, Cho C, Li D, Nasir K, Kronmal R, Barr RG, Budoff M. Correlation of coronary artery calcium scoring on ungated computed tomography compared to gated cardiac computed tomography scans from the multi-ethnic study of atherosclerosis. *J Am Coll Cardiol.* 2015;65(10S):A1063.

- Battiola T, Cosic M, Holmuhamedov A, Negmadjanov U, Holmuhamedov E, Jahangir A. Human cardiac fibroblasts motility is predominantly supported by ATP from anaerobic glycolysis. Orally presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Peterson L, Shafer M, Abugiazya A, Scoon C, Kramer D. Telemedicine improves hospital system compliance with lung-protective ventilation. *Crit Care Med.* 2014;42(12 Suppl 1):A1555.
- Andreeva A, Divan V, Maria A, Simpson M, Khan A, Malone ML. Increasing delirium awareness in caregivers of older hospitalized patients using an educational pamphlet: a quality improvement project. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Hook ML, Badger MK, Gentile DL, Giannini RC, Hoffmann ML, Ketchum BM, Martens M, Singh M. The impact of electronic Knowledge-Based Nursing content and decision-support on nursing knowledge and use of evidence-based practices. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Shanitkvitch Z, Amuzu B. Necessity of pathologic analysis after tubal ligation by resection. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Bauer LM. Program evaluation of the integrative health coaching initiative at the Aurora Walker's Point Community Clinic: elucidating barriers to engagement and optimal health. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Negmadjanov U, Godic Z, Mirza M, Emelyanova L, Rizvi F, Holmuhamedov E, Jahangir A. Transforming growth factor- β 1 increases resistance of fibroblasts to apoptotic cell death. *Circ Res.* 2014;115:A268.
- Pinninti M, Rivera C, Cho C, Thohan V, Hastings TE, Cheema O, Downey FX, Crouch J, Weiss E, Sulemanjee NZ. The effect of severity of renal dysfunction on clinical outcomes in patients with continuous-flow left ventricular assist device implantation. *J Heart Lung Transplant.* 2015;34(4 Suppl):S229.
- Kumaravel V, Mahmoud M, Klyve D, Hernandez LV, Guda NM. A prospective study on endoscopy for luminal abnormalities on imaging and its impact on clinical management. *Gastrointest Endosc.* 2015;81(5 Suppl):AB237-AB238.
- Getzin A, Bobot B, Simpson D. Fueling the fire, sustaining family physicians in urban underserved communities. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Fink JT, Havens KK, Schumacher JA, Walker RE, Morris GL 3rd, Nelson DA, Singh M, Cisler RA. Impact of the Heart WATCH program on patients at risk of developing metabolic syndrome, prediabetes or cardiovascular disease. *J Patient-Centered Res Rev.* 2015;2:56-63.
- Kazmi SS, Riaz A, Ahmad MN, Husain FA, Husain I, Yousaf H, Shah S, Ammar KA, Gupta A. A baseline Pd/Pa of ≤ 0.86 obviates the need for FFR measurement and adenosine infusion in intermediate coronary stenoses: a large tertiary care experience. *J Am Coll Cardiol.* 2015;65(10S):A1738.
- Riaz A, Ahmad MN, Husain F, Kazmi SS, Husain I, Yousaf H, Ammar KA, Gupta A. Prevalence of errors in fractional flow reserve measurement in a high volume tertiary care center. *J Am Coll Cardiol.* 2015;65(10S):A1879.
- Rizvi F, Siddiqui R, DeFranco A, Jayaprakash A, Mirza M, Emelyanova L, Ross G, Holmuhamedov E, O'Hair D, Tajik AJ, Jahangir A. Simvastatin inhibits TGF- β 1-induced proliferation and activation of cardiac fibroblasts through inhibition of SMAD pathway. *Circ Res.* 2014;115:A329.
- Cox Bauer C, Greer DM, Kram JJF, Kamelle SA. Tumor diameter as a predictor of lymphatic dissemination in endometrioid endometrial cancer. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Ross G, Holmuhamedov A, Cosic M, Rizvi F, Holmuhamedov E, Jahangir A. Pro-proliferative effect of nifedipine, a L-type Ca^{2+} channel blocker, in NIH-3T3 fibroblasts. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Aldag E, Farrell S, Pedersen R, Sahajpal A, Clendenon J, Gunabushanam V, Kramer D. Evaluation of the effects of N-acetylcysteine treatment in adult liver transplant recipients [abstract]. *Am J Transplant.* 2015;15(S3). Available online at <http://www.atcmeetingabstracts.com/abstract/evaluation-of-the-effects-of-n-acetylcysteine-treatment-in-adult-liver-transplant-recipients/>. Accessed May 4, 2015.
- Erickson L, Sra J, Krum D, Ahmad MN, Majid T, Choudhuri I, Rahman M, Djelmami-Hani M, Mortada ME, Kress D. A retrospective analysis of hybrid ablation in patients with long-standing persistent atrial fibrillation. Orally presented at Aurora Scientific Day, Milwaukee, WI, May 20, 2015.
- Klemm S, Cook M, Brummitt C, Ravenna V. Management of Staphylococcus aureus bacteremia through pharmacist prospective evaluation. *Crit Care Med.* 2014;42(12 Suppl 1):A1480.

© 2015 Aurora Health Care, Inc.