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Proceedings of 2014 Aurora Scientific Day

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The following select abstracts were presented at the Aurora Scientific Day research symposium, held May 21, 2014, at Aurora Health Care Conference Center in Milwaukee, WI.

Obesity Remains Underdiagnosed: Discordant Documentation of Obesity Body Mass Index and Obesity Diagnosis in Patients' Electronic Medical Record

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Background: Obesity remains a public health crisis in the United States with 64% of adults in the U.S. being overweight or obese with its corresponding economic impacts.

Purpose: This study examined concordance between obesity body mass index (BMI > 30) in the patient's electronic medical record (EMR) and a documented diagnosis of obesity in the EMR.

Methods: We conducted a retrospective record review of a large health care system EMR for the period of one year (2012). A total of 397,313 patients met criteria including having at least one physician visit, at least 18 years of age and not being pregnant. Of those patients, 158,372 had a BMI > 30 (39.86%). We examined BMI obesity and obesity diagnosis on the EMR concordance as well as demographics and comorbid diagnoses for their ability to predict obesity diagnosis.

Results: Obesity was on the problem list for only 35% of patients with a BMI > 30. Obesity was documented more frequently in women, more frequently in middle-aged patients, and more frequently for blacks/African Americans. Obesity on the problem list was greater for some comorbidities (e.g. sleep apnea, hypertension, diabetes) and less for others (e.g. coronary artery disease, osteoarthritis); there was a significant positive association between the number of comorbid diagnoses and obesity diagnosis on the problem list.

Conclusion: Obesity remains underdiagnosed despite the presence of obesity BMI in the patient's EMR. Patient demographics and comorbidities should be considered when identifying new best practices for screening, diagnosing, documenting, intervening and monitoring weight management. New practices should be patient-centered and consider cultural context and social and physical resources available to patients – all crucial for enacting systems change in a true accountable care environment.

Electronic Data Modeling to Predict 30-Day Hospital Readmission for Older Adults

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Background/Significance: Approximately 20% of Medicare beneficiaries are readmitted within 30 days, costing $17.4 billion annually. Research predicting readmission (readmit) has focused on administrative and diagnosis data.

Purpose: The aim of this study was to identify electronic health record (EHR)-based clinical factors to predict readmit for older adults.

Methods: This retrospective cohort study used demographic, diagnoses, and clinical EHR data to identify readmit predictors at a large quaternary medical center. The population was limited to adults > 65 years, index length of stay < 30 days and those not discharged to an acute care facility or inpatient rehabilitation. Logistic regression modeling evaluated clinical predictors with diagnoses from two sources: medical history and postdischarge ICD9 coding. Univariate analysis was done for categorical and continuous variables. For multivariate logistic regression, the population was divided into derivation (70%) and validation (30%) cohorts.

Results: The sample (N=4,503; mean age ± standard deviation (SD): 77 ± 8 years; female: 54%) included patients hospitalized between July 2012 and Dec. 2012. Index length of stay ± SD was 4.9 ± 4; disposition to home was 65%, to home care was 18% and to skilled nursing was 18%; readmit rate was 12.3%. Readmit predictors were: age, heart failure, COPD, depression, anxiety, gastrointestinal disease, malnutrition, chronic pain, Medicaid insurance, length of stay, smoking, respiratory symptoms, social work consult, hypertension and acute respiratory failure (ICD9 only), pneumonia and kidney disease (medical history only). The receiver-operating characteristic (ROC) C-statistic using ICD9 diagnoses was 0.64 (95% confidence interval [CI]: 0.61-0.67) for derivation and 0.63 (95% CI: 0.58-0.67) for validation cohorts, respectively, with significant predictors being age 75-84 (odds ratio [OR]: 1.33; 95% CI: 1.04-1.71), depression (OR: 1.42; 95% CI: 1.01-2.01), hypertension (OR: 0.76; 95% CI: 0.61-0.95); smoking past (OR: 0.69; 95% CI: 0.53-0.88), length of stay = 0.95 (95% CI: 0.93-0.98). The model using medical history data produced similar findings (ROC: 0.64, 95% CI: 0.61-0.67) with somewhat different predicators. Limitations included single site and missing clinical values.

Conclusion: EHR-based clinical factors were found to predict readmission. Medical history produced similar results to ICD9 coding, suggesting that risk can be predicted using clinical data available during patient care. More work is needed to isolate clinical predictors for use in creating real time scoring mechanisms.

Factors Influencing Post-Spinal Puncture Headaches or Leaks

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Background: Post-spinal puncture headache or leak is a well-known complication that occurs due to delay in dural defect repair. Identifying factors that increase the likelihood of such post-spinal puncture complications might be of benefit to decrease these adverse events. Several predisposing factors have been proposed including patient's age, sex, smoking status, number of puncture attempts, etc.
Purpose: To assess whether spinal puncture at prior laminectomy site, patient age, needle gauge, needle type, training level of the physician, any prior spinal surgery, history of prior complications of spinal headaches or cerebrospinal fluid (CSF) leaks modifies the risk of getting post-spinal puncture headaches or leaks.
Methods: Incidence of spinal headaches or CSF leaks according to the aforementioned variables was determined by retrospective analysis of 557 patients at Aurora St. Luke's Medical Center who had a spinal puncture for myelogram, spinal anesthesia, intrathecal chemotherapy, baclofen administration or CSF analysis. Fisher's exact test was used to assess 2×2 tables, two-sample t-test was used to assess age, and binary logistic regression was used to assess needle gauge and physician training level. Binary logistic regression also was used for multivariate analysis of patient's age and needle type.
Results: There were 11 reported cases of spinal headaches or CSF leaks out of 557 spinal punctures (1.97%). Younger age was associated with increased risk of complications post-spinal puncture (P=0.000). Whitaker needle was associated with decreased risk of complications (P=0.0496). Multivariate analysis demonstrated both age and needle type as significant independent predictors of complications (P=0.000 and P=0.021, respectively). None of the other variables, including prior spinal surgery, needle gauge, puncture at prior laminectomy site, physician training level or history of prior complications, were significant predictors of complication rates (P>0.05).
Conclusion: While post-spinal puncture complications were infrequent in our sample, there seem to be at least two factors that predict complication rates. Most notably, advanced age and the use of Whitaker needle were associated with reduced risk of post-spinal puncture headache or leak as compared to younger patients and use of Quinke needle.

Using the Electronic Health Record as an Innovative Approach to Measure Delirium in Older Hospitalized Patients

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Background: "Acute Care for Elders (ACE) Tracker" is an automated checklist generated by the electronic health record (EHR) and used to identify geriatric conditions among older hospitalized patients.
Purpose: The aim of this study was to examine the validity of the EHR in detecting delirium.
Methods: Hospitalized adults 65 years and older were included in this cross-sectional study. The researchers utilized "confusion assessment method" as the gold standard. "Delirium marker" on the ACE Tracker was defined as presence of any of the following: delirium symptoms (by nurse) or use of physical restraints or delirium treatment (quetiapine, haloperidol, olanzapine and risperdone). The performance of the delirium tool was evaluated using sensitivity, specificity, positive and negative predictive values, and likelihood ratios from simple 2×2 tables.
Results: Ninety-two participants in three hospitals were included. Of these, 54% were female; mean age was 77 ± 8.8 years, mean length of hospitalization was 5.9 ± 5.1 days, and mean number of scheduled medications was 11.6 ± 4.3. Overall, 70% of individuals had a Morse score > 45; the mean ADL score was 10, and the mean Braden score was 17.3. Dementia was present in 10% of participants. Delirium symptoms were present in 5.4%, delirium treatment 11% and restraints 4.3%. The prevalence of delirium marker was 16% by EHR and 17% by researchers. The delirium marker had a sensitivity of 44%, specificity of 89%, positive predictive value of 47% and negative predictive value of 88%. The likelihood ratios for positive and negative tests were 4 and 0.6, respectively.
Limitations: The researchers examined the patient only once. To ensure accurate assessment of fluctuation in status, the researchers interviewed the nurses and, if needed, the physician and family. There may have been a change in mental status between the time participant was assessed by the researchers and documentation of delirium by the EHR.
Conclusion: The EHR is a useful tool to alert health care professionals to the possibility of the diagnosis of delirium. Health systems may be able to use the EHR "delirium marker" (or a multiple of it, i.e. "proxy") as a quality measure to improve patient safety.

A Decade of Early Intervention for Psychiatric Patients in Hospital Emergency Departments by a Behavioral Health Intake Team

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Background: In the changing face of health care and the introduction of the Affordable Care Act, collaborative interventions are essential to compassionate and dynamic care. There is an increasing volume of patients with complex mental health and substance abuse treatment needs in emergency departments taking time away from medical teams. There is increasing recidivism among patients with complex mental illness, substance abuse and medical comorbidities. There has been increasing volume of uninsured patients needing interventions and resources from the expert Behavioral Health Intake Team (BHIT).

Purpose: Evaluate the role of a BHIT in six emergency departments (ED) in an integrated health care system in Wisconsin.

Methods: Six hospitals in the Milwaukee area integrated this novel model of early access to care. Each BHIT has psychotherapists or nurses, who triage patients with behavioral health needs in collaboration with a psychiatrist. For all category variables, frequency count and percentages were computed, and chi-square test was used for testing the association between category variables such as age, disposition, types of insurance, time needed and the diagnoses. For statistical tests, an alpha level of 0.05 was used, and all statistical analysis was done using SAS 9.2 software (SAS Institute Inc., Cary, NC). Data was collected for patients assessed every year in ED since 2002. A 10-question survey was sent to emergency room staff to evaluate the role and the effectiveness of the BHIT.

Results: The BHIT in ED evaluated 45,161 patients from 2002 through 2013. Per survey results (N=96), 90% rated the effectiveness of the BHIT from very good to excellent; showed BHIT reduced their time spent with patients, provided expertise; reduced inappropriate admissions and established care plans to reduce recidivism in admissions. Majority of patients across all ages were mentally ill without comorbid substance use (P<0.0001). Of those over 64 years old, 84% (N=2,988) had a mental illness. Uninsured patients (N=6,970) had higher substance use (33%, P<0.001); of the insured patients, 56% are mentally ill without substance use (P<0.001). BHIT time in ED increased by 50% for insured and 40% for uninsured, addressing complexities of diagnoses and psychosocial needs over the period of 11 years.

Conclusion: The availability of a dedicated BHIT proved to be effective in improving the timely behavioral health access in emergency departments. Further research and exploration of available data will provide direction for improved patient care.

Training Physicians to Care for Urban Populations: A Win-Win for Health Systems

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Background: Aurora Health Care and University of Wisconsin School of Medicine and Public Health (UWSMPH) created TRIUMPH to prepare medical students to promote equity and reduce health disparities for urban, disadvantaged populations. TRIUMPH integrates clinical training during the last two years of medical school with the development of leadership and community health skills.

Purpose: TRIUMPH students are more likely to choose career paths needed to care for urban populations and to select residencies in Milwaukee and Wisconsin.

Methods: Since 2009, TRIUMPH students have relocated to Milwaukee for 15 months. They develop community health improvement projects and participate in a core curriculum focused on skills needed by community-responsive physicians. A student database and program evaluation track student characteristics and self-assessment of knowledge, skills and attitudes related to working with disadvantaged urban populations. In 2014, interviews were conducted with six alumni completing primary care residencies in Milwaukee to better understand the impact of TRIUMPH on specialty choice, residency and practice selection.

Results: To date, there are 23 graduates who are predominantly female (67%), Wisconsin residents (74%) and all with prior experience working with disadvantaged populations. A comparatively high number entered primary care residencies (78%) vs. UWSMPH non-TRIUMPH graduates (45.5%). All graduates are serving urban, underserved populations. Ten graduates (43.5%) have remained in the state to train, with two at UWSMPH, three at Milwaukee College of Wisconsin and five at Aurora Health Care's Family Medicine Department. Interview themes revealed a motivation to serve diverse, urban populations in clinical and community health modes. TRIUMPH clarified specialty choice and led many to consider Milwaukee for residency. Students identified increased skills and confidence related to community engagement activities and an inclination to consider practicing in Milwaukee.

Conclusion: TRIUMPH students self-select with a common motivation for urban underserved service. They are more likely to be female, from out-of-state, and from disadvantaged backgrounds than their UWSMPH peers. While the study is limited by enrollment selection bias and small sample size, the percentage of students going into primary care and staying in Milwaukee and Wisconsin for training is remarkable and bodes well for practice selection and addressing physician workforce needs. TRIUMPH is meeting the personal and professional needs of the learners. And TRIUMPH is a win-win for all partners – state, medical school, Milwaukee and Aurora.

Chronic Illness Management in Teams of Urban Multidisciplinary Scholars: CIMTUMS

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Background: Patients with chronic illness benefit from health care that addresses diverse health needs through multiple disciplines. At Aurora Midtown Clinic, CIMTUMS used interprofessional teams of students and faculty working with African American diabetic patients to improve self-management skills and diabetes biomarkers. The first two cycles demonstrated a high level of patient participation and successful collaboration between Aurora Health Care, University of Wisconsin School of Medical and Public Health and Concordia University. The multidisciplinary health care team consists of a physician, pharmacist, dietitian, nurse practitioner and exercise physiologist with medical, pharmacy and biology students.

Purpose: Simultaneous multidisciplinary delivery of care can improve health outcomes and self-management skills in chronic diabetic patients.

Methods: Phase 1: The interdisciplinary team met four times for team-building activities that focus on patient-centered delivery of care, leadership, and cross-discipline communication. They used CDC's TeamSTEPPS and its questionnaire to evaluate baseline knowledge and attitudes towards cross-collaboration. Phase 2: Patients were recruited from a pooled list of those meeting eligibility using established biometrical control norms (hemoglobin > 7, blood pressure > 130/80, low-density lipoprotein > 100). Patients participated in five sessions using the American Diabetes Association Self-Management and Education program and Merck conversation maps. Phase 3: Coaching and follow-up of patients occurred via phone to assist patients in meeting their personal goals. The health team identified needs and barriers to compliance and ensured sustainability of learned concepts.

Results: Results from the initial two cycles include significant learner attitude and behavior changes as well as improvement in diabetic patients' biomarkers, empowerment and satisfaction. Results from the third cohort are pending.

Conclusion: An interdisciplinary team approach to chronic disease management maximizes the possibility for improved health outcomes in patients. Patient self-efficacy is increased by shared input and knowledge from peers and the health care team. Interdisciplinary team members work together to enhance their knowledge and skills for a comprehensive and patient-centered approach. CIMTUMS success with diabetes management demonstrates the potential for application to other chronic health issues such as hypertension or asthma.

Calculating Time/Effort to Develop Medical Specialty-Approved Board (Re)Certification Modules for Part IV Practice Performance Assessment

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Background: Twenty-four medical specialties now require physicians to complete four parts for board (re)certification. The American Board of Family Medicine (ABFM) is the first specialty board to require that all trainees entering family medicine residencies on or after June 1, 2012, also complete all four parts, including a Performance in Practice Module (Part IV), for their initial board certification. Integrated health care systems are uniquely positioned to align resident and practicing physicians Part IV board certification requirements by developing system-specific modules aligned with Residency Review Committee (RRC) requirements and health care system clinical care metrics. However, there is currently no published literature about time/effort required to develop these aligned modules, thus limiting physician willingness to co-author.

Purpose: To determine the time/effort required for an interdisciplinary team to successfully design and submit Part IV modules that meet board (re)certification requirements, meet residency program accreditation requirements and align with health care system metrics.

Methods: Two interprofessional education teams were charged with creating ABFM Part IV modules on 1) asthma, and 2) nutrition/diet. Each team included 1-3 family physicians, a continuing medical education (CME) specialist, and an experienced educator. Each team conceptualized the core module elements and physician(s) then provided evidence-based resources. The educator and CME specialist drafted the proposal to reflect best evidence education and align with RRC and Part IV requirements. Time/effort was recorded by all work group members throughout the process using a short online survey at regular intervals. Team meeting time was abstracted from Microsoft Outlook calendars.

Results: Two ABFM modules were completed, submitted and approved. Total team time to complete the modules averaged 90 hours: asthma = 82.4 hours; nutrition = 97.7 hours. Total physician hours per module ranged from 12.4 to 24.2 hours. Educator and CME specialist accounted for 75% (nutrition) and 85% (asthma) of the effort. Tasks included project management, content/research for evidence-based resources, and proposal drafting and review.

Conclusion: An interprofessional team can successfully design and submit specialty board Part IV modules in

< 100 hours. Defining expertise needed by tasks and distributing work accordingly limit physician time/effort, leading one physician to say "Most of us never imagined we could do this!"

Use of Guided Imagery for Reduction of Pain and Anxiety and Improved Quality of Sleep in Patients Undergoing Surgery: A Review and Meta-Analysis

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Background: While surgery is a very stressful event, patient factors are among the strongest predictors of recovery. Guided imagery is a collection of meditation and relaxation techniques used to reduce anxiety, stress and pain during and after surgical procedures. The use of guided imagery, a low-technology and low-cost approach to health care, is patient-centered in nature. However, skepticism in its use persists, possibly because it may not conform to the biomedical treatment model.

Purpose: The focus of this meta-analysis was to determine the effect sizes for the effectiveness of guided imagery in reducing pain and anxiety and improving quality of sleep for patients undergoing surgery.

Methods: A search through MEDLINE, Journals@OVID, PsycINFO, CINAHL and AltHealthWatch databases for studies published after 1985 that reported guided imagery and surgical procedures was done with the help of Aurora Libraries. A total of 113 publications were reviewed independently by two reviewers. Fifteen studies with randomized controlled trials and pre-post design comparing those receiving guided imagery intervention and a control group for outcomes such as anxiety, pain and quality of sleep were included for analysis. For anxiety, pain and quality of sleep, data was converted to visual analog scale.

Results: A total of 1,216 patients from 15 studies were analyzed. The point estimate for mean age was similar in both groups (P=0.72). Estimated mean difference in the anxiety (-0.93, P<0.001; I2=90.5, P<0.001) and pain scores (-0.64, P<0.001; I2=94.2, P<0.001) between groups showed significantly lower scores for patients in the guided imagery group. However, there was no significant difference in quality of sleep between groups (P=0.55). Other outcome variables reported in the studies comparing guided imagery and control groups were depression, quality of life, length of stay, calmness heart rate, and blood pressure, but there were not enough data in the studies to estimate effect size for these variables.

Conclusion: We conclude guided imagery intervention is effective for reducing anxiety and pain in patients undergoing surgery. Guided imagery intervention does not improve the quality of sleep. Patients undergoing surgery should be given the option to have this low-cost, low-technology intervention.

Racial Disparity in Kidney Transplantation: A Review and Meta-Analysis

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Background: Racial disparities in outcomes continue to exist, with African Americans (AA) reported to have poorer patient and graft survival compared to their non-AA counterparts. According to a large review conducted looking at historical data (1996-2005), graft survival for AA was about 15% less compared to non-AA.

Purpose: The focus of this meta-analysis was to determine the effect size for the differences in patient and graft survival in AA and non-AA patients, and to identify associated factors reported in the literature.

Methods: A comprehensive, systematic review search was conducted using MEDLINE, Journals@OVID, PsycINFO, CINAHL and AltHealthWatch databases for studies published after 1999 with keywords of: single-kidney transplant, patient outcomes, graft survival, patient survival, race, ethnicity and disparities. Two reviewers (R.P. and M.S.) reviewed 283 studies, and data on race (AA vs. Non-AA), hypertension, diabetes, human leukocyte antigen (HLA) mismatch, type of donor (deceased or live), and incidence of patient survival and graft survival for 1 and 5 years were extracted independently.

Results: Data were collected from 19 articles with a total of 151,285 patients (60% male). The point estimate for odds ratio (OR) for 1-year survival (OR=0.83, P=0.22; I2=0.0, P=0.78) was similar for AA and non-AA, whereas 5-year survival was lower for AA (OR=0.63, P<0.001; I2=91.7, P<0.001). Similarly, the graft loss at 1 year (OR=1.24, P<0.001; I2=80.25, P<0.001) and 5 years (OR=1.59, P<0.05; I2=0.0, P=0.88) was higher among AA compared to non-AA. AA have a lower incidence of diabetes (0.79, P<0.001; I2=75.49, P<0.001), higher incidence of hypertension (P<0.001; I2=99.73, P<0.001), and higher level of mean HLA mismatch (difference in mean=0.44, P<0.001; I2=77.14). AA received more transplants from deceased donors (1.80, P<0.001; I2=79.3, P<0.001) than non-AA.

Conclusion: Lower long-term survival and higher graft loss for AA was evident. Some of the factors associated with this disparity are hypertension, HLA mismatch and deceased organ donor. Interventional prospective studies are needed to correct factors that could lead to improved patient and graft survival for AA.

Employee Wellness Program: Participation Rates Among Obese Employees and Selection Patterns of Available Alternative Activities

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Background: This research was performed to evaluate the inaugural year of implementing an incentivized healthy weight option as part of Live Well Aurora. Obesity is a problem for both individuals and the organizations that provide health insurance to obese employees. Health care costs are increasing for employers and employees; a novel way to decrease the cost of health insurance is to encourage employees to become healthier.

Purpose: To retrospectively examine possible demographic differences between those who participate in an employee wellness program (EWP) and those who do not, and to identify distribution of alternative activity selections.

Methods: This quasiexperimental study used a nonequivalent two-group design: Aurora Health Care employees who participated in EWP and those who did not. Aurora weighed 19,771 employees with mean body mass index (BMI) of 28.9; 6,375 (35%) caregivers were obese (defined as BMI ≥ 30), and of those, 3,094 (47%) chose alternative activities. Five alternative activities were offered to employees: (1) lose 5% of body weight, (2) Healthy Solutions® at home, (3) Weight Watchers group meetings, (4) Weight Watchers online, and (5) Aurora-directed healthy weight coaching. Chi-square tests were used for all categorical variables; logistic regression was used to predict participation factors.

Results: Overall, 47% of obese employees participated in the wellness program. Participation was higher among females, whites, those age > 50 years, and staff (as compared to nurses), P<0.0001 for all. The most common alternative activity chosen was lose 5% of body weight (67%), followed by behavioral coaching (15%).

Conclusion: Participation rate varied significantly based on demographic variables. Targeting 5% weight loss was the most popular alternative activity.

Weather and Environmental Exposures in Human Blastomycosis: Northern Wisconsin

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Background: Blastomycosis is a potentially fatal fungal infection contracted by inhalation of Blastomyces spores from the environment. Blastomycosis case occurrence in dogs has been associated with antecedent weather, using 6-month warm and cold periods. Paracoccidioidomycosis in South America has been associated with variations in the Southern Oscillation Index (SOI). A comprehensive human case registry has been kept in Vilas County, Wisconsin, since 1979 (mandatory reporting since 1984).

Purpose: Determine the effects of weather parameters on the occurrence of human blastomycosis cases in this highly endemic area; update exposure factors since last report in 1996.

Methods: Database review. Chi-squared test was used for categorical data of exposures, comparing 1979-1996 (N=101) vs. 1997-June 2013 (N=95). Linear regression was used to model lagged local weather station data (available 1990-present; N=126) and SOI, North Atlantic Oscillation Index (NAOI) and Wisconsin River water discharge (WRD) data from the adjacent county (all available for 1984-present; N=174), using pulmonary blastomycosis case counts of known onset by 6-month warm (April-September) and cold (October-March) periods.

Results: The seasonal distribution of pulmonary cases, 1984-2012, was: winter (N=35 [22%]), spring (40 [25%]), summer (45 [28%]), fall (42 [26%]); P=0.9. Environmental exposures, 1997-June 2013 (mean age 45, 59% male), were: residence < 400 m from waterway (76%), excavation (42%), gardening (31%); none different than 1979-1996. Fishing (23% vs. 37%; P=0.09) and hunting (15% vs. 26%; P=0.13) were less common than 1979-1996 but not significantly different. Overall, 69% of cases recalled some prior soil-disturbing activities. Considering the 6-month warm/cold periods, 19% of variation is explained by a direct relationship with total precipitation two periods prior (P=0.005). There was no association of case occurrence with SOI, NAOI or WRD. The estimated annual incidence of blastomycosis, 1997-present, was 27/100,000 compared to 44/100,000 in 1984-1996.

Conclusion: As with dogs, human blastomycosis case occurrence is partially determined by antecedent precipitation (an association that may be more robust with increased cases). It is unclear if recent lower incidence rates are due to less opportunity for exposure, reduced fungal virulence or random variation.

Wisconsin Physician Survey on Diagnosis and Treatment of Obesity

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Background: Obesity is an expensive and substantially undermanaged condition. The literature suggests that obesity is not always addressed and is infrequently documented in the patient's problem list despite screening and interventional recommendations. Physician interest and referral has a positive effect on weight reduction strategies.

Purpose: We conducted a cross-sectional email solicitation of Wisconsin physicians to complete a survey on their knowledge, perceptions and practices regarding obesity.

Methods: Survey questions included obesity causes, definition, frequency, documentation and barriers to documentation, available consultation time, treatments used and barriers to treatment, and training in obesity management.

From over 12,000 emails sent from the Wisconsin Medical Society, 590 responses were obtained.

Results: Primary care physicians represented 61% of all respondents, and electronic medical records were used in 94% of their practices. Over 90% of respondents accurately identified obesity causes such as diet and activity level. Family support, depression, stress and lack of knowledge about nutrition were recognized as obesity causes by over 80% of respondents; 81% of respondents identified a body mass index of > 30 as obese, and 71% of respondents correctly identified that 21-50% of the population is obese. Physicians reported documentation failure of obesity in the patient problem list for a variety of reasons, including treatment unavailability, lack of reimbursement, expense and lack of effectiveness. Failure to document was reported due to embarrassment discussing obesity by 19%, and 15% reported due to lack of pertinence to the visit. Time spent readdressing obesity in follow-up visits was 6 minutes or less for 77% of respondents. Referrals were most commonly made to dietitians and bariatric surgeons, but only 12% of respondents reported always or sometimes making referrals. Only 14% of respondents were optimistic about sustained weight loss, and only 7% believe they have been successful at treating obesity. Training in obesity management was reported to have occurred in 6% of medical school experiences and in 10% of respondent's residency training.

Conclusion: The effectiveness of physician obesity interventions must be improved. Training in obesity management during medical school and residency may improve patient outcomes. The majority of respondents stated they would be interested in receiving training in obesity management and reported lacking sufficient tools to assist in obesity management.

Effects of Prosthesis-Patient Mismatch in Patients With Low Flow, Low Gradient and With Low Left Ventricular Ejection Fraction After Aortic Valve Replacement Surgery

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Background: Aortic valve stenosis, one of the most common valvular diseases in the elderly, has the highest morbidity and mortality rate of any valvular disease. There is a subset of patients with aortic valve stenosis who have low flow, low gradient (LFLG) and low left ventricular ejection fraction (LVEF), defined as an aortic valve area of < 1 cm^2, a transvalvular gradient of < 40 mmHg and LVEF of $\leq 40\%$. Compared to normal-flow aortic valve stenosis, patients with LFLG and low LVEF are known to have a high operative mortality rate. There are a number of factors that influence peri- and postoperative mortality in patients with LFLG and low LVEF, such as a decreased contractile reserve of the left ventricle.

There have been studies that show that prosthesis-patient mismatch (PPM) may independently affect postoperative mortality and the recovery of the left ventricle after aortic valve replacement (AVR) in patients with normal-flow aortic valve stenosis.

Purpose: The purpose of this study is to investigate PPM on the recovery of the left ventricle in patients with LFLG and low LVEF aortic valve stenosis.

Methods: We conducted a retrospective chart review of patients with LFLG and low LVEF who underwent AVR for severe aortic valve stenosis at Aurora St. Luke's Medical Center from January 2007 to December 2012. Two-dimensional echocardiograms of these patients pre- and post-AVR were reviewed, and effective orifice area index (EOAi) for the different valves implanted was obtained. Based on the calculated EOAi, patients were separated into different categories: namely, hemodynamically insignificant PPM, moderate PPM and severe PPM, defined as EOAi > 0.85 cm^2/m^2, > 0.65 to 0.85 cm^2/m^2, and ≤ 0.65 cm^2/m^2, respectively.

Results: Of the 1,882 patients who underwent AVR, a total of 254 (13%) patients met the criteria for LFLG and low LVEF and 65 patient charts contained data that was complete and allowed comprehensive review. Of these 65 (75% male), mean age was 77 ± 10 years; prevalence of coronary artery disease was 77%, hypertension 72% and hyperlipidemia 54%. Median New York Heart Association class was II. Moderate or severe PPM was present in 28 patients (42%). LVEF pre- and up to 1-year post-AVR in the patients with moderate or severe PPM was $30 \pm 6\%$ and $33 \pm 13\%$ (P=0.29), respectively, whereas patients with insignificant PPM had pre- and up to 1-year post-AVR LVEF of $29 \pm 7\%$ and $39 \pm 13\%$ (P=0.002), respectively.

Conclusion: In patients with LFLG and low LVEF, the presence of moderate to severe PPM may adversely affect the recovery of the left ventricle after AVR surgery.

Utilizing Resident Council Leaders to Improve the Culture of Patient Care Through Systematic Design of Our Clinical Learning Environment

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Background: The health care landscape continues to evolve, with hospital and resident/fellowship accrediting bodies calling for a culture shift. There have been previous attempts to change this culture, but these have all failed. Alliance for Independent Academic Medical Center's (AIAMC) National Initiative IV focuses on activating residents as leaders and

participants in creating a patient safety and quality culture.

Purpose: This study seeks to evaluate resident involvement as leaders and contributors to our institution's quality and safety culture at two levels: individual residency programs and across residency programs.

Methods: AIAMC National Initiative IV focuses on activating residents in creating a patient safety and quality culture. Three residency programs were selected to participate in National Initiative IV and required to design a project aimed at improving patient safety/care quality specific to their specialty. Our institution is required to have a Residency Council (RC) comprised of representatives from our resident/fellowship programs. The RC members were charged to serve as culture change leaders for quality/safety across our institution's graduate medical education programs.

Results: Each of the three residencies has established an interprofessional program team with project timelines, tasks and roles. Each program team selected a project and finalized our institution's established and created EPIC-based metrics to monitor improvement: Family Medicine (ambulatory medication reconciliation); Internal Medicine (30-hospital readmission rates); and OB/GYN (labor and delivery patient safety/quality checklists). RC received approval for all incoming residents and fellows to complete five Institute for Healthcare Improvement quality and safety modules as required activities. RC also received Graduate Medical Education Committee (GMEC) approval that a "Synergy Committee" be created to explicitly link quality and safety projects between hospital, clinic and GMEC leadership. RC members now co-present quality and safety curriculum using the GMEC shared noon conference slot.

Conclusion: Bending the culture curve to address quality/safety through engagement of residents/fellows at individual cross program levels through RC and GMEC can be done. Utilization of National Initiative IV as one of the triggers to spur engagement provides clear deadlines to spur action at program and RC/GMEC levels. Sustaining the program and RC role as culture change leaders and advocates will require additional accountability and leaders to facilitate a change in clinical culture.

Novel Use of Three-Dimensional Mapping for Cryoablation of Atrial Fibrillation

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Background: In cryoablation of atrial fibrillation, we prefer using a 0.035-inch guidewire as a rail for the cryoballoon rather than a mini-lasso catheter. The guidewire can be passed selectively into a specific side branch of the target vein branches to allow more coaxial orientation of the cryoballoon, and thereby superior occlusion of the pulmonary vein (PV).

Purpose: Endocardial Solutions Inc.'s (ESI) three-dimensional (3D) mapping system can localize a coil-tip guidewire in three dimensions and determine location in the appropriate side branch as well as the PV, which we hypothesized would facilitate cryoisolation.

Methods: The study population included 26 patients (19 men) with paroxysmal atrial fibrillation who underwent cryoballoon PV isolation (mean age 65 ± 9 years, mean left atrial volume index 37.4 ± 11 ml/m², mean left ventricular ejection fraction 56 ± 10%). Following transseptal puncture, the 0.035-inch guidewire was passed into the target branch and then into its various side branches. An alligator clip connected the guidewire to the ESI 3D system. Surface patches served as ESI reference.

Results: By comparing preoperative left atrial computed tomography scan side by side with the ESI 3D map of the target branch and its side branches, it was possible to determine the location of the target PV and side branches more quickly and conveniently than occlusive venography. When complete balloon occlusion of the PV could not be achieved, introducing the guidewire into an alternate side branch allowed isolation.

Conclusion: Guidewire localization with the ESI 3D system is helpful in cryoballoon ablation by allowing rapid identification of the target vein and selection of the best PV side branch for placement of the support guidewire to allow better PV occlusion.

A Novel Sulfhydryl-Sensing Fluorescent Probe to Monitor the Redox Status of Intracellular Compartments

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Background: Sensing of intracellular redox state is important for detecting the effect of disease and therapeutics agents. However, a reliable assay that can simultaneously provide information about the redox state of intracellular compartments is currently not available. Such an assay will improve the detection of abnormal metabolic state and evaluate the impact of therapeutics.

Purpose: To test the responsiveness of DSSQ1 (fluorescein-Donor tethered via a disulfide [S-S] to a para-methyl red Quencher), a novel sulfhydryl-sensing fluorescence probe, and monitor its intracellular distribution under oxidative and reduced conditions.

Methods: Fibroblasts grown in culture were treated with redox sensor DSSQ1, and its intracellular distribution and localization was assessed using confocal fluorescent microscopy. Localization of DSSQ1 within mitochondria, lysosomes and nuclei was confirmed using specific fluorescent dyes – TMRM for mitochondria, LysoTracker®

Red for lysosomes and Hoechst 33342 for nuclei.

Results: Under the normal conditions, the green fluorescence of DSSQ1 was localized to the cytosol, lysosomes, nuclear membrane and within mitochondria. Oxidative stress (extracellular H_2O_2, 100 μM) significantly decreased the loading efficiency of the redox sensor DSSQ1 into the fibroblasts, while reducing agent (extracellular N-acetyl cysteine, 10 mM), which is known to increase intracellular levels of glutathione and cytoplasmic redox state, enhanced the uptake of DSSQ1.

Conclusion: The chemical structure of DSSQ1 allows permeability of compound without losing viability of cells. The compound is distributed within the cytoplasm, and localizes to lysosomes, mitochondria and nuclear membrane, but excluded from the nuclei. DSSQ1 accumulation is affected by redox status of cells and could be used to monitor the redox status of the cell.

A Novel High Throughput Approach for Quantification of Cell Density

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Background: Current approach to cell counting using hemacytometer is limited by requirement for high cell concentration and is prone to error. In biological experiments using cells from human cardiac tissues with limited number of cells, this approach results in large variation in cell counts. Here, we demonstrate the utility of a novel approach using a 96-well microplate that accurately provides the density of cells as low as 15,000 cells/cm^2, which fulfills an unmet need in experiments with limited cell availability.

Purpose: To develop and test the accuracy of a high-throughput 96-well microplate assay in assessing the cell density in comparison to existing methods.

Methods: NIH/3T3 fibroblasts were cultured and differentiated and grown to different cell density. Cell number obtained using hemacytometer was compared to the total fluorescence of propidium iodide, binding to the nuclei of cells permeabilized with Triton X-100 (0.25%), and assessed using multiplate reader. In addition, the total activity of lactate dehydrogenase, an intracellular enzyme, was used to assess the total volume of cytoplasm released from permeabilized cells. Furthermore, the ratio of live/dead cells was determined by propidium iodide-positive cells and lactate dehydrogenase activity before and after permeabilization in each well of the 96-well plate.

Results: There was a linear relationship between increasing intensity of propidium iodide fluorescence with the density of the cells in the 96-well microplate (ranging from 5,000 to 100,000 cells/cm^2). Similarly, linear relationship was observed between the intensity of propidium iodide fluorescence and cellular lactate dehydrogenase activity in corresponding wells. At low cell density (<50,000 cells/cm^2) this novel assay was more reproducible and accurate as compared with hemacytometer, which demonstrated large variation and poor reproducibility. At higher cell density (100,000 cells/cm^2) the two assays had similar reproducibility and accuracy. Time saved in counting cell number in 96-well plate with different experimental condition was ~10-fold (~100 vs. 10 min).

Conclusion: Proposed propidium iodide and lactate dehydrogenase assays are useful tools for quantification of cell number in high-throughput manner with greater accuracy at low cell density, higher reproducibility and overall time saving. This assay is especially useful in experiments using limited cell number such as cells isolated from the human heart.

"Surgery-Chemotherapy-Radiation, Followed by a Different Kind of Triathlon": Medically Directed Group Exercise Program Is Unique and Effective Among Overweight and Obese Breast Cancer Survivors

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Background: Structured exercise is a potential adjunct therapy following a cancer diagnosis associated with improvements in treatment-related side effects, including fatigue, deconditioning and quality of life. However, despite published exercise guidelines for cancer patients, breast cancer survivors struggle to initiate regular exercise into their lifestyles, particularly if already overweight or obese.

Purpose: To determine if a medically recommended and supervised team triathlon training program focusing on self-efficacy, observational learning and reinforcements improved exercise capacity and quality of life for overweight and obese (body mass index [BMI]: 25-40) breast cancer survivors.

Methods: A breast cancer surgeon and cancer rehabilitation physical therapist recruited 18 overweight to obese survivors [mean age: 52(7) years, mean BMI: 32(4)] who underwent local and systemic treatment to participate in a 14-week triathlon training program adjusted for common treatment-related side effects. Training consisted of 2 weekly group sessions supervised by medical and athletic coaches, and 3 days of prescribed activities that patients completed independently or with their peers. The program culminated in an organized sprint-distance triathlon. Quality of life (FACT-B), cancer-related fatigue (FACIT-F), and six-minute walk test (6MWT) were measured pre- and postintervention.

Focus groups elucidated motivational factors.

Results: 14 patients with complete datasets were compared pre- and postintervention. FACT-B improved [pre: 120(11), post: 128(6); P=0.01]. FACIT-F improved [pre: 42(8), post: 47(5); P<0.01]. 6MWT improved [pre: 564(54) m, post: 587(67) m; P=0.04], with lower ratings of perceived exertion [pre: 7(2), post: 6(1)]. Focus groups identified sense of "being part of a team," having commonality with other proactive breast cancer survivors, and "individualized attention from the medical team" present at every session as contributing motivators to exercise adherence. Overweight patients appreciated the "structure and organization" of "prescribed exercise," while obese patients enjoyed more the social aspect and "camaraderie" of group training. Patients were often "surprised" at what exercise intensity they could perform when guided to do so. All felt motivated to continue regular exercise in the future.

Conclusion: Medically directed group training of overweight and obese breast cancer survivors with the goal of completing a sprint-distance triathlon is a unique and effective model addressing motivation, endurance and quality of life after treatment.

Correlation of Potential Noninvasive Biomarkers of Extracellular Matrix Remodeling With Postoperative Heart Failure – A Preliminary Study

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Background: Postoperative heart failure (PHF) is a major factor that prolongs hospital stay and contributes to increased cost and morbidity after surgery. Clinical predictors of PHF have been identified but lack specificity and predictive accuracy; therefore, identifying the candidates at risk for PHF remains difficult, thus, necessitating further investigation. Since cardiac fibrosis in the elderly contributes to abnormal cardiac contractility, elevated markers of extracellular matrix turnover can be used to identify those at risk for PHF.

Purpose: To identify biomarkers in those at risk for PHF.

Methods: Serum biomarkers of collagen synthesis (C-terminal propeptide type 1 of procollagen [PICP] and N-terminal propeptide of type III procollagen [PIIINP]), collagen degradation (C-terminal telopeptide of collagen type 1 [CITP]), and extracellular matrix remodeling (matrix metalloprotease-1 [MMP-1] and tissue inhibitor of metalloproteases-1 [TIMP-1]) were determined by ELISA in preoperative blood samples collected from patients with no prior history of heart failure who were undergoing cardiac surgery and correlated to PHF.

Results: Of 45 patients enrolled (mean age 69 ± 11 years, 77% male), 11 (24%, mean age 66 ± 10 years) developed PHF requiring additional inotropic support (dobutamine) and management for heart failure. Overall, there were no significant differences in baseline demographics and comorbidities between those who did or did not develop PHF. Ventricular function was preserved, with no significant differences in left ventricular ejection fraction (60 ± 11% vs. 50 ± 16%; P=0.11) or atrial and ventricular dimensions and function between the two groups. Mean PICP levels showed elevated trend in PHF (661 ± 375 ng/ml vs. 609 ± 410 ng/ml in the non-PHF group; P=0.07); however, PIIINP levels were not significantly different between the two groups (134 ± 72 in PHF vs. 157 ± 73; P=0.47). However, levels of CITP were significantly lower in PHF patients (6 ± 3 ng/ml vs. 9 ± 7 ng/ml; P=0.03). The overall ratio of PICP/CITP was higher in patients with PHF (119 vs. 108; P=0.7). The MMP-1, MMP-2 and TIMP-1 levels were not significantly different between the two groups.

Conclusion: The preliminary data obtained from 45 patients demonstrated a trend toward higher PICP levels indicative of collagen synthesis in those at risk for PHF but was not statistically significant. This is likely due to the small sample size and the heterogeneity of the patients, indicating a larger number of heterogeneous patients are needed to demonstrate the prognostic significance of serum biomarkers of extracellular matrix remodeling.

Demographic Features of Aurora Blastomycosis Cases, 2007-2013

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Background: Blastomycosis is a serious systemic fungal infection endemic to Wisconsin. It is contracted by inhalation of Blastomyces spores from the environment. Blastomycosis case incidence is considered less frequent along the state's eastern lakeshore, compared to northern and central Wisconsin.

Purpose: Determine the geographic distribution and demographic features of recent Aurora Health Care blastomycosis cases.

Methods: Records review of the 100 blastomycosis cases from the Aurora clinical and laboratory databases, 2007-2013. Demographic and zip code data was compared with 211 adult cases of pneumonia from the Aurora clinical database during a similar time period. Two-sample t-test was used to compare ages, and chi-square test with Yates correction for 2 × 2 tables.

Results: There were 100 blastomycosis cases from 72 different service-area zip codes (97 confirmed, 3 suspected; average of 14/year; age range: 2-84). The 96 adults with blastomycosis were significantly younger than those with pneumonia (48 vs. 55 years, P=0.002) and were more likely to be male (67% vs. 45%, P=0.0007) and nonwhite race (21% vs. 9.5%, P=0.01).

Blastomycosis cases occurred throughout eastern Wisconsin and appeared to be overrepresented in the three Manitowoc/Three Rivers zip codes. Employment status was known for 84 and included a variety of occupations as well as retirement/unemployment (37 of 84). Outdoor occupations were listed in 10 of 84 subjects with recorded employment status.

Conclusion: While infrequent, patients with blastomycosis present to Aurora clinicians from a variety of locations and diverse demographic backgrounds.

Expression Pattern of Estrogen, Progesterone and HER2/neu Receptors in Atypical Breast Lesions Does Not Predict Subsequent Clinically Significant Event

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Background: While 5-year survival rates for breast cancer patients have improved, we still cannot predict whether early breast lesions, such as atypical ductal hyperplasia (ADH) or atypical lobular hyperplasia (ALH), are harbingers of future cancer. Atypia increases the risk of developing subsequent breast cancer four- to fivefold. To avoid this, women may opt for aggressive management with associated side effects. Thus, identifying predictors of future breast cancer after a diagnosis of atypia would assist in risk reduction strategy selection.

Purpose: Given that lifetime estrogen exposure is a significant risk factor for breast cancer, and human epidermal growth factor receptor-2 (HER2/neu) gene amplification is linked to cancer pathogenesis, we tested whether expression patterns of estrogen receptor (ER), progesterone receptor (PR) and HER2/neu at initial diagnosis of atypia predicted a subsequent clinically significant event (SCSE), i.e. another occurrence of atypia, in situ or invasive carcinoma.

Methods: Patients with an initial diagnosis of ADH and/or ALH were retrospectively identified. A study cohort of 19 women who developed SCSE (cases) was matched to 45 women with no SCSE for at least 5 years after atypia diagnosis (controls). Archived tissues from cases and controls were subjected to immunohistochemical analysis of ER, PR and HER2/neu. ER and PR staining patterns were reported using Allred score, while HER2/neu expression was reported as negative (0-1+), equivocal (2+) or positive (3+). Atypia with HER2/neu 2+ or 3+ scores were subject to FISH analysis to confirm gene amplification.

Results: There was no significant difference in expression of ER (mean Allred score: cases = 7.26 ± 0.35; controls = 6.91 ± 0.43) or PR (mean Allred score: cases = 6.95 ± 0.43; controls = 6.57 ± 0.34). Greater than 90% of both cases and controls were negative (0-1+) for expression of HER2/neu. Longitudinal assessment of ER, PR and

HER2/neu expression in the cohort of patients who developed SCSE revealed that 3 of the 19 cases presented with HER2/neu overexpression; however FISH analysis revealed no gene amplification. Interestingly, decreased expression of ER/PR was observed in 3 of 7 patients with atypia that later developed an invasive malignancy.

Conclusion: ER, PR and HER2/neu expression does not predict SCSE after an initial diagnosis of breast atypia. Although we did not detect increased expression or amplification of HER2/neu in breast atypia associated with a SCSE, the activation status of HER2/neu remains unknown.

Tdap Immunization in Pregnancy: Provider Compliance With CDC Guidelines

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Background: Pertussis, also known as whooping cough, is a highly contagious, acute respiratory illness. In children and infants, morbidity is more often substantial and the disease may be fatal. There has been a steady increase in reported cases in the United States (27,550 in 2010 vs. 41,000 in 2012). Mothers were responsible for 30-40% of infant infections when the source of pertussis was identified. In October 2012, the Centers for Disease Control and Prevention (CDC) and Advisory Committee for Immunization (ACIP) recommended that caregivers provide a Tdap immunization for all pregnant women for each pregnancy, irrespective of the patient's prior history of receiving Tdap.

Purpose: Evaluate provider compliance with Tdap immunization guidelines at four different time periods: prior to change in CDC guidelines, immediately after change, 5 months after change/educational intervention, and 1 year after change.

Methods: Records review of 400 random charts, 100 in each of the above categories from 2012 to 2013. Excluded were patients without an appointment during the 27-36 gestational weeks. Educational lecture and survey was provided to all staff of the Women's Health Center regarding Tdap immunization changes. Compliance rate was calculated for each time period. Two-sample t-test was used to compare compliance rates, and chi-square test with Yates correction for 2×2 tables.

Results: Compliance rate was 62% prior to change, 39% immediately after change, 50% at 5 months after change/intervention, and 72% at 1 year after change. Odds ratios for the three time periods were: 1.00, 1.62 and 4.14, respectively (P=0.00000). The vaccine was received appropriately in the immediate postpartum period in 32% prior to change, 43% immediately after change, 44% at 5 months after change/intervention, and 13% at 1 year after change. Resident physicians answered 63% correct and faculty physicians answered 67% correct regarding frequency and timing of Tdap vaccination survey questions;

however, the residents were more compliant (60% vs. 52%) in actual clinical practice.

Conclusion: Educational intervention and time had a statistically significant impact in improving compliance rate. Appropriate vaccination during the postpartum period and adequate documentation are areas of improvement.

Obese Patients' Compliance and Satisfaction With Educational Intervention: O.N.E. Packet

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Background: Today, 36% of U.S. adults are obese. Combating obesity is important, as obesity has been shown to increase risk of hypertension, dyslipidemia and type 2 diabetes. The obesity rate in the state of Wisconsin in 2010 was 26%. It is well established that physician counseling is effective in promoting healthy behavior. Although weight loss is asked and advised during clinic visits, physicians rarely assess, assist or arrange interventions.

Purpose: To determine if distribution of educational materials to patients with body mass index (BMI) > 30 kg/m^2 affects lifestyle modification compliance; and to determine if there is a difference in compliance between physician distribution or peer educator personal summary of educational materials.

Methods: Adults with BMI > 30 kg/m^2 were randomized before the clinic visits into one of two groups using preprinted envelopes. Physician group patients were handed the packet by the resident physicians. Patient educator group had brief visits with the patient educator who summarized the information and answered questions. Follow-up phone calls were made to patients using a standardized questionnaire. Chi-square or Fisher exact tests were used for categorical data, Mann-Whitney tests for age/BMI; binary logistic regression was used for multivariate analysis.

Results: Of the 180 patients eligible to participate, 165 patients were enrolled in the study (80 patient educator, 85 physician) and 15 lost to follow-up. Mean age was 42 ± 14, 76% were female, 81% were African American, and mean visit BMI was 37 ± 7. When asked if they remembered who gave them the packet (patient educator vs. physician), 74% of patients responded correctly. Of the patients who made diet or lifestyle changes since receiving the packet, 68% (54) were from patient educator and 45% (38) from physician (P=0.003). The most common changes were: exercised more (24%, 39), ate healthier (33%, 54), and more aware of what I ate (35%, 57). Visit BMI was not associated with lifestyle change (P=0.07). Univariate analysis determined younger age (35 vs. 50, P=0.0012), brief patient educator visits (P=0.005) and accurate recall of who distributed information (P=0.000) were associated

with patient reported lifestyle changes, confirmed by multivariate regression (P=0.03, P=0.007 and P=0.001, respectively).

Conclusion: Younger age, brief patient educator visits, and accurate recall of the educational event were significantly associated with patient-reported lifestyle changes in obese patients.

FIRST PLACE ORAL PRESENTATION
Elevated Troponin as a Risk Marker in Hypertrophic Cardiomyopathy

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Background: A high proportion of hemodynamically stable hypertrophic cardiomyopathy (HCM) patients are known to have elevated serum cardiac troponin I (cTnI). However, the usefulness of elevated cTnI for predicting high risk and echocardiographic abnormalities in HCM patients is unknown.

Purpose: To assess if elevated troponin in patients with HCM was a marker for increased risk of adverse outcomes, especially reduced global strain.

Methods: We retrospectively interrogated clinical and echocardiographic data of patients evaluated for HCM at our HCM Center from July 2010 to September 2013. Abnormal cTnI due to any precipitating cause (like alcohol septal ablation or myocardial infarction) was excluded.

Results: Of 187 HCM patients, 18 were excluded due to incomplete data. Of 169 patients included, 57 (34%) showed elevated cTnI (>0.04 ng/ml). Clinical variables associated with elevated cTnI included elevated brain natriuretic peptide (310 ± 286 vs. 159 ± 206, P<0.01), ventricular tachycardia (26% vs. 12%, P=0.02), more than three sudden cardiac risk factors (18% vs. 6%, P=0.02), and implantable defibrillator (37% vs. 21%, P=0.04). Echocardiographic variables associated with elevated cTnI included reduced global longitudinal strain (GLS) (-14.4 ± 5.0 vs. -16.5 ± 3.5, P<0.01), extent of left ventricular hypertrophy (2.4 ± 0.7 vs. 2.2 ± 1.7, P<0.01), and reduced septal E′ (5.0 ± 2.3 vs. 5.7 ± 2.3, P=0.03). In a multiple linear regression model evaluating GLS, patients with elevated cTnI were found to have reduced GLS (P=0.046) and patients with greater septal E′ had greater GLS (P=0.002).

Conclusion: Elevated troponin I in hypertrophic cardiomyopathy identifies a high-risk subgroup for sudden cardiac death and is an independent predictor of reduced global longitudinal strain.

Additional Presentations

The following citations acknowledge the additional 2014 Aurora Scientific Day presentations, some of which have been published as abstracts in other scientific journals.

Rieselbach Distinguished Paper: Ortiz D, Singh M, Jahangir A, Allaqaband S, Mewissen M. Development and validation of a risk score to predict access site hematomas after peripheral vascular interventions. *Eur Heart J.* 2014 (in press).

Rieselbach Distinguished Paper: Mirza M, Strunets A, Niazi I, Nangia V, Cho C, Choudhuri I, Mortada ME, Bhatia A, Sra J, Jahangir A. Diabetes mellitus is associated with early mortality in patients with implantable cardioverter-defibrillator. *J Am Coll Cardiol.* 2014;63:A338.

First Place Poster: Strunets A, Mirza M, Cho C, Sra J, Jahangir A. Combination of ASA with dabigatran or rivaroxaban increases risk of bleeding without additional benefit of stroke reduction in patients with atrial fibrillation. *J Am Coll Cardiol.* 2014;63:A440.

Second Place Poster: Yousefzai R, Agarwal A, Anigbogu M, Shetabi K, Cho C, Bush M, Ammar KA, Paterick TE, Khandheria BK, Tajik AJ. Hypertrophic cardiomyopathy with aortopathy: a novel association. *J Am Coll Cardiol.* 2014;63:A826.

Third Place Poster: Mirza M, Rizvi F, Albrecht M, Strunets A, Emelyanova L, Holmuhamedov E, Werner PH, Kress DC, Khandheria BK, Sra J, Jahangir A. Noninvasive approach assessing atrial mechanics and serum biomarkers of collagen turnover provides a surrogate for fibrosis and atrial fibrillation. *Circ Res.* 2014 (in press).

Second Place Oral Presentation (tie): Yousefzai R, Allaqaband S, Shetabi K, Anigbogu M, Murtaza G, Agarwal A, Cho C, Palakuru S, O'Hair D, Bajwa T. Effect of pulmonary hypertension on patients with aortic stenosis who undergo transcatheter aortic valve replacement. *Catheter Cardiovasc Interv.* 2014;83:S219.

Second Place Oral Presentation (tie): O'Rourke L, Chauhan SP, Siddiqui D, Bernhard KA, Endres LK. Association of fetal abdominal-head circumference size difference with shoulder dystocia: a multicenter study. Orally presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

Third Place Oral Presentation: Sra J, Belanger B, Palma M, Krum D. Determining three-dimensional catheter location using single-plane fluoroscopy only. *Circulation.* 2013;128:A9457.

Khan A, Singh M, Aziz Z, Siddiqui A. A survey of concerns in end-of-life care: perspective from Pakistan. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

Bangaru MLY, Chen S, Woodliff J, Kansra S. Curcumin (diferuloylmethane) induces apoptosis and blocks migration of human medulloblastoma cells. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

Agarwal A, Yousefzai R, Cho C, Shetabi K, Jan MF, Bush M, Khandheria B, Paterick T, Werner P, Bajwa T, Allaqaband S, Tajik AJ. Hypertrophic cardiomyopathy center: contemporary multidisciplinary guideline-based experience. *J Am Coll Cardiol.* 2014;63:A503.

Chavez A, Bernhard KA, Siddiqui D, Magann EF, Chauhan SP. Poor detection of small for gestational age and discordant growth among twins irrespective of body mass index: a multicenter study. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

Agarwal A, Nfor T, Agrawal BK, Ortiz D, Lazarov L, Cho C, Tyszkowska A, Palakuru S, Jahangir A, Bajwa T, Gupta A, Allaqaband S. Contemporary review of the use of mild therapeutic hypothermia among comatose survivors after cardiopulmonary resuscitation: a tertiary care center's 4.5-year experience. *Catheter Cardiovasc Interv.* 2014;83:S164-S165.

Roberts E, Sulemanjee NZ, Lazarov L, Cook JA, Schultz KA, Cho C, Cheema OM, Hastings TE, Zwicke DL, Crouch J, Downey FX, Thohan V. Prevalence of late right ventricular dysfunction after left ventricular assist device implantation. *J Heart Lung Transplant.* 2014;33:S239.

Bauer WS, Hook ML. Evaluating the impact of evidence-based patient education on patient knowledge and behavior in acute care. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

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Rosner KJ, Ledesma M, Bernhard KA, Baumgardner DJ. Concordance between patient and provider greatest health concerns in a family medicine residency clinic. Poster presented at Aurora Scientific Day, Milwaukee, WI, May 21, 2014.

Strunets A, Mirza M, Cho C, Sra J, Jahangir A. Safety and efficacy of rivaroxaban and dabigatran in octa- and nonagenerians with atrial fibrillation: a community-based experience. *J Am Coll Cardiol.* 2014;63:A291.

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Anigbogu M, Nagendran K, Yousefzai R, Allaqaband S, Bajwa T, Gupta A. Educational program for reducing inappropriate percutaneous coronary intervention: a real-world experience at a tertiary care institution. *J Am Coll Cardiol.* 2014;63:A1627.

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Emelyanova L, Gudlawar S, Cosic M, Mirza M, Rizvi F, Holmuhamedov E, Downey FX, Tajik AJ, Jahangir A. Metformin inhibits mitochondrial permeability transition pore opening in human cardiac mitochondria. *Circ Res.* 2014 (in press).

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