**Poster Presenter:** Aaron Burnett  

**Contact Email:** Aaron.M.Burnett@HealthPartners.com  

**Abstract Title:** Potential Negative Effects of Epinephrine on Carotid Blood Flow and ETCO2 During Active Compression-Decompression CPR Utilizing an Impedance Threshold Device  

**Authors:** Burnett AB, Salzman JG, Segal N, McKnite S, Frascone RJ  

**Abstract:**  

**Objectives:** This study examined the effects of IV epinephrine administration on carotid blood flow and end tidal CO2 (ETCO2) production of a swine undergoing active compression-decompression CPR with an impedance threshold device (ACD-CPR + ITD).  

**Methods:** Six female swine (32±1Kg) were anesthetized, intubated and mechanically ventilated. Intracranial, thoracic aorta and right atrial pressures were recorded via indwelling catheters. Carotid blood flow (CBF) was recorded via Doppler. ETCO2, SpO2 and EKG were monitored. V-fib was induced and went untreated for 6 minutes. 3 minutes each of standard CPR (STD), STD-CPR+ITD and ACD-CPR+ITD was performed. At minute 9 of the resuscitation, 40µg/Kg of IV Epinephrine was administered and ACD-CPR+ITD was continued for 1 minute. Statistical analysis was performed with a Paired t test.  

**Results:** Aortic pressure, calculated cerebral and carotid perfusion pressures increased from STD < STD+ITD < ACD-CPR+ITD (p=<.001). Epinephrine administered during ACD-CPR+ITD significantly increased mean aortic (29±5 vs 42±12, p=0.01) cerebral (12±5 vs 22±10, p=0.01), and coronary perfusion pressures (8±7 vs 17±4, p=0.02); however, mean CBF and ETCO2 decreased (respectively 29±15 vs 14±7.0, p=0.03; 20±7 vs 18±6, p=0.04).  

**Conclusions:** The administration of epinephrine during ACD-CPR+ITD significantly increased markers of macrocirculation, while significantly decreasing ETCO2, a proxy for organ perfusion. While the calculated cerebral perfusion pressures increased, the directly measured CBF decreased. This calls into question the ability of calculated perfusion pressures to accurately reflect blood flow and oxygen delivery to end organs.
Poster Presenter: Abigail Katz

Contact Email: Abigail.S.Katz@HealthPartners.com

Abstract Title: Systems-Inspired Global Obesity Study (SIGOS): A Unique Approach to Multi-Site Data Collection

Authors: Katz AK, Pronk NP

Collaborators: Martinson BC (HPIER), Ankel FK (Emergency Departmment), Abdel-Hamid TK (Naval Postgraduate School)

Abstract: System dynamics is a methodology for understanding complex problems and has recently been applied to the study of weight management (Hamid, 2009). Better understanding the utility of systems sciences when applied to weight management may inform targeted and population-based approaches to obesity prevention.

Purpose: Demonstrate a unique methodological approach for collecting multi-site data from institutions worldwide.

Methods: The Principal Investigator at the host institution harnessed the capacity of over thirty (30) international researchers. Partner researchers were asked to collect data at each of their primary institutions based on a model outlined in a previous study (Sweeny & Sterman, 2000). Investigators at each site committed to recruit twenty-five (25) subjects, and recorded basic descriptive characteristics. An anonymous 10-minute paper-based exercise was used to assess subjects’ intuitive understanding of the dynamics of weight regulation. Data from all sites are being pooled for analysis.

Results: Three (3) convenience samples were drawn from the HealthPartners family of organizations. One sample consisted of Emergency Department residents, the others from interdisciplinary staff in administrative roles within HealthPartners (Sales and Health Promotion departments).

Conclusions: The SIGOS data collection experience represents an efficient method for collecting multi-site data. In the span of three months, over thirty (30) international researchers collected over 1,000 observations at a variety of institutions.
**Poster Presenter:** Ajay Behl  
**Contact Email:** Ajay.S.Behl@HealthPartners.com  
**Abstract Title:** Costs and Effects of Employing Dental Therapists  
**Authors:** Rindal DB, Huntley C  
**Collaborators:** Gesko D, Huntley C  
**Funding Agency:** W.K. Kellogg Foundation  

**Abstract:**

**Background and Aims:** There is an urgent need to improve access to dental care among underserved populations, which tend to include racial/ethnic minority groups and those of lower socioeconomic status. Low access remains the main cause of low utilization and high oral health disparities among the underserved.

In other developed countries, the use of expanded dental teams that include midlevel providers, such as dental therapists (DT), is quite prevalent. In the United States, only Alaska and Minnesota have the laws for the training and employment of midlevel dental providers. But there has been no comprehensive, evidence-based economic analysis of how these dental teams. This project addresses this critical deficit by developing and implementing a comprehensive analytical framework based on data from HealthPartners’ electronic dental records. In Minnesota the first class of dental therapists and advanced dental therapists has joined the workforce. For this proposal, we will use DT to denote both these types of providers.

**Hypotheses:** The project will address the following hypotheses:

1) Employing DTs has a net benefit for dental practices.

2) Employing DTs is cost effective from a societal perspective.

**Methods:** To analyze the effects and costs of increased access to dental care, we are first testing the feasibility of employment of DTs at the clinic’s level. After establishing that a clinic can employ DTs, we will analyze the consequences for society using patient-level econometric analysis.

**Results:** Our preliminary findings show that even the most disadvantaged HP dental clinic should be able to benefit from employing DTs.
**Poster Presenter:** Alex Adams

**Contact Email:** Alex.B.Adams@HealthPartners.com

**Abstract Title:** Intra-Abdominal Pressure Transmission to the Thorax is Predominantly at End-Inspiration

**Authors:** Cortes-Puentes G, Gard K, Faltesek K, Adams AB, Dries D, Marini JJ

**Collaborators:** Surgery – Regions Hospital, Pulmonary/Critical Care – Regions Hospital

**Funding Agency:** GE HealthCare

**Abstract:**

**Background:** Pathologic conditions that increase intra-abdominal pressure (IAP) can influence respiratory function by altering diaphragmatic function at end-exhalation and by restricting thoracic expansion. Increased IAP can reduce lung volume at end-expiration to generate poorly ventilated or collapsed lung units, as indicated by reduced FRC. At end-inspiration, increased IAP drives up plateau pressure, prompting a modification of ventilatory strategy to reduce plateau pressure and damaging transpulmonary forces. Because the impact of IAP on these two key parameters of tidal ventilation is not well defined, we evaluated IAP transmission to the esophagus and monitored FRC in a swine model of increased IAP.

**Methods:** Four deeply anesthetized swine were ventilated at f=15, Vt= 10 ml/kg, I:E = 1:2 and PEEP = 1 cmH2O. A tracheostomy tube was surgically inserted into the peritoneal cavity and a range of IAP levels (0,5,10,15,20,25 mmHg) were randomly applied via a CPAP system. Esophageal pressure and FRC were obtained at each IAP.

**Results:** Increasing IAP reduced FRC; the majority of the reduction occurring at IAP of 15 mmHg. The esophageal pressure relationship to increasing IAP had different effects at end-inspiration compared to end-expiration. Transmission of abdominal to esophageal pressure at end-inspiration was 0.408. Transmission of end-expiratory pressure was minimal at 0.037, despite a decline in FRC.

**Conclusions:** 1) Increasing intra-abdominal pressure reduces FRC but this reduction is not tracked by changes in end-expiratory trans-alveolar pressure. 2) Rising IAP stiffens the most flexible portion of the chest wall, markedly worsening tidal compliance of the respiratory system.
**Poster Presenter:** Amanda Carlson  
**Contact Email:** Amanda.J.Carlson@HealthPartners.com  
**Abstract Title:** Effect of Simulated Rare Procedures Clinic on EM Faculty Clinical Procedural Knowledge and Confidence  
**Authors:** Binstadt E, Carlson A, Nelson J, Dahms R  
**Collaborators:** Salzman J (Critical Care Research Center)  
**Funding Agency:** IME Resident Project Grant  

**Abstract:**

*Background:* Many emergency medicine procedures are rarely performed in clinical practice by faculty members. Simulation provides a safe and effective method to increase exposure to these treatments, theoretically improving provider confidence and technical ability, but is often not utilized by faculty.

*Objective:* Does emergency department faculty completion of a 2-hour rare procedure lab improve self-rated confidence in the ability to perform and teach the procedures safely and effectively?

*Methods:* This was a prospective, observational cohort study using a pre- and post-survey methodology for emergency department faculty physicians of an urban, Level One trauma center. The 16-item visual analog scale (VAS; 100mm) questionnaire asked participants to describe their ability to efficiently and safely perform and teach 4 different rare procedures (thoracotomy, lateral canthotomy, retrograde intubation, and ultrasound guided IJ placement). Following the pre-survey, participants completed standardized learning modules followed by simulated hands on rare procedural experience. Post-training surveys with the same 16-items were completed. Descriptive statistics were used to describe participant experience with each procedure prior to the education sessions. Wilcoxon signed rank test was used to compare pre- and post-survey results.

*Results:* 20 staff physicians participated in the procedure lab. Physicians reported the most experience with ultrasound guided IJ placement and the least experience with lateral canthotomy. Post-survey scores were significantly higher for self-reported confidence in their ability to efficiently and safely perform and teach each of the 4 procedures (p < 0.05 for all comparisons). The average change in VAS score from pre to post survey was largest for lateral canthotomy (efficiency = 38.6±27.6; safely = 35.4±29.6; teach = 46.8±28.8) and smallest for the rescue airway module (efficiency = 11.7±20.3; safely = 11.3±19.7; teach = 12.8±18.7). Previous experience with the procedure did not impact pre- and post-survey score improvement.

*Conclusions:* Providers reported improved confidence in their ability to efficiently and safely perform and teach 4 procedures following a rare procedures lab. Physicians reported the highest improvement in VAS scores for the lateral canthotomy module, with the least improvement in rescue airway.
Poster Presenter: Amy Butani

Contact Email: Amy.L.Butani@HealthPartners.com

Abstract Title: Building Cancer Research Capacity: Exploring How a Non-SEER Site can Readily and Efficiently Participate in Cancer Studies

Authors: Flottemesch TJ, Jackson JM, Butani AL

Collaborators: Braaten S (Regions Oncology Services)

Funding Agency: HealthPartners Institute for Education and Research Internal Grant

Abstract: Access to large, inclusive cancer databases such as the Surveillance, Epidemiology and End-Results (SEER) registries enables timely and efficient identification of cancer cases and gathering of tumor data. HealthPartners Institute for Education and Research's (HPIER) ability to conduct cancer research has been hampered by lack of access to such registries. HPIER developed a capacity-building project to explore how to quickly and accurately identify cancer cases and related data for research. Identification of a viable electronic data source would allow HPIER to populate the virtual data warehouse (VDW) tumor table and participate in multi-site studies within the Cancer Research Network (CRN).
Poster Presenter: Benji Mathews

Contact Email: Benji.K.Mathews@HealthPartners.com

Abstract Title: Steroid Use in COPD Exacerbation: A Quality Improvement Project at Regions Hospital, St. Paul, Minnesota


Collaborators: Internal Medicine Department

Abstract:

Introduction: Chronic obstructive pulmonary disease (COPD) is a leading cause of hospitalizations and mortality in the United States. In practice, the dose and route of steroid administration in COPD exacerbations varies widely.

Methods: A literature review was performed to identify the effectiveness of various steroid doses and administration routes used in the treatment of COPD exacerbations and compare it with what is done at Regions Hospital in St. Paul, MN.

Results: Literature review demonstrated the benefits of using methylprednisolone 125 mg IV vs. placebo. Subsequent studies compared lower oral doses (20-80 mg prednisone) to high IV doses and found low-dose oral steroids to be equally effective with fewer side effects. Among patients admitted for COPD exacerbation (n=225), 39% received low-dose (20-80 mg prednisone equivalent) oral prednisone in the emergency department. 22% received higher doses or IV doses in the emergency department. The initial inpatient steroid dose of these same patients revealed that 66% versus 33% received low-dose compared to high-dose or IV steroids, respectively.

Conclusion: Many physicians continue to prescribe unnecessarily high or IV doses of steroids for COPD exacerbations despite evidence suggesting that lower doses are equally effective and have fewer side effects. A creation of a COPD order set with a decision support tool is planned that includes information about the effectiveness of lower-dose oral steroids and encourages selection of lower doses for the initial treatment of these patients. A secondary analysis will be carried out one year after implementation to monitor the quality improvement.
**Poster Presenter:** Bill Rush

**Contact Email:** William.A.Rush@HealthPartners.com

**Abstract Title:** Dissemination and Implementation: The Challenge of Twenty-First Century Health Care Research

**Authors:** Rush WA

**Abstract:** Osmosis has proven itself to be a largely ineffective way of transferring knowledge from health research to the population of health care practitioners. There are many barriers and few facilitators to the dissemination of new and more effective health care advances. First study results are published across thousands of journals which are rarely read by the practicing provider. Even if a provider is interested in the latest results in a specific area, most lack the skill at using the tools to search out the appropriate information or to evaluate its validity. When a journal article is read, the scope of most research reports is extremely limited and lacking insights into how it may be incorporated into everyday health care practice. The strongest level of evidence, the randomized control trial (RCT), because of the restrictions of the underlying study design, are very difficult to implement within a practice setting where patient variation can be expected to exceed the boundaries of the RCT.

A recent response to the problem of too much knowledge and the lack of effective approaches for dissemination has been the development of guidelines and systematic reviews. While both these approaches to research summarization, can organize knowledge in a coherent and standardized way, they have proven unable to span the chasm between dissemination and implementation.

HealthPartners Institute for Education and Research is trying to bridge this gap through the development of simulated training tools. This is made possible by three recent innovations. The first is the aforementioned guidelines, which encourage the standardization of care while also personalizing it for each patient. The second is the development of the internet, thus allowing the rapid distribution and updating of simulation tools. Third is the electronic health record (EHR). By emulating an HER information can be presented and collected from the provider as they practice treating simulated patients.

Internet based simulated training provides a rich learning environment with the latest knowledge and limited patient risk. When a new medication, procedure or other health care innovation is developed it can be rapidly disseminated to users across the globe. Health care is a profession where one does not want to learn through ones mistakes. This can introduce a level of caution and hesitancy around trying new developments; however, a simulation provides a safe environment where simulated patient can be treated without risk of adverse events.

HealthPartners Institute for Education and Research because of its unique relationship with health care systems and work developing simulated systems is well positioned to be a leader in dissemination and implementation of the ever expanding research advances.
Abstract: Public policy and health research increasingly recognize the impact of nutrition and place upon the health of individuals and communities, as glaringly demonstrated in rural and urban areas where it is difficult to affordably obtain the whole foods needed to maintain a healthy diet. Life in these “food deserts” has been shown to correlate with poorer nutrition and hunger. Researchers have also suggested that exposure to food deserts contributes to the development and exacerbation of health problems like diabetes, hypertension, dyslipidemia, and vascular disease. However, few studies have explicitly examined this connection. Understanding the link between food availability and diet-related illness may help explain certain health disparities and point to modifiable environmental factors that contribute to them.

Our study examines correlations between emergency department (ED) presentations for diet-related complaints and living in “food desert” areas of low healthy food availability. We are using geographic information systems (GIS) to analyze food outlet data from St. Paul-Ramsey County Public Health and the Minnesota Department of Health in order to define local “food desert” areas by US Census tract block groups. We are analyzing data from Regions Hospital ED visits using geographic information systems (GIS) to similarly map patients’ presentations for diet-related complaints (malnutrition, diabetes, and hypertension). Finally, we are using spatial regression analysis to look for associations between these two geographic models of ED presentations for diet-related illness and areas of low healthy food availability, mapped by US Census block group, while controlling for covariates derived from US Census 2010 data.
**Poster Presenter:** Brad Rindal  
**Contact Email:** Donald.B.Rindal@HealthPartners.com  
**Abstract Title:** The Impact of Participation in a PBRN on Dental Practice Patterns  
**Authors:** Rindal DB, Flottemesch TJ, Godlevesky OV  
**Funding Agency:** NIDCR  

**Abstract:**  

**Introduction:** The National Institute of Dental and Craniofacial Research has made significant investments in dental practice-based research networks dating back to 2005. By connecting practitioners with experienced clinical investigators and addressing questions faced by dental health practitioners on a daily basis, PBRNs have the potential to generate research findings that are immediately relevant to practitioners. These networks hold great potential to improve the translation of research evidence into daily practice. Prior efforts to examine this issue have relied on questionnaires to assess the dentist's stated clinical practice in a given clinical scenario. Clinical data examining actual practice patterns is needed to better answer the question of whether participation in topic related studies and related dissemination meetings changed their practice patterns to align with the evidence. This project utilized clinical data from the electronic heath record to examine actual practice patterns at baseline when HealthPartners dentists first enrolled in the network and examined practice patterns at a later time period after completion of the study and related meetings.  

**Methods:** Multivariate logistic regression models adjusting for clustering at the clinic, provider, and patient level were used to compare 2005 and 2009 restoration rates. Preparation of the analytic datasets was done in four steps using two data sources. First, using the electronic dental record (EDR) all F80, F81, and F82 findings corresponding to preventive dental visits occurring in the calendar years 2005 and 2009 were identified. Visits with a finding were classified as index visits. Second, using the EDR, each finding's treatment was determined by identifying any treatment codes occurring for a period of up to six-months following the date of the finding code's index visit. Treatments were placed into one of four categories: Fluoride, Remineralization, Restoration, and Unknown. If multiple treatment codes were identified, the following order was applied: Restoration, Remineralization, and Fluoride. Third, using the EDR, the number of co-occurring dental finding for that patient were identified and classified as enamel (F80, F81, F82), dentin (F83, F84), or sealant (F892, F893) damage. Fourth, each HPDG provider's level of DBPRN engagement was determined using a separate database maintained by the study coordinator.  

**Results:** Three levels of increasing DBPRN involvement were identified: None (n=6), Low (n=15), and High (n=14). The multivariate, cross-level models yielded two important findings. The first was that there was a significant overall reduction on restoration rates for the entire dental group. In 2005, prior to DBPRN involvement, restoration rates across the three groups of providers varied significantly. HPDG providers with no future DBPRN involvement restored 85% of all F80, F81 and F82 findings. Providers with a future low level of DBPRN involvement
restored 78% of F80, F81, and F82 findings in 2005; and, HPDG providers with a high level of future DBPRN involvement only restored 73% of similar findings. In 2009, providers with no DBPRN involvement restored 54% (37% relative decrease) of F80, F81, and F82 findings. Those with a low level of DBPRN involvement restored 48% (39% relative decrease) of F80, F81, and F82 findings, and those with a high level of DBPRN involvement restored 46% (38% relative decrease). The second key finding was that the level treatment variation across providers was far greater than the level of variation across levels of DBPRN involvement. In 2005, restoration rates ranged from high of 95% to a low of 43% across providers. In 2009, restoration rates ranged from a high of 70% to a low of 24%.

Conclusions: There are multiple factors impacting the decision to restore or remineralize a tooth found to have a carious lesion. While involvement with the DBPRN appears to correlate with lower overall rates of restoration, it did not correlate with practice change defined as significant decreases in restoration rates. A more detailed analysis of how treatment patterns evolved over the study timeframe is needed to better understand the impact of DBPRN involvement upon dental treatment.
Abstract:

**Introduction:** Based on a previous mapping study which detailed pilon fracture patterns, a distal tibial implant was designed to address common zones of comminution and primary fracture fragments in pilon fractures. The purpose of this study is to determine if this plate design properly addresses the most common OTA/AO type 43C3 fracture patterns.

**Methods:** This anteriorly based implant features removable distal tabs which can buttress anterior plafond comminution, two kickstand screw trajectories which address the typical posterolateral and medial fragments, and a distal A to P screw pattern which allows for a raft above the plafond apex. All patients treated using this plate for the pilon fracture between September 2011 and June 2012 were prospectively enrolled. Injury radiographs and CT scans performed after application of external fixators and all postoperative radiographs were reviewed. An assessment of how the plate addressed the fracture pattern was performed for each patient.

**Results:** Twenty consecutive OTA/AO type 43C3 tibial pilon fractures (11 R/9 L) were enrolled. The cohort consisted of 14 males and 6 females, with a mean age of 43 years (range, 23-61). There were three open fractures. Fourteen of the 20 fractures (70%) had an associated fibula fracture; all which were fixed through a separate incision. Eighteen of the 20 (90%) were consistent with the published Pilon Map. In the series, seven 3-hole, four 5-hole, five 9-hole and four 13-hole plates were used. 78% of the kickstand screws were used (15 medial, 16 lateral) addressing the medial malleolar and/or posterolateral fragment. Thirty-nine of the 60 (65%) distal tabs for the anterior comminution of the fracture were utilized. Of the 20 cases, only 2 (10%) had separate medial buttress plates applied.

**Discussion:** A new custom anterior pilon plate designed to address tibia pilon mapping data, consistently addressed the fracture patterns in OTA/AO type 43C3 tibial pilon fractures. This study provides the basis for a comparative outcome study.
**Poster Presenter:** Bruce Bennett

**Contact Email:** Bruce.A.Bennett@HealthPartners.com

**Abstract Title:** Incidence of External Fixator Complications in Patients Undergoing Magnetic Resonance Imaging

**Authors:** Gonzaga T, Morgan RA, Kurland JL, Wewerka SS, Bennett BA

**Abstract:**

**Background:** There is speculation that use of magnetic resonance imaging (MRI) can increase the risk of pin site infection in patients with external fixation due to heating of the fixator pins, but no studies have evaluated this association with a large cohort of patients. This study compared pin site infection and external fixator complications in trauma patients with and without MRI exposure who also had extremity or pelvic fixation.

**Methods:** Following IRB approval, we conducted a retrospective chart review for 915 trauma patients admitted between January 2000 and December 2011 who underwent external fixation placement. Patients with LISS and Ilizarov fixators were excluded. Age, gender, date of service Injury Severity Score (ISS), and fracture classification (Gustillo) were abstracted, as were the following external fixation variables: location, date of placement, date of removal, exposure of fixator to MRI and hospital discharge date. Complications, including pin site infection, wound infection, skin necrosis, pin displacement and non-union were recorded. Logistic regression was used to determine if patients undergoing an MRI were more likely to experience a pin-site infection or complication, after adjusting for patient demographic variables.

**Results:** Demographic results were as follows: 64.5% male, median age = 44, and median ISS = 10. Overall, 12.9% of patients developed pin-site infections, and 24.7% developed one or more complications. Pin-site infection was not associated with MRI exposure (OR 0.64, 95% CI 0.22 - 1.51, p=0.35). The odds of developing a complication were also not associated with exposure to MRI (OR 1.51, 95% CI 0.84 - 2.63, p= 0.14), and did not change when adjusted for fracture classification (OR 1.37, 95% CI 0.79 - 2.36, p = 0.26).

**Conclusion:** MRI obtained in the presence of external fixator devices does not appear to increase the incidence of pin site infections or complications.
**Poster Presenter:** Carl Patow

**Contact Email:** Carl.A.Patow@HealthPartners.com

**Abstract Title:** Creating Culturally Authentic Films about Health: Challenges and Best Practices

**Authors:** Bryan DJ, Patow CA

**Collaborators:** HealthPartners Medical Group, HealthPartners Dental Group, HealthPartners Health Plan, Regions Hospital, Mixed Blood Theater, Twin Cities Public Television, Rainbow Research, 25 community members and patients

**Funding Agency:** Pfizer Medical Education Group

**Abstract:** Films about the impact of culture on health can be powerful tools in creating intercultural understanding of health behaviors and preferences.

As part of a year-long health care redesign activity, four films were commissioned from screenwriters of diverse cultures in Hmong, East African, African American and Latino communities in Minnesota. The playwrights created theater pieces of 30 minutes in length, with very few characters, that described health issues of a family from their culture. The plays were performed by professional actors, in their native language, and filmed by Twin Cities Public Television. The four films that were produced became the basis for in-depth intercultural discussions by 100 participants in the care redesign educational activity.

During the creation, filming, production and discussions of the films, a set of best practices were identified. These practices include: creating a common vision for the written script, managing language and translation issues, choosing sets and locations that are culturally authentic, finding talent, navigating cultural preferences and expectations of actors and maintaining cultural sensitivity in postproduction.

The best practices provide guidance for institutions considering commissioning theater pieces that include diverse languages and cultures. Once filming has begun, it may be too late. Anticipate cultural preferences to avoid costly mistakes.
Poster Presenter: Chad House

Contact Email: Chad.M.House@HealthPartners.com

Abstract Title: Ultra-Low Dose Single Photon Emission Computed Tomography Myocardial Perfusion Imaging

Authors: Nelson WB, House CM, Turnquist PK, Spence JM, Anstadt MA, Nickele GA, Dahiya R

Collaborators: Nuclear Medicine

Abstract:

**Background:** Single photon emission computed tomography (SPECT) myocardial perfusion imaging (MPI) provides excellent diagnostic and prognostic information. Limitations include radiation exposure and imaging time, with radiation doses of 10-15 millisieverts (mSv) and imaging times exceeding twenty minutes. New cadmium zinc telluride (CZT) technology has opened the door to reduced radiation exposure and imaging times.

**Methods:** An observation of 414 consecutive patients undergoing very low-dose SPECT MPI, utilizing CZT technology, at Regions Hospital, St. Paul, MN, between 11/16/2011 and 1/24/2012 was conducted. Patients received dosing strategies of 3/9, 4/12, 6/18, 8/24 or 10/30 millicuries (mCi), depending on their weight and body mass index (BMI). The groups were compared on total counts and subjective scan quality using an unpaired t-test or Fischer's exact test.

**Results:** Of the 414 patients, 58% received 3/9mCi, 22% received 4/12mCi, 13% received 6/18mCi, 6% received 8/24mCi and the remaining 1% received 10/30mCi. The estimated radiation dose was 3.6, 4.8, 7.2, 9.6 and 12mSv respectively. 88% of all studies were subjectively graded as either good or excellent, with the remaining 12% being fair, poor or not graded. All groups, except the 10/30 group, had 82-92% of studies subjectively graded as excellent or good according to the respective reader. The rest/stress counts (103) for 3/9 and 4/12 groups were 532±212/1718±525 and 545±177/1748±399, while the rest/stress counts (103) for the 6/18 and 8/24 groups were 673±178/2235±923 and 764±249/2588±788 respectively. The 3/9 and 4/12 groups had significantly lower counts than the 6/18 and 8/24 groups, with no difference in image quality. 35 patients proceeded to angiography after their MPI. This revealed a sensitivity of 97%, specificity of 50%, positive predictive value of 94%, negative predictive value of 67% and an accuracy of 91% for detecting coronary artery disease.

**Conclusion:** CZT technology permits rapid, very low-dose MPI studies to be performed, thus reducing the radiation exposure for patients, while still providing high quality, diagnostic perfusion results.
**Poster Presenter:** Chris Anderson

**Contact Email:** Christopher.P.Anderson@HealthPartners.com

**Abstract Title:** A Data-Driven Triage Tool Indicates the Risk of 30-Day Hospital Readmission

**Authors:** McCarty MC, Anderson CP

**Collaborators:** HealthPartners Institute for Education and Research, Department of Quality Measurement and Data

**Funding Agency:** HealthPartners Institute for Education and Research Internal Grant

**Abstract:**

**Background:** Existing scores for predicting 30-day hospital readmissions have limited practical use given the complexity of required data elements.

**Objectives:** The purpose of this study was to develop a simple predictive tool to identify patients at high risk of readmission.

**Methods:** Medical or surgical patients who were discharged alive from Regions hospital between 7/1/2006 and 6/30/2009 were identified from administrative data. Our primary outcome was 30-day readmission to Regions hospital. We investigated 80 independent variables as predictors of readmission: demographic and utilization data, care characteristics and discharge medications. Logistic regression was used to find odds ratios and discrimination provided by each predictor. Observations were randomly allocated to training or validation datasets. The training data was used to construct several multivariate models of 30-day readmissions, which were selected for predictive ability, parsimony, and clinical ease of use. From these models, we developed an integer scale to indicate a patient's risk of readmission, based on the magnitude of the observed regression coefficients.

**Results:** Our sample consisted of 38,636 patients. The selected multivariate model had six independent predictors of readmission: a count of ICD-9 codes, a count of past year hospitalizations, indication of >2 ED visits in the past year, indication of being in an operating room, indication of either heart failure or COPD, and discharge to a skilled nursing facility. The composite risk score derived from these predictors ranges from 0 to 16, with higher scores indicating greater risk. This rule showed good discrimination (c-statistic =0.670) when applied to the holdout data.
Poster Presenter: Dave Butani

Contact Email: Dave.I.Butani@HealthPartners.com

Abstract Title: HP Institute's DCC

Authors: Butani D, Paskach R

Abstract: Overview of the services and expertise available within the Data Collection center that is available to support research done at the Institute. Also, includes the technology available for data collection by web, telephone, mail, and in person.
Abstract:

Background: Approximately 300,000 hip fractures occur yearly within the US. This number is projected to double by 2050. Mortality/Complication rates for all patients with hip fractures approach 30%. In spite of the high complication rate associated with hip fractures in the elderly, surgical repair of these fractures is often undertaken at night. Multiple studies have found that work done at night is more likely to result in complications. There is, however, little evidence regarding the effect of the time of day on the outcome of surgical repair of hip fractures. We present a retrospective study comparing the outcomes of surgery for hip fractures based on the time of day of surgery. Our hypothesis was that hip fracture patients who have surgery in the evening or night have worse outcomes than those who have surgery during the day.

Methods: A retrospective study of 1552 consecutive patients with a diagnosis of intertrochanteric, subtrochanteric, or femoral neck fracture from 2005 to 2010. 860 pts met the inclusion criteria (age≥50 years old, isolated injury, and surgical treatment of the fracture). Surgeries were grouped by time of surgical incision into an AM group (07:00 - 15:59) and a PM group (16:00 - 06:59). Records were analyzed for age, comorbidities, ASA score, 30-day mortality, re-admission, re-operation, time to surgery, procedure length, total time in the operating room (OR), intra-operative fracture, and medical complications (myocardial infarction, cardiac event, stroke, central nervous system event, pneumonia, urinary tract infection, post-operative wound infection, bleeding requiring transfusion of 3 or more red blood cell units).

Results: 860 patients met the inclusion criteria. 660 patients underwent surgery in the time period designated as the AM group. 200 patients underwent surgery in the time period designated as the PM group. There was no statistical difference between the groups regarding age, ASA score, Charlson comorbidity index, gender, or fracture type. The overall 30-day mortality was 7.8%. The total complication rate was 28%. There was no significant difference found in either 30-day mortality or total complication rate based on the time of day that the surgery was performed (P=0.88 and P=0.86 respectively). This remained unchanged when ASA score, Charlson comorbidity index, and age were taken into account. A multivariate analysis of the risk factors collected was performed to determine which factors did affect outcomes in our study. Age (Odds Ratio=1.034/year), Charlson score (OR= 1.155/point), ASA score (OR=1.405/point), and total OR time (OR=1.688/hour) were all found to predict adverse outcomes. Female gender was found to be protective (OR=0.679). Type of surgery, fracture site, total surgery time, and surgery time of day did not predict adverse outcomes.

Conclusion: In our study population, surgical time of day did not affect the 30-day mortality or number of complications. As the number of hip fractures increases, the demands on orthopaedic surgeons will increase as well. Surgical treatment within 48 hours has been shown
to reduce morbidity and mortality of hip fractures. Our study shows that operating after hours did not increase the risk of adverse events surrounding surgery. Age, ASA score, Charlson comorbidity index, and total time in the OR were predictive of adverse outcomes. This information may be used to discuss the risks of the surgical repair of hip fractures with patients and their families.
**Poster Presenter:** Debra Bryan  
**Contact Email:** Debra.J.Bryan@HealthPartners.com  
**Abstract Title:** The EBAN Experience: An Equitable Health Collaborative  
**Authors:** Bryan DJ, Patow CA  
**Collaborators:** HealthPartners Medical Group, HealthPartners Dental Group, HealthPartners Health Plan, Regions Hospital, Mixed Blood Theater, Twin Cities Public Television, Rainbow Research, 25 community members and patients  
**Funding Agency:** Pfizer Medical Education Group  

**Abstract:** The effectiveness of a yearlong educational format that included interdisciplinary teamwork, quality improvement and care process redesign was demonstrated through an equitable health collaborative. Ethnic community members and health professionals, in teams together, improved outcomes in preventive services for cancer screening, immunizations, dental care, diabetes and other conditions. 100 participants in 9 teams learned about quality improvement, explored the influence of culture on health and redesigned care according to cultural preferences for East African, African American and Latino populations in Minnesota. In four quarterly meetings, participants learned about culture and health, quality improvement and the social determinants of community wellbeing. Educational methods included didactic lectures, interactive learning, panel discussions and facilitated dialogue. Three screenplays were commissioned from ethnic screenwriters, performed in native languages, filmed by public television and used to stimulate intercultural discussion and understanding. A structured framework of meetings, conference calls and reports to leadership maintained the momentum and discipline needed for success of the collaborative. Outcomes included improved experience of the clinical system, better health for patients of color and new, robust, relationships with cultural organizations and members of diverse communities in the region.
Abstract:

Introduction: The role of aspirin therapy for reducing risk of cardiovascular events among those with pre-existing cardiovascular disease is well-established. However, a more individualized approach is recommended for primary prevention based on estimated risks for cardiovascular disease and gastrointestinal bleeding.

Methods: The United States Preventive Service task force has published methods and tables to estimate the number of MIs and strokes prevented and estimated harms of using aspirin based on age categories in hypothetical cohorts of men and women. Translation of the guideline requires data and formulas to calculate risk which are not readily available to practicing clinicians. We took advantage of the opportunity to enhance the efficiency of provider and patient decision making regarding aspirin through the use of electronic health record data and computer program assistance to assess the risks and benefits.

Results: The decision support program for aspirin in HPMG was integrated with the electronic health record through a web-service called Cardiovascular (CV) Wizard. At the point of care, de-identified data including pertinent demographics, diagnosis codes, lab results, medications, and allergies are transmitted to the web service and run through a set of sophisticated algorithms to assess whether aspirin is indicated and to provide individualized treatment suggestions and safety alerts based on known allergies and intolerance, contraindications, and identification of previous bleeding risks.

Conclusion: Using electronic decision support algorithms, it is possible to provide patients and providers with printable information to engage them in more evidence-based decisions about aspirin use for primary prevention.
Poster Presenter: Don Nixdorf

Contact Email: Donald.R.Nixdorf@HealthPartners.com

Abstract Title: Peri-Operative Endodontic Pain within The Dental Practice-Based Research Network

Authors: Rabinowitz IA, Nixdorf DR, Look JO, Rindal DB, Gordan VV, Gilbert GH, Law AS, DPBRN COLLABORATIVE GROUP

Collaborators: Park Dental, Saint Louis Park, MN; School of Dentistry, University of Minnesota, Minneapolis, MN; College of Dentistry, University of Florida, Gainsevill, FL; Dept. of General Dental Sciences, University of Alabama at Birmingham, Birmingham, AL; Endodontics, The Dental Specialists, Lake Elmo, MN

Funding Agency: NIDCR

Abstract:

Objective: An estimated 16 million root canals are performed annually in the U.S. alone. Pain is often associated with endodontic involvement and subsequent root canal therapy (RCT). The ability of dentists to ameliorate pain makes this an important area for study. We present observational data on pain intensity and pain interference experienced by RCT patients.

Method: A total of 62 dentists (46 generalists, 16 endodontists), practicing in five geographical areas of The Dental Practice-Based Research Network enrolled patients requiring RCT. Data collection via patient self-report occurred before, immediately following treatment, and 1 week after treatment to measure pre-operative, intra-operative and post-operative pain. Pain intensity and interference in life activities were measured using the Graded Chronic Pain Scale (0-10), while analgesic intake and adequate anesthesia were dichotomous outcomes.

Results: 708 patients were enrolled over a 6-month period. Mean (S.D) pain intensity during the week prior to treatment was 3.6/10 (2.9); worst pain was 6.7/10 (3.0) with 50% experiencing severe pain ($\geq$7/10). Preoperatively, 65% of patients reported taking analgesics and the mean (S.D.) number of days with pain was 0.5 (1.2). Intra-operative pain was 1.1/10 (1.9) and adequate local anesthesia was reported by 91%. In the week following treatment, worst pain was 4.3/10 (1.4), and 16% of patients experienced severe pain. Post-operatively, 55% of patients took analgesics and the mean (S.D.) number of days of pain interference was 0.3 (1.0); 6% reported severe pain plus regional swelling.

Conclusion: On average, patients experienced moderate amounts of pain and one-half days of pain interference during the week before treatment. The majority experienced minimal intra-operative pain and adequate anesthesia. Severe pain within the first week post-operatively was reduced, but was still reported by 1 in 6 patients.
Poster Presenter: Elyse Kharbanda  
Contact Email: Elyse.O.Kharbanda@HealthPartners.com  
Abstract Title: Pregnancy Among Insured Adolescents  
Authors: Kharbanda EO, Anderson C, Molitor B, Nordin JD  
Funding Agency: HealthPartners Institute for Education and Research Internal Grant  
Abstract:

**Background:** Birth to a teen mother is associated with increased risk for adverse outcomes, including preterm birth and low birth weight. Goals of this study were, in an insured population, to describe teen pregnancy rates and outcomes and to identify sub-populations of youth at increased risk for pregnancy.

**Methods:** Using a validated, claims-based algorithm, we identified pregnancies occurring among adolescents 15-19 years of age with at least one year of continuous insurance from 2003-2010. We used descriptive statistics to compare teen pregnancy rates by age, year, race/ethnicity and type of insurance.

**Results:** Our cohort included 73,199 teens and 93,491 person-years. The mean annual teen pregnancy rate was 44.6 per 1000 teens 15-19 years of age. Pregnancy rates increased markedly by age, from 12.4 per 1000 15 year-olds to 78.9 per 1000 19 year-olds. Trends in pregnancy rates by year were not observed. African American and Hispanic teens experienced pregnancy at rates over 4 times greater than white teens (137.8, 127.0 and 30.7 per 1000, respectively). Teens who were ever on public insurance had pregnancy rates more than 7 times greater than those never on public insurance (134.8 per 1000 versus 17.4 per 1000). Two-thirds of pregnancies ended in a live birth, one-fourth in a therapeutic abortion and the remainder resulted in spontaneous abortions. Hispanic youth and those ever on public insurance had lower rates of therapeutic abortions.

**Conclusion:** In this insured cohort, African American and Hispanic youth, and adolescents with public insurance experienced markedly increased rates of teen pregnancy.
Abstract Title: Impact of BMI and Change in BMI on Progression from Normotension to Prehypertension or Hypertension in Patients Ages 3-17

Authors: Parker ED, O'Connor PJ, Trower NK, Tavel HM, Sherwood NE, Kharbanda EO, Daley MF, Adams KF, Jacobs DR Jr, Sinaiko AR, Margolis KL, LO JC, Magid DJ

Collaborators: Institute for Health Research, Kaiser Permanente Colorado; Division of Epidemiology and Community Health, University of Minnesota; Department of Pediatrics, University of Minnesota; Division of Research, Kaiser Permanente Northern California

Funding Agency: NHLBI

Abstract:

Objective: Overweight and obesity among US children and adolescents is an important public health problem. Conditions associated with obesity, such as type 2 diabetes, hypertension, and hypercholesterolemia, are becoming more common in children. This study examined the relationship between changes in BMI percentile and incident prehypertension and hypertension in a cohort of children and adolescents.

Methods: Study subjects were 23,578 patients, ages 3-17, with three or more outpatient primary care visits between 2007 and 2010 at HealthPartners Medical Group, Kaiser Permanente Colorado, or Kaiser Permanente Northern California. Data were extracted from electronic health records (EHR). Change in BMI was defined as: increase, decrease, stayed obese, stayed overweight, and stayed healthy weight using established BMI percentile cut-points. Incident prehypertension and hypertension were defined using blood pressures and diagnosis codes from the EHR. We used time-dependent Cox proportional hazards models to estimate the hazard of change in BMI percentile with incident prehypertension and hypertension.

Results: Over a median 2.6 years follow-up, there were 7,232 cases of incident prehypertension, 148 diagnoses of incident hypertension, and 107 additional cases of incident hypertension based on blood pressure data from the EHR. Seventy-one prehypertensives went on to develop hypertension. Those who stayed obese, stayed overweight, and increased BMI had increased hazard of incident prehypertension (1.96, 1.39, and 1.49, respectively) and increased hazard of incident hypertension (3.61, 1.21, and 1.83, respectively) compared with those who stayed healthy weight.

Conclusion: Persistently high BMI or increasing BMI over time was associated with pronounced increase in risk of both incident prehypertension and hypertension. Future research should examine factors associated with the development and recognition of hypertension.
Poster Presenter: Erhard Haus

Contact Email: Erhad.X.Haus@HealthPartners.com

Abstract Title: Adrenal Response to Endogenous ACTH in Obese and Non-Obese Elderly Subjects

Authors: Haus E, Dumitriu L, Sackett-Lundeen L, Nicolau G

Collaborators: Regions Hospital Department of Pathology, University of Minnesota, “C.I. Parhon” Institute of Endocrinology, Romanian Academy of Medical Sciences

Abstract: The circadian rhythm in plasma ACTH and plasma cortisol was determined by radioimmunoassay in 324 diurnally active elderly subjects 57 to 95 years of age. The body mass index (BMI) was obtained and the circadian means of ACTH and cortisol in subjects with a BMI below 30 (202 subjects) were compared with obese subjects (122 Subjects) with a BMI of 30 and above.

Results: The obese subjects showed significantly lower circadian mean in ACTH but not lower circadian means in plasma cortisol. The ACTH in obese subjects was 17.9 ± 1.4 as compared to 27.5 ± 2.2 in the non-obese subjects (F = 9.784, p = 0.0019), while cortisol was 9.1 ± 0.2 and 9.6 ± 0.2 (F = 3.061, p = 0.0811) respectively. The ACTH/Cortisol ratio in the obese was 2.03 ± 0.18 as compared to 3.70 ± 0.34 in the non-obese subjects (F = 8.360, p = 0.0041). This change in the ACTH/Cortisol ratio suggests an increased sensitivity of the adrenal in obese subjects to endogenous ACTH which may be of interest for the pathogenesis of this disorder.
**Poster Presenter:** Eugenia Canaan

**Contact Email:** Eugenia.S.Canaan@HealthPartners.com

**Abstract Title:** Beyond Resiliency: Thriving in Today's Health Care Environment

**Authors:** Canaan E, de la Torre M, Patow C

**Abstract:**

**Objective:** To aid residents and faculty in coping with the pressures of medical life in an academic medical center; stimulate discussion and deeper understanding of physician “burnout,” by using experiential education techniques to enhance dialogue.

**Rationale:** The topic of “resilience” has surfaced in multiple educational forums including GME committee meetings, resident advisor one-on-ones, and physician leadership meetings. The frequency and complexity of the concerns underscored the need to provide coping mechanisms to ensure a safe and thriving learning environment.

**Description:** A group of physician leaders participated in an off-site retreat designed to: 1) provide time for reflection on personal choices and career paths, 2) examine “resiliency” as a concept, and 3) create a vision for a healthier work environment. The retreat was conducted by a local leadership facilitator and performing arts director and incorporated story-telling, readings, team challenges, personal reflection and discussion.

**Results:** Retreat participants left the retreat with individual action plans and opted to reconvene as a cohort on a periodic basis to support each other and learn from their ongoing experiences. In addition to the retreat, a six hour Physician Well-being Symposium will be held in June 2012 for residents and faculty. The symposium will be coupled with a commissioned play about physician well-being, that explores the impact of five physicians’ choices on career, family, dreams and personal well-being. Initial readings of the play have demonstrated its ability to raise issues and promote discussion.

**Summary:** Experiential education techniques can be an effective method to stimulate discussion about physician wellness.
**Poster Presenter:** Gail Johnson

**Contact Email:** Gail.L.Johnson@HealthPartners.com

**Abstract Title:** Doing the Simulation Two Step: Implementing 2-Patient Assignment Simulations

**Authors:** Kipper KI, Chew SL, Johnson GL

**Collaborators:** Meadows C (Nursing Practice & Education, Regions Hospital)

**Abstract:**

**Problem:** The healthcare environment is dynamic and healthcare professionals must learn to function under unique demands: changing patient needs, multiple interruptions, various distracters, inconsistent resource availability, time-critical needs, and evolving acuity levels. Although the reality of practice is multiple patient assignments, education and orientation processes often focus on the management of one patient at a time to maximize learning and comprehension. This creates a performance gap and may set new nurses up to fail.

**Educational Intervention:** To bridge this gap, a series of four 2-patient simulations were developed and implemented into the final day of a 7 week critical care orientation program. During the program, two patient scenarios occur simultaneously in separate rooms. Scenarios are designed so the “patients” have competing needs requiring participants to consider prioritization, utilization of resources, troubleshooting equipment, and critical thinking. The four simulations (8 patients) incorporate disease processes encountered/discussed during the orientation program. Two participants work as one person to assess and intervene as needed. Different participant pairs are involved with each 2-patient simulation.

**Result/Outcome:** Implementation of 2-patient simulations has resulted in more in-depth discussions of clinical reasoning, prioritization, troubleshooting, resource utilization and use of critical language during the post simulation debriefing session. Participants have said that the experience is more realistic. As a result of the success of this program, multiple patient scenarios have been implemented into Progressive Care Orientation, and nursing student curricula.
Poster Presenter: Gretchen Taylor

Contact Email: Jay.R.Desai@HealthPartners.com

Abstract Title: We Can Prevent Diabetes in Minnesota


Collaborators: Minnesota Department of Human Services, Minnesota Department of Health, YMCA of the Greater Twin Cities, Diabetes Prevention and Control Alliance

Funding Agency: Center for Medicare and Medicaid Services

Abstract: CMS has selected 10 states to study the effectiveness of incentives to prevent chronic disease among Medicaid beneficiaries. Minnesota is focusing on preventing diabetes. Almost 30% of Americans 20+ years of age have prediabetes and are at high risk of developing diabetes. The Diabetes Primary Prevention Lifestyle program is effective in reducing the incidence of diabetes by 34% over 10 years and in a group delivery format is potentially cost-saving. Financial incentives can be effective for changing behaviors but many questions remain such as in what populations, how often, in what increments and total amounts, over what period of time, should they be goal-driven, and what is the effect based on individual or group performance?

The objective of this study is to test two different patient incentive structures among 18-74 year old Minnesota Medicaid beneficiaries at high risk of developing diabetes. The incentives are tied to participation and weight loss in the group-delivered YMCA diabetes prevention program (Y-DPP).

This is a prospective group randomized trial with Y-DPP classes as the unit of analysis. Up to 350 classes with up to 3500 participants will be randomized to one of three study conditions: a) Control: The 12-month Y-DPP program; b) Individual Incentives: The 12-month Y-DPP program with a tiered incentive structure for program participation and weight loss. All incentives are dependent on the individual actions of the Medicaid beneficiary; c) Group Incentives: This is a combination of individual incentives plus tiered incentives based on overall class attainment of participation and weight loss.
Poster Presenter: Gustavo Cortes

Contact Email: Gustavo.A.CortsPuentes@HealthPartners.com

Abstract Title: Experimental Intra-Abdominal Pressure Symmetrically Influences Bladder Pressure and Airway Plateau Pressure

Authors: Cortes-Puentes G, Adams AB, Marini JJ, Dries D

Collaborators: Regions Hospital Surgery Department, Regions Hospital Pulmonary/Critical Care Department

Funding Agency: GE HealthCare

Abstract:

Introduction: Bladder pressure is routinely measured in the clinical setting to estimate intra-abdominal pressure (IAP). Elevated IAP also affects standard airway pressure measurements. In a porcine model of controlled intra-abdominal hypertension (IAH), we evaluated the fidelity of the standardized bladder pressure measurement and airway plateau pressure changes over a range of IAPs.

Methods: Eight (n=8) deeply anesthetized swine were mechanically ventilated at VT=10 ml/kg, f=15, I:E=1:2 and PEEP=1 and 10 cmH2O. After surgical placement of airway tubing in the peritoneal cavity, different levels of IAP (5, 10, 15, 20 and 25 mmHg) were applied via a CPAP system. Bladder pressure and airway pressure were each measured after 10 minutes of stabilization at each level of IAP and during PEEP= 1 and 10 cmH2O.

Results: Bladder pressure changed in parallel with IAP. When IAP is >10 mmHg, a mean underestimation of 3.25±0.83 mmHg was observed. Airway plateau pressure also increased with IAP. Bladder pressure was not affected by PEEP (1 and 10 mmHg) or the ventilatory cycle in this air-based model.

Conclusion: Our model confirms the reported role of bladder pressure measurement in identifying IAH. Minimal underestimation is noted (3-4 mmHg after IAP>10 mmHg); probably due to incomplete pressure transmission. During mechanical ventilation, airway plateau pressure is directly influenced by IAP as estimated by bladder pressure.
Abstract:

Introduction: More than 30% of adults in the U.S. have a 10% risk or greater of having a heart attack in the next 10 years. The proportion of adults with moderate and high cardiovascular risk (CVR) account for nearly half of the first major cardiovascular (CV) events in the United States. Shared decision support tools may reduce CVR by facilitating and prioritizing provider-patient communication about CV risk.

Methods: CV Wizard was developed to identify and prioritize uncontrolled CVR factors and offer treatment suggestions. It was integrated into the electronic health record through a web-service and pilot tested with 14 providers at 6 HMPG clinics. CV Wizard was triggered during patient visits for adults age 18-75 with known CV risk factors such as diabetes, heart disease, tobacco use, hypertension, and hyperlipidemia. Staff printed the patient and provider versions of the decision making support. Providers completed a satisfaction survey 6 weeks post-implementation.

Results: Eleven providers completed the survey. Ten said CV Wizard fit well in their workflow. All found the information on the form useful and would recommend it to others. Providers also reported that patients were receptive, all or most of the time, to using the tool. Several (n=3) were encouraged that patients paid more attention to smoking risks.

Conclusion: Preliminary results show that the CV Wizard is promising for engaging patients in decisions to lower CV risk and providers had high satisfaction rates. The patient tool provides an easy to comprehend visual for communicating and prioritizing CV risk reduction, particularly around smoking.
Poster Presenter: Jane Duncan

Contact Email: Jane.E.Duncan@HealthPartners.com

Abstract Title: The Midwest Research Network

Authors: Duncan, JE

Abstract: This poster will provide information on the newly-developed Midwest Research Network.
**Poster Presenter:** Jared Fine

**Contact Email:** Jared.M.Fine@HealthPartners.com

**Abstract Title:** Intranasal Deferoxamine Treatment in a Rat Model of Parkinsons Disease: Preliminary Results

**Authors:** Fine JM, Forsberg AC, Faltesek KA, Mohan KG, Wong JC, Arneson LC, Frey WH, Hanson LH

**Collaborators:** Animal Care Facility

**Funding Agency:** HealthPartners Institute for Education and Research Internal Grant

**Abstract:** Deferoxamine (DFO) has been shown to drastically decrease the behavioral and brain changes of Parkinson's disease (PD) in rat models. However, the benefit was realized when DFO was injected directly into the brain, which is not a possible delivery method for humans. We propose to determine whether DFO delivered intranasally can be used as a treatment for PD in rodent models. PD was induced in rats by injecting 6-hydroxy-dopamine (6-OHDA; which kills dopaminergic neurons) into the medial forebrain bundle (MFB), while sham surgery rats received saline injections. Rats were pre-treated three times with either IN DFO or saline, and post-treated for up to 1 month before behavioral tests were performed. Thus far, we have only completed tests for 5 rats in each treatment group which provides preliminary, but not completely analyzed data. The data show that the model was created successfully, and the trends seen thus far indicate that IN DFO is beneficial in this model. In the drug-induced rotational test, which measures the extent of neuronal damage to the MFB, DFO treatment decreased the number of turns compared to saline treated rats. Also, in the tapered balance beam test, DFO treatment decreased the number of footslips compared to saline treated rats. In both tests, rats given 6-OHDA fared much worse than rats with sham surgery. These results are preliminary and include a small sample size, but if the trends continue with more rats than statistical significance may be obtained, and with it, a potential new treatment for PD.
**Poster Presenter:** Jawali Jaranilla  
**Contact Email:** Jawali.B.Jaranilla@HealthPartners.com  
**Abstract Title:** Lipid Patterns Among Foreign and US Born Patients in a Medical Group  
**Authors:** Jawali J, DeFor T, Vazquez-Benitez G, Kottke T  
**Abstract:**

**Background:** Elevated triglycerides and low HDL-cholesterol are components of the cardiometabolic syndrome (CMS). Even though the prevalence of CMS among foreign born (FB) is twice that of the US born population, and cardiovascular mortality among FB residents of the US with CMS is high, it is not known whether the lipids of the foreign born have a cardiometabolic pattern. Our objective is to describe the lipid patterns of FB patients of a medical group and compare them to the lipid patterns of US born patients.

**Methods:** We conducted a retrospective medical record review of US and FB HealthPartners Medical Group patients who were 20+ years old and had outpatient LDL, HDL, triglycerides, and total serum cholesterol levels assessed in 2010. Place of birth was ascertained using country of origin and primary language. FB patients were classified into the following subgroupings: developed regions, Sub-Saharan Africa, Eastern Asia, Southern Asia, South-Eastern Asia, and Latin America. Demographic characteristics and risk factors are described using frequency distributions. Association of place of birth with dyslipidemia is presented as adjusted odds ratio using logistic regression analyses.

**Results:** The data set comprises the records of 53,361 (89%) US born and 6,430 (11%) FB patients. The prevalence of CMS in US born was 39% and 31% for FB patients. The prevalence of high LDL cholesterol (27% US vs 30% FB), high TG (34% US vs 33% FB), low HDL cholesterol (36% US vs 39% FB), and high total cholesterol (38% US vs 38% FB). FB and US born differ in several risk factors such as age, smoking, BMI, insurance coverage, and statin use. Large heterogeneity of lipid pattern was observed across the countries of origin of FB patients with higher percentage of having low HDL levels among women of Somali (49%), Hmong (51%), Sub-Saharan Africa (45%), Southern Asian (59%) and Latin American (49%) origin. After adjusting for potential confounding, association of country of origin with lipid abnormality was observed for low HDL-cholesterol (1.34 OR, CI 1.23-1.45), high LDL cholesterol (1.11 OR, CI 1.02-1.21), and high TG (1.11 OR, CI 1.02-1.22). FB and US born patients with CVD who are treated with statin is 76.6% and 79.8% respectively.

**Conclusion:** The prevalence of heterogeneity of dyslipidemia across population groups in FB patients is large. The rate of CMS was no different between FB and US born, however, lipid abnormalities were greater among FB patients. Awareness of lipid abnormalities, especially in this group, designates cardiometabolic dyslipidemia as an important target of lipid lowering therapy. In addition, nativity status is a non-modifiable characteristic that can be considered as an important variable in stratifying risk for cardiovascular disease.
Poster Presenter: Jessie Nelson

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Abstract Title: ABC’s of Team Leadership in Emergency Medicine: A Literature Review and Novel Curriculum

Authors: Hegarty CB, Barringer KW, Nelson JG, Raghunandan S, Binstadt ES

Abstract: Emergency Medicine (EM) residents are required to direct major resuscitations during their training. Residency programs vary greatly in preparing the residents for this role with team leadership skills education. There is no current team leadership skills curriculum to teach EM residents to specifically prepare them for this role.

A literature search was performed to review some of the larger, more popular medical ‘teamwork’ courses and glean key teaching points that focus specifically on team leadership knowledge and skill. We also searched aviation, business, and U.S. Army literature to learn more about best practices in other high stakes fields.

Many common themes arose in our literature review. We applied these common themes to our experience to develop an EM-specific team leadership curriculum, which we call “The ABC’s of Team Leadership in Emergency Medicine”. We have incorporated the ABC’s into our curriculum and have developed a simple feedback tool for helping residents reflect on their team leading performance and receive written and verbal feedback from nursing staff and supervising ED faculty.

Given the need for EM residents to receive training in team leadership and the gap we found in the EM literature, we reviewed the pertinent literature from other sources to assist in the development of a novel EM-specific team leadership curriculum. We incorporated this curriculum into didactic sessions, small group simulation cases and ED practice. We also are successfully using this rubric to improve resident self-reflective and faculty feedback on team leadership skills vital to the successful practice of EM.
Poster Presenter: Jim Nordin

Contact Email: James.D.Nordin@HealthPartners.com

Abstract Title: Acute Adverse Events Following Trivalent Inactivated Influenza Vaccine (TIV) in Pregnancy

Authors: Nordin JD, Kharbanda EO, VazquezBenitez G, Nichol K, Lipkind H, Naleway A, Lee GM, Hambidge S, Shei W, Olsen A

Collaborators: 7 to 10 VSD sites

Funding Agency: America’s Health Insurance Plans (AHIP) under a contract from the Centers for Disease Control and Prevention

Abstract:

Background: Pregnant women are at increased risk for influenza-related morbidity. Trivalent inactivated influenza vaccine (TIV) can reduce these risks and is recommended during pregnancy. Concerns regarding safety remain a barrier to vaccine uptake.

Methods: In this retrospective observational cohort study we compared rates of medically attended adverse events between TIV-vaccinated and unvaccinated pregnant women within the Vaccine Safety Datalink. Using generalized estimating equations to account for matching, with a Poisson distribution and log link, we calculated adjusted incident rate ratios (AIRR) for composite safety outcomes for the full cohort and a subset vaccinated during first trimester.

Results: The study cohort included 76,682 vaccinated and 148,578 unvaccinated women matched on age, site, and pregnancy start date; 21,952 (28.6%) women were vaccinated during first trimester. Over a 0-3 day window, receipt of TIV was not associated with increased risk for pre-specified acute medically attended events, including allergic reactions, cellulitis, and seizures (Full cohort AIRR=1.13 (95% CI: 0.82-1.56). First trimester: AIRR=.96 (95% CI: 0.52-1.76)). Over a 1-42 day window, no incident cases of Guillain-Barré syndrome, optic neuritis, transverse myelitis or Bell's palsy following TIV were identified. TIV was not associated with thrombocytopenia (Full cohort: AIRR= 0.89 (95% CI: 0.67-1.2) First trimester: AIRR= .55 (95% CI=0.22-1.4)) or an acute neurologic event (Full cohort: AIRR=0.89 (95% CI=0.52-1.5) First trimester: AIRR= 1.04 (95% CI =0.46-2.4)).

Conclusions: Receipt of TIV during pregnancy was not associated with increased risk for medically attended acute adverse events. These findings support the safety of vaccinating pregnant women against influenza.
**Poster Presenter:** Jim Rhodes

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**Abstract Title:** From Research Innovation to Broader Public Use - The SiMCare Story

**Authors:** O'Connor PJ, Sperl-Hillen JM, Rush WA, Ekstrom HL, Rhodes JH

**Collaborators:** Johnson PE (University of Minnesota)

**Funding Agency:** NIDDK

**Abstract:**

**Background:** The chasm between discovery and meaningful translation is recognized as a major barrier to improving our health care delivery system. HealthPartners Institute for Education and Research’s Center for Chronic Care Innovation strives to improve the quality of chronic disease care and prevention by facilitating the transition of evidence into innovative practice for patients and providers. One method of broadening public use is through intellectual property protection and developing partnerships for marketing and licensing.

**Description of SimCare Diabetes:** SiMCare Diabetes is an innovative web-based simulated learning solution now available that replicates real-life patient scenarios to teach safer, more individualized and effective management of diabetes. It is the culmination of more than 12 years of development, research and careful analysis through grants received from the Agency for Healthcare Research and Quality (AHRQ) and the National Institute of Health (NIH). An ACCME accredited program, it engages clinicians in an immersive experience proven to improve patient outcomes using advanced computer technology, sophisticated physiologic modeling, and evidence-based decision support to help guide provider actions.

**A New Company:** SiMCare Health: SiMCare Health is a joint venture between HPIER and Vital Simulations, a health care development company located in Minneapolis that promotes and advances best practices through innovative, engaging and immersive simulations for health care professionals. SimCare Health has a royalty bearing license agreement with HPIER to provide and market the SimCare Diabetes and SimCare Hypertension technology. VitalSims is working to partner with leading health care organizations throughout the world to bring this alive.
Poster Presenter: JoAnn Sperl-Hillen

Contact Email: JoAnn.M.SperlHillen@HealthPartners.com

Abstract Title: Simulated Provider Training Improves Diabetes Management

Authors: Sperl-Hillen JM, O'Connor PJ, Rush WA, Ekstrom HL, Appana DX, Fernandes OD, Asche SE

Funding Agency: NIDDK

Abstract:

Objective: Describe and evaluate software technology for innovative cognitive-based provider simulation training.

Method: SimCare Diabetes, the culmination of 3 federally-funded RCTs, uses simulated learning cases that replicate real and challenging clinical vignettes. The provider engages in patient care using a web-based interactive electronic health record-like interface over longitudinal patient encounters. The software captures effects of treatment actions using physiologic modeling, and uses evidence-based rules algorithms to critique them. The first two RCT's tested the intervention on practicing providers within HPMG. The last RCT evaluated an 18-case comprehensive learning curriculum as an adjunct to traditional training in primary care residents (n=341). Outcomes in these trials included A1c of actual patients, provider management skills (simulated assessments of appropriate and safe treatment decisions), knowledge testing (multiple choice test), self-reported confidence (Likert-scale), and satisfaction.

Result: The first two RCT interventions (a 1-3 hour time commitment of practicing providers) demonstrated a mean A1c reduction of .19% in actual patients (p=.04) and a 10% reduction in metformin prescriptions for patients with contraindications (p=.03). In the third trial, on average, 32% of intervention and 9% of control residents achieved composite clinical goals for glucose, blood pressure, and lipids on 4 simulated assessment cases. 71% of intervention residents (compared to 34% control) answered more than half the knowledge questions correctly, and overall diabetes management confidence was above average for 79.4% intervention and 43.9% of control, p<.001. Satisfaction was high; 88% of practicing providers and 91% of resident physicians would recommend to colleagues.

Conclusion: Evidence supports the use of case-based simulated diabetes education to improve patient outcomes and diabetes management of primary care physicians.
**Poster Presenter:** Jon O'Neal

**Contact Email:** Jon.T.ONeal@HealthPartners.com

**Abstract Title:** Improving Collaboration Between an Occupational Medicine Department and Emergency Department

**Authors:** Summers P, Devagupthapu S, Mi P, O'Neal J, de la Torre M

**Collaborators:** Regions Hospital Emergency Department, HealthPartners St. Paul Clinic

**Abstract:**

**Introduction:** The Emergency Department is often the first point of care for injured employees (EE) who typically require work restrictions upon discharge. Although Occupational Medicine providers (OMP) are adept at managing restrictions, follow up with non-OMP may occur risking sub optimal disability management.

**Methods:** The ability to place referrals to the Occupational Medicine Department (OMD) in the electronic medical record system (EMRS) began in July 2010. Residents and staff from both departments met in March 2011 to discuss the patient discharge and referral process. An OMD generated work restriction form was implemented into the emergency department (ED) discharge process in July 2011. Residents and staff from OMD educated ED residents and staff about referring to OMD in September 2011. Data were collected from consultations placed to OMD from the ED through the EMRS from July 2010 to December 2011. Data were analyzed for the number of increased referrals.

**Results:** The total number of referrals from July 2010 to December 2011 was 319. The number of referrals for the first two months were excluded due to being an introductory period of OMD referral implementation. The mean referral per month was 19.6 (SE=1.96, minimum=10 and maximum=33). The mean number of referrals in the final four months of 2010 and 2011 were 19 and 27.5 respectively. A positive trend was identified. Linear regression revealed a slope of 0.88, SE = 0.345, R square = 0.316, p=0.023.

**Conclusion:** The goal for increasing collaboration from the ED to the OMD was achieved through a teamwork effort to increase the number of referrals. Therefore, EE are more effectively managed for disability. An increase in the variety of injuries was also noted, thus creating the benefit of improving the quality of education for the Occupational Medicine residents.
Abstract:

Introduction: Exception from informed consent trials require subsequent notification of enrollment to patient legally authorized representatives. This study describes the subsequent notification process utilized by one site during a prospective, randomized, controlled prehospital clinical trial.

Methods: The IRB-approved subsequent notification process was implemented for all patients pronounced dead in the field or in the emergency department. Demographic information, including incident address and patient address, was collected by the study coordinator. A mailing was sent via standard U.S. mail to the last known accurate patient address within 2 weeks of accessing that information. The mailing included an informational letter notifying the recipient of the patient's enrollment in the trial and requested return of a response card to assess respondent's prior knowledge of this study and their desire for a phone call follow-up with the principal investigator. The number of mailings per patient, outcome of the mailing, number of recipients requesting a phone call follow-up, and the number of recipients with previous knowledge of the study were calculated.

Results: Between March 2006 and July 2009, a total of 376 patients were formally enrolled into the study, with 255 (68%) requiring subsequent notification. 42% of enrolled patients had one mailing sent to the last known address, with study staff sending two mailings to the remaining patients. Initial mailings were returned undeliverable in 32% of patients (81/253). The certified letter receipt of delivery was the only subsequent notification contact in 76 of 253 patients (30%). 33% of mailing recipients (83/253) returned the response card to the investigators. Of the 83 individuals who returned the response card, 34% requested a phone call from the principal investigator. Only 4 people (4.8%) who responded to the subsequent notification mailing stated they had heard of this study prior to receiving the subsequent notification information.

Conclusions: The return rate of response cards and requests for follow-up phone calls were higher than anticipated. In the future, use of certified mailings for the initial mailing is warranted. The high level of non-deliverable mailings is concerning, but must be balanced with the time and expense of identifying additional and accurate contact information.
**Poster Presenter:** Juliana Tillema

**Contact Email:** Juliana.O.Tillema@HealthPartners.com

**Abstract Title:** Integrating Patient and Clinician Perspectives in the TransforMN Study

**Authors:** Tillema JO, Solberg LI, Norris M, Shapland C, Sherry C, Maes-Voreis M, Whitebird RR, Fontaine PL, Crain AL, Flottemesch TJ

**Collaborators:** Essentia Health - Duluth Pediatric Department; Lakewood Health System; United Hospital District - Blue Earth Clinic; Mayo Northwest Clinic; CentraCare - Becker Clinic; University of Minnesota - Phalen Village Clinic; Park Nicollet - St. Louis Park Internal Medicine Department; Fairview Maple Grove Clinic; HealthPartners - St Paul Clinic; Minnesota Department of Health; Minnesota Department of Human Services; Minnesota Community Measurement; Institute for Clinical Systems Improvement; National Committee for Quality Assurance

**Funding Agency:** AHRQ

**Abstract:**

**Introduction:** The TransforMN Study's goal is to understand the process by which primary care practices are transformed into patient-centered medical homes (PCMH). Because patients and providers are key stakeholders in the PCMH, it has been important to solicit input from them systematically during every stage of project implementation.

**Methods:** We purposefully developed a plan and structure for including patients and clinicians in the study. To find the patients, we relied on study collaborators at MDH to recommend individuals from the MDH Health Care Home Consumer & Family Advisory Council. We selected 10 diverse study clinics representing different sizes, locations and affiliations and interviewed 2-5 leaders at each clinic about their transformation experience. We recruited both groups using direct, personal contact (e-mail, phone and in-person) to participate as advisors to the study.

**Results:** Our study coordinating team includes two paid patient representatives with experience as patient and family advocates in the health care system. We regularly engage them on specific study questions, including how better to include patients in research. Our study Advisory Board consists of 8 clinicians and 5 managers who are both study participants and who provide input on interim findings, study processes and materials, and reports to clinics.

**Discussion/Conclusions:** Successfully including input from patients and clinicians in research studies requires a plan for finding the people; a structure for inviting organized participation; a budget that will support their contributions; and an understanding that relationships with these important contributors matter if research studies are to be meaningful to them.
Poster Presenter: Kara Kim

Contact Email: Kara.S.Kim@HealthPartners.com

Abstract Title: Improving Disparities in Pain Control in the Emergency Department

Authors: Barringer KW, Healy MM, Westgard BC, Oyewo AO, Kim KS, Sekhr-Ra A, Cohen MD, Ankel FK, Isenberger KM

Abstract: Current medical literature suggests that there are disparities in analgesia administration in the emergency department (ED) based on race and ethnicity. As part of the HealthPartners EBAN Experience™, a diverse team of providers and staff in the Regions Hospital ED sought to identify and improve disparities in pain control among the patients we serve. Focusing on extremity injuries and fractures, we identified a significant disparity in analgesia administration. White/Caucasian patients were initially more likely to receive pain medication when compared to African-American patients (OR 1.42, 1.02-1.99) and patients from all other groups (OR 1.35, 1.03-1.77).

Our primary intervention to address disparities in the administration of analgesia in the ED was to create an overhead, department-wide “Code Red” call for pain control. This was intended to increase communication among providers regarding patients in pain and their likely need for analgesia. One of our adjunct interventions was to distribute the “FACES” pain scale among all providers and to survey them about the use of the “FACES” pain scale. The use of the "FACES" pain scale helps adequately assess pain severity in patients across ages and races which will help providers with identifying patients that needed analgesia.

Upon repeat analysis of ED patient data after these interventions, we found no significant disparities in the administration of analgesia for extremity injuries and long-bone fractures between White and African American patients or those from all other groups. Our data showed that there was no disparity in receiving analgesia between White and African American patients (OR 0.85, 0.51-1.43) and between White and those from all other groups (OR 0.85, 0.52-1.36).

In the process of analyzing disparities, we also noted that self-identified race and ethnicity were documented by registering ED clerks only 72.5% of the time. Our secondary intervention involved focused discussion and education with ED clerks regarding registration questions about self-identified race and ethnicity and their importance for tracking and addressing healthcare disparities. We created training and scripting to help ED clerks in asking race/ethnicity questions in a sensitive manner. After this intervention, we noted an increase in registration documentation of self-identified race and ethnicity to 95.4%.

Our results suggest the ongoing reality of disparities in administration of analgesia in the ED, the difficulty and importance of identifying those disparities, and the possibilities for improving upon or eliminating them through a process of quality improvement involving a variety of providers and staff committed to that end.
Poster Presenter: Karen Margolis

Contact Email: Karen.L.Margolis@HealthPartners.com

Abstract Title: Outcomes at Six Months of a Randomized Trial of Home Blood Pressure Telemonitoring with Pharmacist Case Management

Authors: Margolis KL, Bergdall AR, Asche SE, Trower NK, Pritchard RA, Sekenski JL, Kerby TJ, Chaudhry-Waterman N, Sperl-Hillen JM, Maciosek M, O'Connor PJ

Collaborators: HealthPartners Pharmacy Department/MTM Pharmacists (Rehrauer D, Cooper S, Kadrmas H, Groen S, Klotzle K, Michels R)

Funding Agency: NHLBI

Abstract:

Background/Aims: Hyperlink is a clinic-randomized trial testing an intervention that combines home BP telemonitoring with pharmacist case management in patients with uncontrolled hypertension.

Methods: We enrolled 450 patients with uncontrolled BP from 16 primary care clinics. Eight clinics (222 patients) were randomized to usual care and 8 clinics (228 patients) to intervention. Intervention patients received home telemonitors that transmit BP data to a secure database. Pharmacists consult with patients by phone and adjust antihypertensive therapy based on home BP data. The intervention lasts 12 months with follow-up to 18 months to observe durability. The primary outcome is BP control at 6 and 12 months, defined as BP ≤140/90 mm Hg (or ≤130/80 mm Hg in patients with chronic kidney disease or diabetes). Data on demographics, medication use and adherence, and satisfaction with care were also gathered. Here we report 6-month BP outcomes. General and generalized linear mixed models are used to accommodate the cluster-randomization.

Results: Enrollees were 45% female, 83% white, and 13% black, with mean age of 61 years. Mean BP at baseline was 148/85 mm Hg in both treatment groups. Of the 403 attending the 6-month visit (197 usual care, 206 intervention), 45.2% in usual care and 71.8% in intervention achieved BP control (p<0.0001). In usual care, mean systolic BP decreased by 10.3 mm Hg and diastolic decreased by 3.4 mm Hg. In intervention, mean systolic BP decreased by 21.6 mm Hg and diastolic decreased by 9.3 mm Hg. The difference in change between groups was 11.3 mm Hg systolic (p<0.0001) and 5.8 mm Hg diastolic (p=0.003). Results on satisfaction with care, medication therapy, and medication adherence will also be reported.

Conclusion: Our data show the intervention was effective at reducing BP for hypertensive patients over 6 months. 12 month and long-term follow up data are under analysis and are expected to support the efficacy of this intervention for management of chronic hypertension.
Poster Presenter: Karen Quaday

Contact Email: Karen.A.Quaday@HealthPartners.com

Abstract Title: A Retrospective Descriptive Study of MRI Use in an Academic Emergency Department

Authors: Quaday K, Salzman JG, Gordon B

Funding Agency: HealthPartners Institute for Education and Research Internal Grant

Abstract:

Background: The high rate of computed tomography (CT) use over the last decade has resulted in concerns about radiation exposure and healthcare costs. MRI offers excellent visualization of most organs without radiation and may be an alternative to CT for many emergency patients. To date, limited work has been done to evaluate the use of MRI on patients seen in the emergency department (ED).

Methods: This is a retrospective observational study describing the utilization trends of MRI in an emergency department at a single urban academic hospital between 2007-2011. Descriptive data on institutional volume metrics were calculated, including the rate of CT utilization over the same time period. The normalized annual usage of MRI (per 1,000 visits) for 2007-2011 were calculated, as was the percent of all patients per year receiving MRI at our institution. The top 5 clinical chief complaints for all patients receiving an MRI were also reported.

Results: Over the 5 year study period, a total of 85,831 CT (241 per 1000 encounters) and 7,177 MRI (20 per 1,000 encounters) were performed in the ED. There was a mean increase of 2 MRI per 1000 ED encounters between 2007-2011, with a mean decrease of 12 CT per 1,000 encounters over the same time period. MRI head were ordered most frequently (10.7 per 1,000), followed by MRA neck (2.9 per 1,000), MRI lumbar spine (2.2 per 1,000), MRI cervical spine (2.0 per 1,000), and MRI extremity (0.82 per 1,000). The top 5 chief complaints for patients receiving any MRI included acute neurological / behavioral problem, unknown, trauma, extremity pain, and neck/back pain.

Conclusion: The rate of MRI utilization has increased by 2 per 1,000 ED encounters over 5 years, while the rate of CT use has decreased over the same time period. Determining the reasons for increased MRI use is worthy of further study.
Abstract:

**Problem:** One of the goals of simulation is to dispel disbelief by providing a realistic learning experience. Our center identified two common challenges to realism which include (1) how medication is dispensed and administered and (2) how patient data is presented for participant interpretation. In today’s healthcare environment, medication dispensing systems (MDS) and electronic medical records (EMR) have become the standard. Because healthcare professionals often have a these technologies when caring for patients, we sought ways to incorporate these into our simulation scenarios.

**Intervention:** We created a MDS using PowerPoint software and a drawer system to include all medications needed for a multitude of scenarios. The PowerPoint program consists of multiple hyperlinks embedded to guide the participant to either access medications from the patient prescribed list or by a "search by medication" feature.

We initially used paper charts for our simulated patients. However, many organizations use an EMR. We met with Regions Hospital's EMR team to develop a Clinical Simulation Nursing Unit within EPIC. This nursing unit allows us to develop patients for our scenarios in a realistic format allowing participants to access patient data, digital diagnostic images, lab results, and documentation. We have discovered EMR learning gaps and have been able to bridge these through the simulation and debriefing process.

**Conclusion:** The additions of the MDS and EMR to our program have added to the realism, allowed us to identified learning gaps, and have resulted in improved participant feedback regarding our simulations.
**Poster Presenter:** Laura Fortuna

**Contact Email:** Laura.A.Fortuna@HealthPartners.com

**Abstract Title:** Proton Pump Inhibitor Use and the Risk of Adverse Cardiovascular Events in Aspirin-Treated Patients with Coronary Artery Disease

**Authors:** Fortuna LA, Parker ED, Kottke TE, Rehrauer DJ, Cooper S, Pawloski PA

**Collaborators:** HealthPartners Pharmacy Services

**Funding Agency:** HealthPartners Institute for Education and Research Internal Grant

**Abstract:**

**Background:** Concomitant use of aspirin and proton pump inhibitors (PPIs) may lead to decreased aspirin bioavailability and antiplatelet effects. PPIs are recommended by the American Heart Association to treat or prevent gastrointestinal events amongst selected patients taking a daily aspirin for cardioprophylaxis. This study will assess the impact of concomitant aspirin and PPI use in patients with coronary artery disease (CAD).

**Methods:** Using administrative data, we identified CAD patients aged 40 years or older with no history of PPI use. New PPI users were matched by propensity score to non-users. Outcomes of interest included myocardial infarction (MI), coronary revascularization, stroke, and all-cause mortality. Cox proportional hazards regression was used to examine the associations between PPI use and outcomes.

**Results:** The study population included 1199 patients who used a PPI during the study period matched to 1199 non-PPI users. There were 317 MIs, 521 strokes, 171 revascularizations, and 419 deaths during an average of 2.4 years of follow-up. Compared to CAD patients taking aspirin alone, those also taking a PPI had an increased risk of stroke and all-cause mortality (Hazard ratios 1.21 [1.03, 1.23] and 1.10 [1.01, 1.20], respectively). We did not observe an increased risk of MI or revascularization associated with PPI use.

**Conclusion:** Concomitant aspirin and PPI use may increase the risk of stroke and all-cause mortality in CAD patients. Future research will examine the impact of adherence to PPI therapy and will investigate any differences between primary and secondary prevention in CAD patients taking aspirin and PPIs.
Poster Presenter: Lori Barrett

Contact Email: Lori.J.Barrett@HealthPartners.com

Abstract Title: Integration of a SMART Podium into an Emergency Medicine Residency Conference

Authors: Hegarty CB, Barrett LJ

Abstract: Weekly Emergency Medicine Residency conferences feature our `Critical Case' conference in an interactive format. During this conference we use a combination of a white board to write case details, as well as a projector with a screen that covers the white board to project images (EKGs, radiology images) and presentations from a desktop computer. Due to the use of both the white board and projector however, we found that we frequently were having delays in the conference when we had a transition from one to the other. For this reason, we trialed a number of new technologies to see if we could merge our white board and projected images into one system.

Over a three month period we trialed a number of new technologies including iPad applications and different SMART™ Board displays. Feedback was obtained from the users as well as the conference attendees regarding the new technologies.

Based on our trial period, the new technology that received the best feedback was the SMART™ Podium 524. Users found it easy to use --both with integrating into their power point type presentations and also being able to free text with a white board feature. Attendees noted that the technology definitely saved the time we used to waste putting screens up and down, and also noted that the projected white board and presentations were clear and easy to read. Overall conference feedback from the sessions with the Podium was outstanding.
Poster Presenter: Marcella de la Torre

Contact Email: Marcella.X.DeLaTorre@HealthPartners.com

Abstract Title: Integrating Quality Improvement with Resident Education

Authors: de la Torre M, Ankel F, Kim K, Barringer K

Collaborators: Regions Hospital Emergency Department

Abstract:

**Background:** The Emergency Medicine Department at Regions Hospital and HPIER are deeply committed to linking quality with Medical Education. Since 2008 residency programs have involved their residents and faculty in quality improvement to meet two of the core competencies required by ACGME, systems-based practice, and practice-based learning and improvement. The Emergency Medicine Residency program has been the leader in this arena and continues to gain recognition for their innovative approaches. We want to contribute to the 2011 AAMC quality meeting by sharing successes in a presentation/panel discussion format. Some of the successes include creation and integration of quality improvement curriculum and tools; the development of our hospital-based IHI Open School Chapter; alignment of QI curriculum between IHI and Regions Hospital; the development of a Resident Physician Leader Initiative, and the design of Core Competencies Conferences to engage residents in active learning. In addition the presentation will illustrate how resident quality improvement education is aligned with the organization strategic goals by linking QI with the Performance Improvement Department, the Emergency Medicine Quality Committee, and the Graduate Medical Education Office. In addition, examples of past and present projects will be shared.

**Objectives:** To share innovative approaches to integrating quality improvement education in the Emergency Medicine Department.

**Outcomes:** As a result of these initiatives, residents are more involved in quality initiatives and projects within the organization, have gained a broader understanding and appreciation for systems-based practice and practice based-learning and improvement, and have expressed an interest in pursuing careers in quality.
Poster Presenter: Marty Mertens

Contact Email: Marty.T.Mertens@HealthPartners.com

Abstract Title: Lipoprotein Subclass Particles and Small Vessel Elasticity as a Potential Marker for Early Atherosclerosis in Rheumatoid Arthritis, a Prospective Study

Authors: Mertens MT, Gertner E

Collaborators: Duprez D and Florea N (University of Minnesota, Cardiology)

Abstract:

Background: Rheumatoid arthritis (RA) has increased cardiovascular (CV) events. Standard CV risk factors, including lipid profiles, are not different in RA and it is still unclear how to best evaluate this in RA. Lipoprotein subclasses have been used recently to better assess CV risk and have not been evaluated along with a marker of endothelial function in RA.

Methods: Thirty-five seropositive RA and thirty-one control subjects without a history of coronary artery disease, diabetes, or active statin therapy were recruited. Lipoprotein subclass concentration and small arterial elasticity (SAE) - a marker of endothelial function - were measured in both groups and then repeated in the RA group after 12 months.

Results: 1. There was no significant difference between the RA and control groups in small arterial elasticity. 2. The RA group had significantly lower total LDL and small LDL particles and increased average HDL size compared to controls. 3. Within the RA group, there was a significant correlation of increased disease activity with reduced small HDL particles. No significant correlations were seen between disease activity with small LDL particles or HDL size. Changes in lipoprotein particles and disease activity did not correlate with changes in SAE.

Conclusions: 1. Alterations in LDL subclasses may not account for increased cardiovascular risk in RA. However, reductions in the potentially anti-atherogenic small HDL particles may be a potential factor. 2. Small arterial elasticity did not differentiate RA from controls in assessing cardiovascular risk and was not affected by changes in lipoprotein subclasses.
**Poster Presenter:** Matthew Kang

**Contact Email:** Matthew.M.Kang@HealthPartners.com

**Abstract Title:** Tractography of the Human Cervical Spine Nerve Roots

**Authors:** Kang MM, Hill BW, Ellermann J, Hanson L, Xu J, Kollasch P, Lenglet C

**Collaborators:** Center for Magnetic Resonance Research at the University of Minnesota

**Funding Agency:** HealthPartners Institute for Education and Research Internal Grant

**Abstract:**

**Introduction:** High field MR imaging of the human spine has recently resulted in the ability to perform complex structural imaging of neural tissues. As for the cerebral white matter, diffusion MRI and tractography algorithms enable the visualization of axonal pathways in the spinal cord. This follows, in part, from improvements in imaging sequences and post-processing techniques. We present one of the first depictions of clear fiber tractography of the human cervical spine nerve roots.

**Methods:** A healthy subject, without any clinical evidence of cervical spondylosis, negative history for neck disease, and without history of neck surgery/radiation/trauma of any kind, was scanned at 3T. We used an inner volume imaging (IVI) diffusion sequence with 64 diffusion gradient directions, 5 b0 images and a b-value of 1000 s/mm2. Diffusion tensors, fractional anisotropy (FA) and apparent diffusion coefficient (ADC) maps were calculated and deterministic tractography was performed using TrackVis.

**Results:** At the C2 level (i.e. the greater occipital nerve), we were able to visualize fiber tracts with tractography. In Fig. 1 (left), spinal nerve roots are clearly visible at multiple levels. The color code represents the direction of the tracts: red for left-right, green for anterior-posterior, and blue for inferior-superior.

**Conclusions:** To our knowledge, this is the first clear MRI depiction, using diffusion MRI tractography, at the nerve root level in the human cervical spine. This preliminary work will lead to quantitative analysis of nerve root function. In multi-level cervical radiculopathy, such objective data will greatly aid in determining the most symptomatic nerve roots.
Poster Presenter: Mengnai Li

Contact Email: Mengnai.X.Li@HealthPartners.com

Abstract Title: Functional Outcomes after Operative Management of Pediatric Tibial Plateau Fractures

Authors: Hill BW, Li M

Abstract:

Objectives: To report the outcomes of pediatric tibial plateau fractures after operative fixation.

Design: Retrospective Case Series

Setting: Level I Trauma Center

Patients/Participants: Between January 2005 and December 2011, our institution has surgically treated 13 pediatric tibial plateau fracture patients.

Intervention: A temporary spanning external fixation was used for soft-tissue resuscitation prior to definitive fracture reconstruction. Double plating was used in fractures with a displaced coronal split component of the posterior aspect of the medial tibial plateau. Other cases received either single locked plate or interfragmental screws.

Main Outcome Measure: Demographic data, such as age, sex, dexterity, mechanism of injury, and the number of associated injuries were recorded. Operative procedure, length of follow-up, radiographic outcomes, complications, Knee Injury and Osteoarthritis Outcome Score (KOOS) were also captured and documented.

Results: Mean follow-up for the 13 patients was 15.72 months (range 6-48). All patients presented with an associated injury. Six lateral meniscus lacerations, two deep MCL ruptures, and one ACL detachment were found in surgery and repaired. All fractures progressed to union at a mean of 10.31 (range, 7-13) weeks. Knee injury and osteoarthritis outcome score (KOOS) subscales averages were: Pain (89), symptoms (85), ADL (90), Sport/Rec (74), QOL (78).

Conclusions: Spanning external fixator and locked fixation device provided stable fixation of pediatric tibial plateau fractures and good functional outcomes with a low complication rate. This paper highlights the high incidence of meniscus and collateral ligament injury in this special population.
**Poster Presenter:** Michael Goertz

**Contact Email:** Michael.N.Goertz@HealthPartners.com

**Abstract Title:** Benefits from an Innovative Approach to Acute Low Back Pain Treatment in Primary Care

**Authors:** Goertz M, Martinson B

**Collaborators:** Haake B and McCarren D (HealthPartners Department of Neurosciences)

**Funding Agency:** HealthPartners Institute for Education and Research Internal Grant

**Abstract:** In 2009 an acute low back treatment program was piloted in primary care. The intent of the program was to decrease early use of imaging, opioids, referral for specially evaluation and intervention while at the same time encouraging early use of physical therapy. Components of the program included standardized EMR-based documentation tools, order writing and patient education tools. The program included education and coordination with physical therapists to whom the patients were to be referred. It also included a feedback mechanism of performance reports to the providers and their leaders. This process involved the identification of low back cases by ICD-9 codes. A limitation of ICD-9 coding is that it does not allow differentiation of acute versus chronic low back pain. Given this a grant was applied for and awarded on the basis of the following aims.

**Aim 1:** Among a sample of acute low back pain patients at 9 clinics, conduct chart audits to determine the proportion who have 1) acute non-recurrent pain, 2) acute recurrent pain, 3) chronic back pain.

**Aim 2:** Describe changes in patient care in these same 9 clinics, among patients identified in categories 1) and 2) in Aim 1 in terms of proportions of such patients receiving: 1) imaging orders, 2) surgery referral, 3) injection referral, 4) prescriptions for narcotics, prior to and following implementation of the program.

**Aim 3:** Describe the proportion of patients identified in categories 1) and 2) in Aim 1 in each clinic who receive standard education about low back pain following implementation of the program.

**Results:** Of the 900 cases selected 880 were included in the sample for analysis. Of these 318 cases were identified as acute and 160 cases acute recurrent. For aims one and two please see tables A and B. Groups one and two showed no significant difference in the distribution of acute, acute recurrent or chronic pain. There was no statistically significant impact of the intervention on frequency of imaging, use of narcotics, injection referral, surgery referral for either acute or acute recurrent groups or in the aggregate. Physical therapy referral showed a P. value of 0.0274 acute recurrent cases only. There was no change in the aggregate or in the acute group.
Poster Presenter: Michael Zwank

Contact Email: Michael.D.Zwank@HealthPartners.com

Abstract Title: Effect of Repeat Abdominal CT in ED Patients on Diagnosis and Disposition

Authors: Zwank MD, Mayeux GP, Anderson CP, Macdonald J

Funding Agency: IME Resident Project Grant

Abstract:

Objective: Computed tomography (CT) is a commonly used diagnostic resource in emergency departments and has shown utility in many clinical scenarios leading to a rapid increase in use. Recently concern has been raised as to risks from the radiation received during CT scanning, especially among patients receiving multiple CT’s. We conducted surveys of providers who ordered an abdominal CT for patients that had undergone the same CT in the past year. Our goal was to evaluate the effect of CT on diagnosis and clinical management.

Methods: Stable patients older than 18 who were undergoing abdominal CT were enrolled. Patients were excluded if the indication was trauma, malignancy or other chronic illness that is likely to progress. Providers were surveyed before and after the CT.

Results: We enrolled 59 patients (15 male, 44 female). Average age was 48. Enrolled patients had previously been scanned median 2 times, average 3.8 times, maximum 35 times. 6 patients planning for discharge were admitted including 2 that were taken to the operating room while 9 patients planning for admission were discharged home. CT was the primary diagnostic aid for 11 of these changes. 22 patients had a change in diagnosis from an acute illness to no active disease, all based on the CT. Provider diagnostic confidence rose from 5.9 to 8.2 (1-10 scale) after CT.

Conclusions: This study suggests that repeat CT is often justified. It leads to changes in diagnosis and disposition while increasing provider confidence. Patient enrollment is ongoing.
Poster Presenter: Nancy Sherwood

Contact Email: Nancy.E.Sherwood@HealthPartners.com

Abstract Title: Enhancing Weight Loss Maintenance: 2 Year Results from the Keep It Off Trial

Authors: Sherwood NE, Crain LA, Martinson BC, Anderson CP, Hayes MG, Anderson JD, Senso MM, Jeffery RW

Collaborators: University of Minnesota

Funding Agency: NCI

Abstract:

Objective: The Keep It Off trial evaluated the efficacy of a phone- and mail-based weight loss maintenance intervention among adults who have recently lost weight.

Methods: Four hundred nineteen adults who had recently lost ≥ 10% of their body weight were randomized to the “Guided” or “Self-Directed” intervention. Guided participants received a 10 session workbook, 10 biweekly phone coaching calls, eight monthly and six bimonthly calls, and bimonthly weight graphs and tailored letters based on self-reported weights. Self-Directed participants received the same workbook and two coaching calls. Primary outcomes are weight change and maintenance (regain of < 2.5% of baseline body weight) at six, 12, 18, and 24 month follow-up.

Results: Mixed model repeated-measures analysis examining weight change revealed a significant time by treatment group interaction (F = 8.91, p < 0.035). Guided participants regained significantly less weight than Self-Directed participants at 12, 18, and 24 months. The odds of 24 month maintenance were 1.59 (95% CI: 1.04 - 2.41, p=0.03) times greater in the Guided than in the Self-Directed group.

Conclusions: A sustained, supportive phone- and mail-based intervention is effective in promoting weight loss maintenance relative to a brief intervention for participants who have recently lost weight.
Poster Presenter: Neil Johnson

Contact Email: Neil.J.Johnson@HealthPartners.com

Abstract Title: Characteristics of Enamel Lesion Restorations Placed by Dental PBRN Dentists

Authors: Fellows JL, Gordan VV, Gilbert GH, Rindal DB, Qvist V, Litaker MS, Benjamin PL, Flink H, Falck A, Pihlstrom D, Johnson NJ, DPBRN COLLABORATIVE GROUP

Collaborators: Kaiser Permanente Center for Health Research, Portland, OR; College of Dentistry, University of Florida, Newberry, FL; Dept. of General Dental Sciences, University of Alabama at Birmingham, Birmingham, AL, Dept. of Cariology & Endodontics, University of Copenhagen, Copenhagen N, Denmark; Private Practice, Miami, FL; Centre for Clinical Research, Uppsala University, Västerås, Sweden; Private Practice, Lysekil, Sweden; Permanente Dental Associates, Portland, OR; University of Minnesota, Robbinsdale, MN; University of Alabama at Birmingham, Birmingham, AL

Funding Agency: NIDCR

Abstract:

Objective: To test the hypothesis that dentist/practice and patient characteristics are associated with restorative treatment of carious enamel lesions.

Method: DPBRN dentists enrolled 50 consecutive restorations placed on previously unrestored adult tooth surfaces, up to four per patient. The DPBRN comprises dental practices mainly from five regions: Alabama/Mississippi, Florida/Georgia, Minnesota, Permanente Dental Associates, and Scandinavia. Patient and restoration characteristics were collected during the visit. Preoperative depths were diagnosed with methods routinely used in each practice for previously unrestored occlusal and/or proximal surfaces. Analysis of variance and logistic regression were done using generalized estimating equations to assess dentist/practice and patient predictors of enamel lesion restorations, accounting for clustering within practitioner and patient.

Results: 229 practitioner-investigators placed 5,532 restorations involving an occlusal surface and 4,166 involving a proximal surface in 4,397 patients; 1,447 included both occlusal and proximal surfaces (95% of eligible restorations were enrolled). About 13% of occlusal and 6% of proximal caries lesions were confined to the enamel based on preoperative assessment (p<.0001). DPBRN region, patient age, and patient sex (proximal only) were significantly associated with the percentage of enrolled enamel lesions (p-values <0.05). The percentage of enrolled lesions limited to enamel varied by DPBRN region from 20% to 3% for occlusal lesions, and 12% to 1% for proximal lesions. Dentists in the southeast US regions had the highest percentage of enamel lesions restored. Other patient and dentist/practice characteristics were not related to enamel lesion enrollment.

Conclusion: The significant differences in the percentage of enrolled enamel lesions between DPBRN regions, and lack of association with indicators of patient caries risk and other
dentist/practice characteristics, suggest that the external environment (e.g., patient preferences, reimbursement model) has a substantial influence on dentists’ treatment decisions. Support: U01-DE-16746, U01-DE-16747.
Poster Presenter: Omar Fernandes

Contact Email: Omar.D.Fernandes@HealthPartners.com

Abstract Title: The Riverside Research Clinic - Who's There and What They Do


Abstract: Our purpose is to showcase the clinical research capabilities of HealthPartners Institute for Education and Research (HPIER) at the HealthPartners Riverside Clinic. The Riverside Research Clinic began in 2001 with the implementation of the Action to Control Cardiovascular Risk in Diabetes (ACCORD) study. Since then, the research activities have grown to include many other multisite and national trials, all of which the Riverside site either meets or exceeds recruitment targets and is recognized as a performance leader. Currently, 12 HPIER staff work at Riverside Research Clinic conducting seven active study evaluations:

- ACCORDION (NIDDK) - Long-term follow-up study of ACCORD
- AIM-HIGH (NHLBI) - Niacin in the treatment of patients with cardiovascular disease
- ASPREE (NIA) - Impact of aspirin use on physical and cognitive health in people over age 65
- Blood Pressure Accuracy Study (Partnership grant) - Accuracy of the current automated blood pressure protocol in HealthPartners clinics
- HyperLink (NHLBI) - Home blood pressure telemonitoring and case management to control hypertension
- EXSCEL (Amylin & Eli Lilly) - Impact of exenatide once weekly treatment on cardiovascular outcomes in people with type 2 diabetes
- TECOS (Merck) - Impact of sitagliptin treatment on cardiovascular outcomes in people with type 2 diabetes

Among these studies, there are approximately 1,041 research participants being seen by staff. This presentation will include a timeline for past and current studies conducted at Riverside and highlight the expertise of the staff involved.
Abstract:

Introduction: This study was designed to evaluate the effect on displacement of early operative stabilization on unstable fractures when compared to stable fractures of the sacrum.

Methods: Patients who sustained pelvic fractures (including sacral fractures of Denis type I and type II classification) and were aged over 18 years at the time of the study were enrolled into this study. Patients were managed emergently and then subsequently divided into two cohorts, comprising those who were treated operatively and those treated non-operatively. The operative group included patients treated with either internal or external fixation.

Results: Twenty-eight patients had zone II fractures, and 20 had zone I fractures. Zone II fractures showed average displacements of 6.5 mm and 6.9 mm in the rostral-caudal and anteroposterior directions, respectively. At final follow up, Zone I fractures had average displacements of 6.6 mm and 6.1 mm in both directions. There were no significant differences between zone I and II sacral fractures. Average changes in fracture displacement in patients with zone I fractures were 0.6 to 1.0 mm in both directions. Average changes in zone II fractures were 1.8 to 1.5 mm in both directions. There were no significant differences between the average changes in zone I and II fractures in any or in average displacements.

Conclusion: Although optimal treatment for sacral fractures continues to evolve, we demonstrate that operative stabilization ensures displacement is no worse in operatively treated unstable fractures (Zone I and II), at follow up, compared with stable fractures managed conservatively.
**Poster Presenter:** Pam Pawloski

**Contact Email:** Pamala.A.Pawloski@HealthPartners.com

**Abstract Title:** Chemotherapy Treatment Patterns in Advanced Colon Cancer


**Collaborators:** Kaiser Permanente Northwest, Henry Ford Health System, Marshfield Clinic Research Foundation, Kaiser Permanente Colorado, Kaiser Permanente Hawaii, Kaiser Permanente Northern California

**Funding Agency:** NCI

**Abstract:**

**Background/Aims:** Chemotherapy for Stage III/IV colon cancer incorporates new drugs, regimens, and broad treatment guidelines, thus allowing wide variation. Metastatic colon cancer cases at 7 HMO Research Network sites evaluated in the Comparative Effectiveness in Genomic and Personalized Medicine for Colon Cancer (CERGEN) study were evaluated for chemotherapy use by geography and patient characteristics.

**Methods:** Cases diagnosed between 1/1/04 and 12/31/09 were included and patient characteristics (comorbidities, treatment, KRAS status, and palliative care) were collected. KRAS testing was conducted on tumor specimens not previously tested. Analysis included descriptive statistics, incidence rates, and Cox proportional hazards regression models.

**Results:** Analysis of Stage III (n=422) and Stage IV (n=798) cases demonstrated the receipt of chemotherapy varied by stage (87%; 256 of 294 stage III and 68%; 630 of 926 stage IV, adjusted p-value=0.0452), geography (range 51-83%; adjusted p-value 0.0003; age (rate decreased with increasing age, adjusted p-value < 0.0001), Charlson Score (score 0, 76%; 147 of 196 to score 6+, 46%; 118 of 257; adjusted p-value < 0.0001), Medicare coverage (yes, 90%; 311 of 346 vs. no, 66%; 577 of 874; adjusted p-value < 0.0001), and positive family history of cancer (family history 82%; 460 of 561 vs. no family history 71%; 258 of 363; adjusted p-value < 0.0456). The median time to treatment varied by geography, stage, age, race, Medicare coverage, college education, household income, and other therapy.

**Conclusions:** Chemotherapy use and median time to treatment in advanced colon cancer varied by disease stage, geography, and patient characteristics.
Poster Presenter: Pat Walker

Contact Email: Patricia F.Walker@HealthPartners.com

Abstract Title: An Innovative Approach to Improve Hepatitis B Screening Rates in Immigrant Populations: The Global Health Wizard

Authors: Walker PF, Parker ED, Enstad C, Hedblom B, Amundson J, Pryce D, Hassan MA

Collaborators: HealthPartners Medical Group, University of Minnesota Department of Medicine – Global Health Pathway, Hennepin County Medical Center – General Internal Medicine, University of Minnesota Department of Medicine – Gastroenterology Division

Funding Agency: University of Minnesota

Abstract:

Objective: Hepatitis B virus (HBV), a chronic viral infection, is the most common cause of hepatocellular cancer (HCC) worldwide. HCC is the fifth most common cancer in the world and the third leading cause of cancer-related death. Guidelines recommend screening of all patients born in countries with HBV prevalence rates >2%, which is a best practice recommendation for most immigrants in Minnesota. This project will test a point-of-care decision support tool to educate and prompt providers to 1) screen for HBV and 2) order follow-up care.

Methods: Nine clinics with >450 non-English-speaking patients were selected and randomly assigned to active or passive intervention. Point-of-care tools were developed and implemented in EPIC for all primary care providers in the clinics. The point-of-care tool is activated when a patient’s language or country of origin indicates a country with HBV prevalence >2%. Data on patient and provider characteristics will be extracted from EPIC. A generalized logistic regression model will provide odds ratios comparing rates of screening and follow-up tests in both interventions.

Results: The point-of-care tool went into production July 19, 2012. We will present preliminary results on screening rates. We anticipate that the active intervention will identify potential HBV carriers and refer them for follow up, resulting in a higher screening rate than the passive intervention.

Conclusion: Results will be disseminated via community meetings. The results could be used to develop other point-of-care interventions for providers in the global village, and the care process could improve care for immigrants statewide.
**Poster Presenter:** Patrick O’Connor

**Contact Email:** Patrick.J.OConnor@HealthPartners.com

**Abstract Title:** Impact of Bariatric Surgery on Life expectancy in Adults with Diabetes

**Authors:** Schauer DP, Arterburn DE, Livingston EH, Coleman K, Sidney S, O’Connor PJ, Sherwood NE, Fischer D, Eckman MH

**Collaborators:** University of Cincinnati Medical Center – Division of General Internal Medicine, Group Health Center for Health Studies, University of Texas Southwestern School of Medicine – Department of Gastrointestinal and Endocrine Surgery, Southern California Permanente Medical Group, Kaiser Permanente Northern California, University of Cincinnati Medical Center – Division of General Surgery

**Abstract:**

**Objective:** To determine how gastric bypass affects life expectancy for severely obese patients with diabetes.

**Methods:** We developed a decision-analytic Markov model to evaluate two treatment strategies for severely obese patients with diabetes: gastric bypass versus nonsurgical treatment. The efficacy of surgery was determined from a retrospective cohort of 165,000 severely obese diabetic patients (4,500 had gastric bypass) from 4 HMO Research Network sites using fully adjusted Cox proportional hazards models. Logistic regression models calculated in-hospital mortality for surgery using data from the Nationwide Inpatient Sample. The decision model was calibrated using data from the National Health Interview Survey and constructed using Decision Maker®, which estimated changes in life expectancy.

**Results:** Our base case, a 40-year-old woman with a BMI of 45 and no hypertension, coronary artery disease, or congestive heart failure, gained 7.1 years of life expectancy with gastric bypass (43.1 years with surgery vs. 36.0 without). Surgery was no longer favored in our base case when 30-day surgical mortality exceeded 16% (baseline risk, 0.2%). Sensitivity analyses revealed that gain in life expectancy decreases with increasing BMI until a BMI of 62; at this point, nonsurgical treatment achieves greater life expectancy than gastric bypass for men and women of all ages.

**Conclusions:** For most severely obese diabetic patients, gastric bypass surgery increases life expectancy; however, gastric bypass decreases life expectancy for those with a BMI over 62. Patients with a high BMI may receive other benefits from surgery, such as better quality of life and reduced comorbid disease.
Poster Presenter: Prashant Upadhyaya

Contact Email: kpupadhyaya@gmail.com

Abstract Title: The Complex Abdomen

Authors: Upadhyaya P, Obst M, Dries D, Fletcher J

Collaborators: Departments of Plastic and General Surgery

Abstract:

Background: Recurrent ventral incisional hernia in patients considered candidates for abdominal wall reconstruction techniques is never an isolated event. These individuals frequently have complex intra abdominal as well as psychological, nutrition, and physical limitations which must be addressed for successful outcome.

Methods: A “Complex Abdomen” team was formed to meet the varying needs of patients requiring reconstruction for recurrent ventral incisional hernia after multiple abdominal operations. At the heart of the team is a coordinator or navigator who arranges independent evaluation by a senior general surgeon, critical care specialist, and reconstructive plastic surgeon. All patients are counseled for nutrition optimization, tobacco cessation, and exercise therapy. Nicotine levels are screened for 6 to 12 weeks before surgery. In the operating room, regional anesthesia supplemented by general anesthesia allows patients to be fed and ambulated on the first postoperative day. Operative procedures are staffed jointly by abdominal and reconstructive surgeons.

Conclusion: Patients with fistulas or at high risk for complications related to lengthy procedures are treated with “damage control” technique, staged reconstruction, and care in the ICU. All postoperative and postoperative visits are coordinated through the nurse navigator and include visits to the abdominal and reconstructive surgery clinics on alternating weeks. Our team now supports other departments facing the complex abdomen including urology, Gynecology and spine reconstruction services.

Clinical Implications: Abdominal wall reconstruction team has become a resource within our medical group, hospital network, and community. Like hospital programs such as trauma care or burns, abdominal wall problems are best managed by a dedicated team.
**Poster Presenter:** Rich Paskach

**Contact Email:** Richard.R.Paskach@HealthPartners.com

**Abstract Title:** Research Informatics and Information Services

**Authors:** Paskach RR, Defor TA, Appana DX, Hanson AM, Molitor BA, Amundson GH

**Abstract:** Provide an overview of the technical and analytical expertise and services that are available for HP Institute to support research and education through the RIIS department.
Poster Presenter: RJ Frascone

Contact Email: Ralph.J.Frascone@HealthPartners.com

Abstract Title: Treatment of Non-Traumatic Out-Of-Hospital Cardiac Arrest with Active Compression Decompression Cardiopulmonary Resuscitation Plus an Impedance Threshold Device

Authors: Frascone RJ, Wayne MA, Swor RA, Mahoney BD, Domeier RM, Olinger ML, Tupper DE, Setum CM, Burkhart N, Klann L, Salzman JG, Wewerka SS, Yannopoulos D, Holcumb RG, Aufderheide TP

Funding Agency: NHLBI

Abstract:

Background: The primary analysis of a clinical trial comparing active compression decompression cardiopulmonary resuscitation (CPR) plus an impedance threshold device (ACD+ITD) with standard (S) CPR in subjects with non-traumatic out-of-hospital cardiac arrest (OHCA) of presumed cardiac etiology (n=1653) showed that ACD+ITD resulted in improved survival to hospital discharge with favorable neurologic function. In that evaluation, nearly one third of all patients treated with either S-CPR or ACD+ITD did not meet final enrollment criteria. Safety and effectiveness findings from all randomized subjects in that trial, regardless of OHCA etiology, are described herein.

Methods & Results: Adults with presumed non-traumatic OHCA were prospectively enrolled and randomly allocated to treatment with S-CPR (N=1335) or ACD+ITD (N=1403). Except for rescue personnel, research and hospital staff were blinded to treatment assignment. The primary endpoint was survival to discharge with favorable neurologic function (modified Rankin Scale score ≤3). Survival to discharge with favorable neurologic function was greater with ACD+ITD compared with S-CPR: 7.9% versus 5.7%, (OR 1.42, 95% CI 1.04,1.95, p=0.027). One-year survival was also greater: 7.9% versus 5.7%, (OR 1.43, 95% CI 1.04,1.96, p=0.026). Nearly all survivors in both groups had returned to their baseline neurological function by one year. Major adverse event rates were similar between groups.

Conclusions: ACD+ITD resulted in a 38% increase in survival with favorable neurological function at hospital discharge, and a 39% increase in survival at one year. These findings from all randomized study subjects, regardless of OHCA etiology, support the use of ACD+ITD in all non-traumatic cardiac arrest patients.
**Poster Presenter:** Robert Neumann

**Contact Email:** rneumann@umn.edu

**Abstract Title:** Laparoscopic Transperitoneal Harvest Technique of Rectus Abdominis Muscle

**Authors:** Neumann RG, Serleth HJ, Dries D, Fletcher JW

**Collaborators:** Regions Hospital Department of Plastic Surgery, Regions Hospital Department of General Surgery

**Abstract:**

**Objective:** Muscle free flaps are used by plastic surgeons to provide coverage of vital anatomic structures. However, open harvest can lead to significant donor site complications, including incisional hernias, infections, chronic pain, and seromas. Here we present the first series of laparoscopic rectus abdominis muscle harvest results with comparison to a concurrent cohort of open muscle harvests.

**Methods:** From September 2009 to December 2010, eight patients underwent laparoscopic rectus harvest with free transfer to reconstruct lower extremity injuries at a Level I trauma center. We compare operative characteristics and outcomes to eleven consecutive patients with open rectus harvest from February 2008 to September 2010.

**Results:** Laparoscopic subjects were four females and four males, average age 44 years (range 28-61yrs). Open harvest subjects were four women and seven men, average age 37 years (range 10 -65yrs). Ileus duration was 2 days laparoscopic vs 3.36 days open (p=0.026). Complication incidence was 0.5 laparoscopic vs 1.36 open (p=0.045). No laparoscopic and one open harvest patient developed an abdominal bulge. There were no significant differences in OR time (246 minutes vs 234 minutes), blood loss (176ml vs 205ml), or time to discharge (10.8 days vs 17 days).

**Conclusion:** Laparoscopic rectus muscle harvest for free transfer is safe, efficient, and well received by patients. Our technique is straightforward. We demonstrated a shorter duration of ileus and reduced complication rate with our laparoscopic technique compared to conventional open harvest. Laparoscopic technique compares favorably to open rectus harvest and represents a viable option in the carefully-selected patient.
**Poster Presenter:** Ryan Kelly  
**Contact Email:** kelly847@umn.edu  
**Abstract Title:** Procalcitonin use at Regions Hospital  
**Authors:** Kelly R, Chomilo N, DeSilva M, Jongwutiwes U, Reddy P, Saab A, Schaaf E, Vawter L  

**Abstract:**

**Introduction:** Lower respiratory tract infections (LRTIs) are the most frequent indication for antibiotics in primary care setting. Inappropriate use of antibiotics can lead to antibiotic-resistance and increases in healthcare costs. In an attempt to improve decision-making for antibiotic use in LRTIs, a number of biomarkers have been tested to guide the decision of whether to initiate antibiotics. One of these biomarkers, procalcitonin (PCT), has been shown to be helpful at decreasing antibiotic use in patients with LRTIs without increasing morbidity/mortality. Research suggests that in certain clinical situations, when patients have a low PCT value, physicians should be strongly discouraged from prescribing antibiotics. At our institution, although PCT had been ordered frequently, we wondered if PCT results were being used to help direct antibiotic therapy. We specifically wanted to determine whether an undetectable PCT changed antibiotic management for patients admitted with LRTIs.

**Methods:** Using the electronic medical record, all inpatient PCTs ordered between 1/30/10 and 3/29/11 were obtained. Undetectable PCT levels, defined as <0.05 ng/mL, were included in this analysis and all other values were excluded. The charts of patients for whom an undetectable PCT was measured were reviewed and data including demographics, use of antibiotics before and after PCT measurement, and hospital diagnoses were collected. Data was analyzed using standard biostatistical measures.

**Results:** A total of 1142 PCT tests were ordered during the time period studied. Of those, 381 (33.3%) were reported as undetectable. Two-hundred and twenty-four (58.8%) patients were receiving antibiotics at the time PCT was drawn. A negative procalcitonin value may have contributed to 24% reduction in antibiotic use. One-hundred thirty-one (29.7%) patients in with negative PCT values had a diagnosis of pneumonia. In patients diagnosed with pneumonia, antibiotics were stopped in 27%, continued without an alternate infection in 50%, and continued with an alternative infectious diagnosis in 19%. In patients diagnosed with a COPD exacerbation, antibiotics were stopped in 40% after negative PCT level and continued or added in 60%.

**Conclusions:** Despite many limitations to our study, it often appeared that clinical judgment overruled lab values in patients with suspected LRTIs in whom PT levels were ordered. While PCT measurement is a simple intervention that is easy to implement into hospital practice that may reduce antibiotic exposure and associated costs, its’ current role is limited.
Abstract:

Introduction: Regional anesthesia is commonly used in place of, or in conjunction with, general anesthesia in elective, outpatient foot and ankle surgery. However, there is minimal data about its use in fracture care. This retrospective chart review evaluated the efficacy of popliteal fossa nerve blockade (PFNB) as an adjuvant to general anesthesia in ankle fracture surgery.

Methods: We reviewed the charts of patients who underwent open reduction and internal fixation for either bimalleolar or bimalleolar equivalent ankle fractures. Group I (24 patients) received general anesthesia alone and Group II (13 patients) received general anesthesia with PFNB. Variables included in analysis were patient's age, sex, injury pattern, ASA score, operative tourniquet time, block usage, daily pain scores, and post-operative narcotic usage.

Results: Patients who had general anesthesia plus PFNB had lower pain scores (mean of 5.6 vs. 7.3) and lower narcotic usage (mean of 41 mg morphine vs. 98mg) during the first hospital day. These differences were significant (p<0.005) and normalized by the second hospital day.

Discussion and Conclusion: Popliteal fossa nerve block is a useful adjuvant to general anesthesia in ankle fracture patients. It delays the first usage of narcotics, decreases narcotic usage during the first day after surgery, and improves pain scores during the immediate postoperative period.
Poster Presenter: Sarah Basile

Contact Email: Sarah.M.Basile@HealthPartners.com

Abstract Title: Partners in Practice-Based Research: The National Dental Practice-Based Research Network

Authors: Durand EU, Basile SM, Kelley ME, Rindal DB, Nixdorf DR

Collaborators: The National Dental Practice-Based Research Network

Funding Agency: NIDCR

Abstract: The National Dental Practice-Based Research Network is funded by the National Institute of Dental and Craniofacial Research (NIDCR), part of the National Institutes of Health. A dental practice-based research network is an investigative union of practicing dentists and academic scientists. The National Dental PBRN provides practitioners across the United States with an opportunity to propose or participate in research studies that address day-to-day issues in oral healthcare. The studies, conducted in participating dental offices with consenting patients, help to expand the profession’s evidence base and further refine care. Investigators and practitioners work together to perform relatively short-term studies to compare the effectiveness of preventive and treatment methods in dentistry. Headquartered at the University of Alabama at Birmingham School of Dentistry, the National Dental PBRN serves as an administrative hub that leads and oversees six regions. HealthPartners Institute for Education and Research administratively leads the Midwest Region (IL, IN, IA, MI, MN, NE, ND, OH, SD, WI). A large part of the development of the network involves engaging diverse stakeholders in the community including dental providers in a variety of practice settings, dental professional organizations, institutions of higher education (e.g., dental schools) and continuing and professional education, and researchers across the nation. A key role of Regional Coordinator staff is the recruitment of practitioners to the network. This presentation highlights how practitioners not otherwise involved in research learn about the opportunity to improve the nation's oral health and the further develop the scientific basis for the profession through involvement in practice-based research.
**Poster Presenter:** Ted Wawrzyniak  

**Contact Email:** Ted.D.Wawrzyniak@HealthPartners.com  

**Abstract Title:** Initial Hypertension Severity Determines the Extent of Blood Pressure Reduction in CPAP-treated OSA Patients  

**Authors:** Wawrzyniak T, Adams AB, Goswani U, Bijwadia J  

**Abstract:** A primary goal of cardiovascular morbidity and mortality risk management is hypertension control. Hypertension (HTN) is prevalent in obstructive sleep apnea (OSA) and continuous positive airway pressure therapy (CPAP) is reported to reduce blood pressure (BP) in OSA patients above a compliance threshold (>5.6 hours/night) and after 3-6 months of CPAP. We studied the extent of HTN reduction achieved by CPAP therapy in patients referred to a sleep diagnostic center by analyzing electronic health records (EHR) of OSA patients diagnosed and treated from June 2009 - Nov 2011. EHR were compared for BP and weight (BMI) changes between a pre-CPAP primary care visit and followup visits after 6 months and 1 year of CPAP Rx. Of the 723 patients studied, 294 were hypertensive with systolic blood pressure (SBP) > 130mmHg. Changes in mean SBP (mmHg) by deciles from the initial visit to 6 months after CPAP therapy were: 160-170 (n=15) 167.5→146.1, p<.001, SBP 150-160 (n=33) 152.4→131.9, p<.001, SBP 140-150 (n=87) 143.0→132.4, p<.001, SBP 130-140 (n=159) 133.5→128.2, p<.001 with no CPAP effect if SBP =120-130 123.4→124.9, NS. The changes by descending decile SBP categories were, respectively, -21.4, -20.5, -10.6, -5.3, +1.5. Corresponding significant reductions in DBP were -5.8, -5.9, -4.1, -3.5 and -0.7 (NS). There were no differences in mean SBP or DBP between 6 month and 12 month visits. Initial mean BMI decreased with descending SBP category 41.1, 39.1, 39.3, 37.3, 36.8, however, no significant changes in BMI occurred between visits. We conclude that significant BP reduction occurs in OSA patients after 6 months of CPAP therapy in relation to initial pre-CPAP blood pressure readings. The reduction is sustained at 12 months with a graduated effect, the reduction being greater in patients with a higher baseline BP. The effect is unrelated to weight change.
**Poster Presenter:** Teresa Gonzaga

**Contact Email:** tgonzaga322@gmail.com

**Abstract Title:** Cellulitis Following Thermal Injury: A Retrospective Review for Quality Improvement

**Authors:** Gonzaga TA, Endorf FW, Mohr WJ, Ahrenholz DH

**Collaborators:** Salzman J (Critical Care Research Center), Rood J (Regions Hospital Burn Center)

**Abstract:** We have defined cellulitis in burn patients as a new area of redness and induration extending beyond the limits of the initial wound with or without pain, leukocytosis or fever. Our goal is to determine our incidence of cellulitis, identify those at high risk and identify ways to reduce this complication.

For quality improvement measure, we reviewed charts of patients admitted to our regional burn center from January 2010 to June 2011. Using burn center patient cards, demographic data were collected as was burn size and location, time from injury to onset of cellulitis, time of injury to excision and antibiotics used for treatment. None of our patients received prophylactic antibiotics after thermal injury.

During an 18 month period, we saw 722 new thermal injury burn patients; 273 were admitted to the hospital, 210 fit inclusion criteria. Fifteen (7.1%) patients admitted had existing cellulitis. An additional 36 (17.1%) patients developed cellulitis. We admitted 88 facial burns, 181 burns of the upper extremity/hands, 74 of the anterior trunk, 48 of the back/flank and 103 of the lower extremity/feet. Patients with lower extremity burns were three times as likely to develop cellulitis compared to those burned in other locations (OR=3.282, 95% CI 1.536-6.975, p<0.001).

These data suggest an unexpectedly high incidence of cellulitis in lower extremity burns. As a result of this QI, we have reached a consensus on how we define and treat burn wound cellulitis at our institution. The use of prophylactic antibiotics for lower extremity burns warrants a prospective randomized study.
Poster Presenter: Terry Barclay

Contact Email: Terry.R.Barclay@HealthPartners.com

Abstract Title: Specific Types of Memory Complaints May Provide an Early Warning Sign of Cognitive Impairment in Community Dwelling Older Adults

Authors: Barclay TR, Rao RJ, Forsberg A, Cooner JM, Owens B, Kumagai RH, Svitak AL, Cagan A, Hanson LR

Abstract:

Background: Early diagnosis is critical to efforts aimed at improving treatment, care, and outcomes for persons with dementia. Routine, population-based dementia screening in primary care has been met with resistance among many in the medical profession. Subjective memory complaints may be the first sign a provider confronts when a patient is experiencing cognitive decline. However, because complaints are so common among older adults, they are frequently attributed to normal aging or disregarded altogether. The Cognitive Change Checklist (3CL) is a brief, 28-item self-report inventory of cognitive change. Several studies support its use in differentiating older adults with true cognitive impairment from healthy individuals with normal, age-related memory complaints.

Methods: Adults aged >55 years old, living in the community without a memory loss diagnosis were recruited for participation in the Minnesota Memory Project, a longitudinal study investigating cognitive and lifestyle factors associated with advancing age. Baseline assessments included cognitive screening (Montreal Cognitive Assessment; MoCA), brief neuropsychological testing (learning/memory, attention/concentration, cognitive/motor speed, visuospatial, executive functioning), self-report inventories, health history, and lifestyle information. For data analysis, the sample was divided into two groups, normal and impaired, using established cut-points for MCI on the MoCA. Cognitive complaint profiles on the 3CL were analyzed and correlated with objective cognitive performance on neuropsychological testing.

Results: Enrolled subjects (N=251) ranged in age from 55-96 (M=69.6) and were generally female (76.7%), non-Hispanic White (98.4%), and retired (65.7%). Thirty two percent of subjects scored in the impaired range (<25) on MoCA testing. More subjective memory complaints on the 3CL were associated with greater impairment on the MoCA as well as more significant cognitive deficits as measured by various neuropsychological tests sensitive to early dementia. Item-analysis of the 3CL revealed a small number of critical items with particular sensitivity in differentiating normal subjects from those with cognitive impairment. These critical items reflected specific complaints regarding select aspects of comprehension, recent, and remote memory.

Conclusions: Results of this study provide support for the 3CL as a brief measure to quantify memory complaints and to facilitate earlier identification of individuals with possible MCI and dementia. Specific types of memory/cognitive complaints differentiated the worried well from those with suspected cognitive impairment.
Poster Presenter: Tom Kottke

Contact Email: Thomas.E.Kottke@HealthPartners.com

Abstract Title: Impact of Pricing Change on Cafeteria Salad Bar Purchases

Authors: Kottke TE, Pronk NP, Katz AS

Collaborators: HealthPartners Human Resources Department, Be Well Committee

Abstract:

Background: To determine whether lowering the price of salad might increase consumption, HealthPartners subsidized 50% of the cost of salad-bar products at the 8170 cafeteria in March 2012.

Methods: Monthly sales by cafeteria product line were compared for February through June 2012. 2,643 employees on the 8170 email distribution list were invited to respond to a survey in June 2012. 677 responded.

Results: Salad-bar sales for February through June were $3,344, $6,747, $3,629, $3,899, and $3,874 (mean, SD = $3687, $1,386). 86% of the survey respondents reported that they increased the number of times that they purchased salad during March, 96% reported that they would eat more salad if the price were permanently less, and 50% reported that they have eaten less salad since March. Most of the responses to the open-ended opportunity were positive and said that the cost of the salad bar relative to other choices was the reason that the respondent did not eat more salads.

Conclusion: Reducing the cost of salads significantly increased sales. This suggests that, for many HealthPartners employees at 8170, the higher costs of salad dominate the health benefits. Permanently lowering the cost of the salad bar could be expected to increase consumption of salad products.
**Poster Presenter:** Tyler Van Heest

**Contact Email:** Tyler.X.VanHeest@HealthPartners.com

**Abstract Title:** The Treatment of Complex Hip Fractures with a Proximal Femoral Locking Plate and Short Term Surgical Results

**Authors:** Lafferty PM, Will RE, Li M, Cole PA

**Abstract:**

**Summary:** Complex proximal femur fractures are challenging. The treatment goals of anatomic alignment with stable fixation to allow early functional rehabilitation are difficult to achieve. The Proximal Femoral Locking Compression Plate (PF-LCP) is viewed as a viable alternative for stable fixation of complex proximal femur fractures. The aim of this study is to review the short-term surgical results of the PF-LCP.

**Methods:** We reviewed the charts and radiographs of 30 consecutive patients treated at a single Level-I Trauma Center from February, 2006 to March, 2009. Two patients died shortly after surgery, leaving 28 patients with adequate follow-up for review. Quality of reduction was critically examined using the Garden's alignment index. All fractures were classified according to the AO system. There were 22 males and 8 females. Average age was 48.4. There were 29 closed injuries and 1 open Gustilo Type IIIA injury. The mechanism of injury was high energy in 19 cases and low energy in 11 cases. Twenty-seven of thirty (90%) patients were treated at an average of 0.8 days after injury. Three patients underwent revision to the PF-LCP from other implants, two for nonunions and one for early fixation failure. The mean follow-up period was 39.9 weeks.

**Results:** Displaced femoral neck fractures (31-B) were present in 12/30 (40%) patients, intertrochanteric fractures (31-A) were present in 18/30 (60%), and subtrochanteric fractures (32-A1.1, 32-A2.1, 32-A3.1) were present in 6/30 (20%). Nonunion occurred in 5/12 (41.7%) of femoral neck fractures, 0/18 (0%) intertrochanteric fractures, and 2/6 (33.3%) of subtrochanteric fractures. One of the subtrochanteric nonunions was associated with the open fracture, which had been associated with significant bone loss. All femoral neck fractures were found to be satisfactorily reduced according to Garden's alignment criteria. All femoral neck nonunions progressed to varus collapse with failure of fixation. Residual posteromedial fracture gap following fixation due to fracture comminution was found in 3/5 (60%) of the nonunion group and 1/7 (14.3%) of the healed group. This was not significant. There were a total of 6 fixation failures among the 5 femoral neck nonunions. The lengths of the proximal screws were found to be significantly different in the healed and unhealed groups. The mean screw lengths for the cephalic portion in the nonunion versus healed groups was 77 mm versus 93.6 mm for the 95° screws ($p=0.02$), 89 mm versus 102.9 mm for the 120° screws ($p=0.03$) and 74 mm versus 101.4 mm for the 135° screws ($p=0.008$). The average total screw length was 240.0 mm (SD 20.9) versus 297.9 mm (SD 18.5) ($p=0.001$).

**Conclusion:** The PF-LCP was found to have a high nonunion rate in complex pertrochanteric variants with ipsilateral femoral neck fractures. Short screw lengths may be a contributing factor.
Weaknesses of this study include the retrospective design, small sample size, short length of follow-up, and heterogenous patient population and fracture patterns.