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Behavioral Interventions

C-A3-01:
The Effect of an Automated Reminder Call Intervention on Completion of Fecal Occult Blood Testing (FOBT)

David M Mosen, PhD, MPH, *Kaiser Permanente Northwest*; Adrianne C Feldstein, MD, *Kaiser Permanente Northwest*; Nancy Perrin, PhD, *Kaiser Permanente Northwest*; A Gabriela Rosales, MS, *Kaiser Permanente Northwest*; Ronald E Myers, PhD, *Thomas Jefferson University*; David H Smith, PhD, *Kaiser Permanente Northwest*; Elizabeth G Liles, MD, *Kaiser Permanente Northwest*; Jennifer L Schneider, PhD, *Kaiser Permanente Northwest*; Jennifer E Lafata, PhD, *Henry Ford Health System*; Russell E Glasgow, PhD, *Kaiser Permanente Colorado*

Background: Colorectal cancer (CRC) is the third most common cancer in the United States and is associated with significant morbidity and mortality. Although CRC has a good prognosis if diagnosed early, screening rates remain low. Innovative, low cost intervention, such as the use of automated reminder calls, may increase CRC screening rates. The objective of this prospective study was to determine the effect of an automated telephone reminder message on completion of a fecal occult blood test (FOBT), an evidence-based screening method for populations with average risk for CRC. **Methods:** A prospective randomized clinical trial of 5,993 patients (intervention group = 2,993, usual care group = 3,000), between ages 51–80, due for CRC screening with average risk for CRC. The patient population received care in a not for profit HMO in the Pacific Northwest. The intervention group received a 1-minute automated telephone call, which provided a general description and health benefits of FOBT. Patients could request that an FOBT kit be mailed to their home on the call. Up to three calls were attempted for non respondents over a five month period. Multiple logistic regressions was used to examine the independent effect of automated reminder calls on completion of an FOBT test, after adjusting for age, gender and prior CRC screening. **Results:** Compared to usual care, those in the intervention group were significantly more likely to complete an FOBT (OR = 1.60, 95% CI = 1.39–1.84), five months post randomization. Two characteristics were also associated with completion of FOBT: 1) older age [age 61–70 (OR = 1.33, 95% CI = 1.14–1.56), age 71–80 (OR = 1.85, 95% CI = 1.52–2.25] vs. age 51–60, and 2) any prior CRC screening (OR = 3.13, 95% CI = 2.71–3.62) vs. no prior screening. **Conclusions:** Automated telephone calls increased completion of screening FOBT compared to usual care. Broad implementation may cost effectively increase community CRC screening rates. Further research is needed to better understand how the stage at CRC diagnosis and CRC related mortality are impacted and to evaluate cost effectiveness.

C-A3-02:
How Do the Best Physicians Get Diabetes Patients to Glycemic Goals?

William A Rush, PhD, *HealthPartners Research Foundation*; JoAnn M Sperl-Hillen, MD, MPH, *HealthPartners Research Foundation*; Patrick J O'Connor, MD, MPH, *HealthPartners Research Foundation*; Paul Johnson, PhD, *HealthPartners Research Foundation*; Heidi L Ekstrom, MS, *HealthPartners Research Foundation*; George Biltz, MD, *HealthPartners Research Foundation*

Objective: To examine the glucose control related practice patterns of primary care physicians (PCP) and ascertain if those who provide better quality diabetes care have lower rates of clinical inertia. **Methods:** Study subjects included 80 PCPs at a large medial group in Minnesota, who were ranked on quality of diabetes care using a composite diabetes quality of care measure. Data on use of glucose lowering pharmacotherapy was combined with laboratory data indicating the level of glycated hemoglobin (A1c) at the time of each office visit to examine differences in patterns of glucose related treatment as a function of the physicians' quality of care. GLM statistical models were used to assess the relationship. **Results:** Optimal PCPs, defined as the top quartile of PCPs, had lower rates of clinical inertia than their less well performing peers. Optimal PCPs initiated (P=0.08) and titrated (P=0.02) glucose lowering therapy at lower A1c levels than their peers. Optimal practice PCPs exhibited a feed forward treatment strategy, while their less well performing peers exhibited a feedback treatment strategy. **Conclusions:** There was significant variation in rates of clinical inertia and in trigger levels of A1c at which different PCPs initiated or intensified glucose lowering therapy in their adult patients with diabetes. Optimal docs had lower rates of clinical inertia. Interventions to reduce clinical inertia have great potential to improve diabetes care.

C-A3-03:
Media Messages About Cancer: What Do People Understand?

Kathleen Mazor, EdD, *Meyers Primary Care Institute*; Laura Saccoccio, BS, *Meyers Primary Care Institute*; Josephine Calvi, MPH, *Kaiser Permanente Georgia*; Rebecca Cowan, BA, *Kaiser Permanente Hawaii*; Douglas Roblin, PhD, *Kaiser Permanente Georgia*; Andrew Williams, PhD, *Kaiser Permanente Hawaii*; Mary Costanza, MD, *UMASS Worcester Medical School*; Paul Han, MD, MA, MPH, *National Institute of Health*; Sarah Greene, MPH, *Group Health*

Background: The importance of print health literacy is widely recognized, but oral literacy has been largely ignored. Because much health information is conveyed via spoken word, an inaccurate or incomplete comprehension of spoken health messages may have important consequences. This study explored the extent to which listeners understood critical concepts in spoken messages about cancer prevention and screening. **Methods:** Forty-four adults from three health plans took part in a 1-hour interview. Participants viewed six brief media clips from TV or the Web about cancer prevention and screening. Each clip contained multiple messages. Participants paraphrased the clips' main points and key concepts. We coded the accuracy of participants' responses with respect to the message content. **Results:** Of 44 participants, aged 41 to 70, 52% were female; 48% were non-white; and 5% had a high school education or less. Messages were generally understood by most participants but some participants misunderstood critical cancer prevention concepts. Nine of 44 could not define the term "at risk." Others provided approximately accurate synonyms, such as "susceptible to," or "inclined to," or gave examples of risk factors (e.g. fair skin for skin cancer) that indicated a partial understanding of the concept. In response to a news report about a comprehensive cancer study synthesizing the results of 7,000 clinical trials, 10% of the participants viewed the study size as small, or mistook the number of trials for number of patients. Some participants had trouble distinguishing "screening" and "prevention," apparently believing that screening is inherently preventive. **Conclusions:** Most participants in this sample of moderately to well-educated adults understood the main points contained in spoken messages about cancer screening and prevention. However, important concepts such as "at risk" (applicable to conditions besides cancer), were sometimes misunderstood. Similarly, some participants had difficulty understanding the strength of research evidence and the value of multiple studies. Comprehension depends on foundational knowledge,

which even educated lay people may be missing. Speakers, whether news anchors or providers—cannot assume that listeners understand critical health concepts even if the words themselves seem simple.

C-A3-04:

The Role of Family Disease History and Perceived Risk of Disease in Change of Fruit and Vegetable Intake Over 12 Months

Dayna A Johnson, MPH, MSW, *Henry Ford Health System*; George Divine, PhD, *Henry Ford Health System*; Gwen Alexander, PhD, *Henry Ford Health System*; Sharon Rolnick, PhD, *Health Partners Research Foundation*; Josephine Calvi, MPH, *Kaiser Permanente Georgia*; Melanie Stopponi, MPA, CHES, *Kaiser Permanente Colorado*; Jennifer McClure, PhD, *Group Health, Center for Clinical Studies*; Julie Richards, MPH, *Group Health, Center for Clinical Studies*; Victor Strecher, PhD, *University of Michigan*; Christine Cole Johnson, PhD, *Henry Ford Health System*

Background: A sufficient daily consumption of fruits and vegetables (F&V) could help prevent chronic diseases. Since implementing the 5 A Day program, research has shown that awareness has increased, but average F&V intake among American adults remains under the minimum recommendation. This analysis examines factors related to increasing F&V intake among participants in the MENU study, a randomized trial with two intervention arms and one control arm. **Methods:** In 2005, 2,513 confirmed HMO members, aged 21–65, from five geographically-diverse health plans completed an online enrollment survey, reporting F&V intake and personal and family health history. Mean change in combined F&V servings per day was assessed at 12 months post baseline, using a validated self-report F&V food frequency questionnaire. Analysis of covariance adjusting for the baseline F&V intake, regardless of study arm, was performed for each factor considered. **Results:** Of the 2,513, 80% were followed up at 12 months. Those with a family history of hypertension or diabetes increased their F&V consumption, *P*=.03 and *P*=.04 compared to those with no family history of these conditions, regardless of race. There were no observed differences in consumption increase by reported family history of cancer, heart disease or obesity. Participants with a high perceived risk of developing diabetes increased their intake by more than 0.6 servings than those with no perceived diabetes risk, *P*=.05, regardless of race. There were no statistical differences for consumption increase by risk of hypertension, heart disease or obesity. We tested for interactions between race and family history (FH) and perceived risk (PR) individually for each condition. Only FH of obesity was significant, *P*=.09 showing that whites with FH were more likely to increase F&V intake while blacks were not. The only significant interaction for PR was PR of cancer, *P*=.07. Interestingly, while the overall change was not significant for either race, whites with high PR increased F&V and blacks with a low PR increased F&V. **Conclusion:** FH of hypertension and diabetes, as well as perceived higher risk for developing diabetes, were characteristics that contributed to increasing F&V consumption, regardless of race. FH of obesity and PR of cancer contributed to differences in F&V intake change between blacks and whites. Interventions addressing perceived risk of disease or family history of disease may be valuable in encouraging dietary lifestyle.

PS2-03:

Primary Care Physician Awareness and Referral to Smoking Cessation Resources

Lila J Finney Rutten, PhD, MPH, *HealthPartners Research Foundation*; Erik M Augustson, PhD, MPH, *National Cancer Institute*; Linda Squiers, PhD, *RTI*; Kia Davis, MPH, SAIC, *National Cancer Institute-Frederick*

Objective: To examine awareness and referral to smoking cessation resources in a national sample of primary care physicians (PCP), and to identify patient, practice, and physician characteristics associated with awareness and referral. **Methods:** Data were from the National Survey of Primary Care Physicians' Recommendations and Practice for Breast, Cervical, Colorectal, and Lung Cancer Screening. The National Survey of Primary Care Physicians' Recommendations and Practice for Breast, Cervical, Colorectal, and Lung Cancer Screening provides national estimates of PCPs knowledge, attitudes, recommendations, and practices relevant to screening for breast, cervical, colorectal, and lung cancer. The survey was fielded between September 2006 and May 2007. Physicians were selected from the sampling frame employing a stratified systematic sample design. The total sample was divided into equal -sized samples for the administration of two different questionnaires. Our analyses were restricted to data from the colorectal and lung cancer questionnaire. Descriptive, bi-variate, and multivariate analyses were conducted to explore awareness and referral to smoking cessation resources. **Results:** Only 23% of primary care physicians reported awareness of and referral to the National Cancer Institute 1-800-QUIT-NOW line, 6% were aware of and made referral to National Cancer Institute 1-877-44U-QUIT line, and 14% were aware of and made referral to www.smokefree.gov. Awareness and referral to other services were higher (60%). PCPs frequently reported use of state and local smoking cessation resources. Multivariate analysis predicting awareness of at least one smoking cessation resource revealed greater awareness in practice locations with 50% or fewer African American patients (OR=12.15) compared to locations with 76–100% African American patients. Awareness was higher among physicians who self identified as non-Hispanic black (OR=2.66) or non-Hispanic other (OR=1.52) compared to non-Hispanic Whites. Practice location was significantly associated with referral at the bi-variate level; however, this association did not remain significant in the multivariate model. **Implications for Practice or Policy:** Physicians are a primary target audience for efforts to raise awareness of and promote national smoking cessation resources. Exploring physician preferences and barriers to referring patients to smoking cessation resources could inform such efforts.

PS2-06:

The Use of Wipe Boards in Patient Rooms to Improve Discharge Communication

Keith A Boell, DO, *Geisinger Health System*; Karen Bailey, MD, *Geisinger Health System*; Heidi Cole, RN, *Geisinger Health System*; Kimberly Duffy, RN, *Geisinger Health System*; Jason General, RN, *Geisinger Health System*; Linda Miller, RN, *Geisinger Health System*; Chris Raup, RN, *Geisinger Health System*; Jody Reeder RN, *Geisinger Health System*; Barry Rohrer, RN, *Geisinger Health System*; Kevin Capatch, *Geisinger Health System*; Beatrice Madison, *Geisinger Health System*

Communication about the discharge process is often lacking. Families and nurses are often unaware when a discharge is expected or what goals need to be met prior to discharge. We aimed to improve the discharge process in hopes of improving patient and staff satisfaction and patient throughput. Through our established quality group, we identified areas to focus on for improvement of the discharge process. From these, we selected discharge goals and an anticipated date of discharge as two areas to intervene. We began by surveying families and nurses as to their understanding of what goals a child needs to meet prior to discharge and when discharge was anticipated. The survey found many families and nurses did not know this basic information. In order to improve these, we decided to place wipe boards in all the patient rooms to be completed during daily rounds documenting discharge goals and an anticipated day of discharge. Nurses and families were challenged to be present during rounds and encouraged to contribute and ask questions and the staff was educated. We then began performing several tests to refine the process and evaluate its impact. A schedule was made where one service per week would begin using the boards with adjustments made as needed. At baseline, 67% of families and 19% of nurses knew the goals a patient needed to reach prior to discharge. With use of the wipe boards for the families, this initially remained at 67% on our first trial and improved to 72% during the second. For the nurses it improved to 33% with our first trial and 64% with the second. At baseline, 56% of families and 11% of nurses knew an anticipated time of discharge. After initiation of the wipe boards for the families, this improved to 67% after the first trial and 75% during the second. For the nurses it improved to 33% during the first trial and 62% during the second. The use of the wipe boards placed in the patients' rooms resulted in an increased percentage of nurses and families who were aware of discharge goals and an anticipated date of discharge. Our hope is that as we expand this to other services, we will see continued improvement in the discharge process. We then plan to address other areas of the discharge process including care management, patient education, and paperwork at discharge. This should result in increased satisfaction and better throughput.

PS2-14:

Why People Don't Eat Fruit and Vegetables: Insight from Participants Who Enrolled in MENU

Julie E Richards, MPH, *Group Health, Center for Health Research*; Jennifer B McClure, PhD, *Group Health, Center for Health Research*; Gwen L Alexander, PhD, *Henry Ford Health System*; George Divine, PhD, Josephine Calvi, MPH, *Kaiser Permanente Georgia*; Melanie A Stopponi, MPA, CHES, *Kaiser Permanente Colorado*; Cheri Rolnick, PhD, *HealthPartners Research Foundation*; Deborah P Ritzwoller, PhD, *Kaiser Permanente Colorado*; Christine Cole Johnson, PhD, *Henry Ford Health System*

Background: In order to develop effective dietary interventions, public health researchers need to better understand the reasons people do not to eat the recommended minimum servings of fruits and vegetables (F&V). **Methods:** Adults were recruited from five U.S. health plans in Washington, Colorado, Minnesota, Michigan and Georgia and enrolled in an online dietary intervention study designed to increase F&V consumption (MENU). Prior to the intervention, 2,513 eligible participants completed a baseline questionnaire assessing demographics and other information relevant for tailoring the intervention content, including perceived barriers to eating F&V. Participants also indicated if they were currently trying to eat more F&V or not. We compared groups who were (n= 849) and were not (n = 1651) trying to increase F&V intake at baseline, to examine if there were distinguishing characteristics which would help inform future intervention development targeted at individuals not trying to change their diet. **Results:** Compared to persons trying to change their diet, those not trying to change were more likely to be male (P=.05), younger (45.9 years vs. 47.1 years, P=.01), and a higher mean BMI (29.5 vs. 27.1, P<.001). Groups did not differ by education or race. Statistically significant differences were observed across most perceived barriers for eating both fruits and vegetables (assessed separately for each). The greatest differences (P<.001) were seen for the following perceptions: that F&V go bad too quickly, they do not satisfy hunger, were not available in their homes, cost, concerns about preparation time, and participants did not know how to add more servings of each to their diet. In all cases, persons who were not trying to change their diets rated these as more significant barriers. **Conclusions:** The results suggest that persons who are not actively trying to change their diet differ from people who are actively trying to eat healthy. Many of these differences may be modifiable through appropriate education and training. Others, such as the expense of F&V, may be modifiable at an environmental level by public policy makers. The insight gained from this study may help inform future intervention studies designed to effect important dietary changes.

PS2-26:

Development of Interventions to Reduce Adolescent Use of Indoor Tanning: The Talking Tanning and Teens Study

Cheri J Rolnick, PhD, MPH, *HealthPartners Research Foundation*; Jody Jackson, RN, BSN, *HealthPartners Research Foundation*; DeAnn Lazovich, PhD, *University of Minnesota School of Public Health*; Kelvin Choi, MPH, *University of Minnesota School of Public Health*; Brian Southwell, PhD, MA, *University of Minnesota School of Journalism and Mass Communication*; Jean Forster, PhD, MPH, *University of Minnesota School of Public Health*

Background: Use of indoor tanning devices has been associated with a range of adverse effects including burns, corneal damage, premature wrinkling, as well as melanoma and non-melanoma skin cancers. Indoor tanning is a common behavior among females and many begin use during adolescence. Interventions that target teens and parents to decrease use are lacking. **Aims:** This project is a collaboration between HealthPartners (HP) and the University of Minnesota (UofM) to develop materials to encourage parent-teen communication about indoor tanning. **Methods:** Adolescents 14–16 years (tanners and non-tanners) and parents of teenagers this age were recruited to participate in focus groups on indoor tanning. The following recruitment strategies were used: (1) Fliers posted in HP clinics, (2) notices in HPs online employee newsletter and intranet, (3) flier included with earnings statement to employees (n=2600), (4) fliers posted on UofM campus, (5) advertisements in three community newspapers, (6) targeted mailing (followed by phone invitation) to 528 households identified via health plan administrative data, (7) targeted postcard mailing (n=1000) to UofM employees, (8) recruitment through high schools (health education teachers, invitation to parents, cafeteria recruitment table). **Results:** Recruitment strategies 1–5 yielded 30 inquiries and six parent and six teen participants. Strategy 6 yielded four parent and four teen participants; of the 528 households targeted, 68% could not be reached by phone with one attempt, 11% had nonworking phone numbers, 15% refused participation (not interested in topic), 2% stated their teens did not tan and 1% could not attend dates offered. Strategy 7 yielded eight inquiries for the study. Strategy 8 yielded four teen groups (Ns of 6 boys, 2 girls, 6 girls, 7 boys). Invites to parents via schools produced two phone inquiries. **Conclusions:** Recruitment was much more difficult than anticipated, requiring eight different approaches. Our original plan of conducting six focus groups (total of 60 participants), ended up with six teen groups (n=31) and two parent groups (n=10). When conducting studies that rely on patient recruitment of a small subsample of the population and for which an interest in the topic is unknown, adequate time, energy and resources should be devoted to recruitment efforts.

Cancer

C-C4-01:

Statin Use and Risk of Basal Cell Carcinoma

Maryam M Asgari, MD, MPH, *Kaiser Permanente Northern California*; Jean Tang, MD, PhD, *Kaiser Permanente Northern California*; Ervin Epstein, MD, *Kaiser Permanente Northern California*; Mary-Margaret Chren, MD, *Kaiser Permanente Northern California*; Margaret Warton, MPH, *Kaiser Permanente Northern California*; Charles P Quesenberry Jr, PhD, *Kaiser Permanente Northern California*; Alan S Go, MD, *Kaiser Permanente Northern California*; Gary D Friedman, MD, MS, *Kaiser Permanente Northern California*

Background: Limited data exist about the association between statin use and skin cancer risk. We examined the independent relation between statin use and basal cell carcinoma (BCC) risk. **Methods:** We identified all members of a large integrated healthcare delivery system diagnosed with a histologically proven BCC in 1997. Subsequent BCCs were identified through 2006 from health plan electronic pathology records. Longitudinal exposure to statins and other lipid lowering agents was determined from automated pharmacy records. We used extended Cox regression to examine the independent association between receipt of statin therapy (ever vs. never, cumulative duration) and risk of subsequent BCC. To minimize confounding by indication, we conducted sensitivity analyses in the subset of individuals considered eligible for lipid lowering therapy based on national guidelines. **Results:** Among 12,123 members diagnosed with BCC who had no prior statin exposure, 6,381 developed a subsequent BCC during follow-up. Neither ever use of statins (adjusted hazard ratio [aHR] 1.02, 95% CI: 0.92-1.12) or cumulative duration of statin (aHR 1.02 per year, 95% CI: 0.99-1.11) was associated with subsequent BCC after adjustment for age, sex, and healthcare utilization. Risk estimates did not change appreciably when the analysis was limited to the subset of individuals who met eligibility criteria for initiating statin therapy. There was also no significant association between use of non-statin anti-lipemics and subsequent BCC (aHR 1.10, 95% CI: 0.76-1.58). **Conclusions:** Among a large cohort of individuals with BCC, statin therapy was not significantly associated with risk of subsequent BCC.

C-C4-02:

Improving Survivorship Care for Long-Term Colorectal Cancer Survivors: Key Findings of a 5-Year Study

Carmit K McMullen, PhD, *Kaiser Permanente Northwest*; Mark C Hornbrook, PhD, *Kaiser Permanente Northwest*; Lisa J Herrinton, PhD, *Kaiser Permanente Northern California*; Andrea Altschuler, PhD, *Kaiser Permanente Northwest*; Marcia Grant, RN, PhD, *City of Hope Medical Center*; Christopher Wendel, MS, *Southern Arizona VA Health Care System*; Stephen Joel Coons, PhD, *University of Arizona College of Public Health, University of Arizona College of Pharmacy*; Sylvan B Green, MD, *Kaiser Permanente Northwest*; M Jane Mohler, PhD, *Arizona State University*; Carol M Baldwin, PhD, RN, *Arizona State University*; Michelle Ramirez, PhD, *University of the Sciences in Philadelphia*; Robert S Krouse, MD, *Southern Arizona VA Health Care System*

Aims: Understand the determinants of health related quality of life (HRQOL) and the lived experiences among colorectal cancer (CRC) survivors, and

identify strategies to help maintain or enhance CRC survivors' HRQOL. **Methods:** Mail survey and focus groups. Subjects were 283 ostomy and 392 anastomosis long-term CRC survivors within an HMO. Focus groups for subjects with ostomy were divided by gender and high and low HRQOL. Outcome measures were the modified City of Hope Quality of Life (mCOH-QOL)-Ostomy (abridged for anastomosis) and SF-36v2 questionnaires. The SF-6D scoring algorithm was used to calculate an overall HRQOL score from SF-36v2 data. Focus groups were conducted to explore ostomy-related barriers to effective self-care and adaptation strategies. **Results:** CRC survivors with an ostomy experienced multiple persistent HRQOL losses that differ between men and women. Women CRC survivors with ostomies, for example, reported more sleep disruption and fatigue than men. Living with an ostomy, co-morbidities, socioeconomic status, self-reported depression, and employment status were independent predictors of SF-6D scores. Among CRC survivors with ostomy, fistulas had important implications for HRQOL. Psychological wellbeing among CRC survivors was positively associated with income. Intestinal stomas significantly influenced spiritual HRQOL. Provision or withdrawal of a partners' support affected both short- and long-term psychosocial adjustment of female CRC ostomy patients. Focus group participants identified dietary changes to control bowel output and odor, demands of coping and adjustment, and the time it took to accept the reality of daily living with an ostomy as significant challenges. **Conclusions:** The greatest challenges reported by CRC survivors confirmed the IOMs findings that survivorship is a distinct, chronic phase of cancer care, and that cancer effects are broad and pervasive. CRC survivors could benefit from dietary and behavioral interventions even 5+ years after their cancer surgery. Women with ostomies seem to do worse than men with ostomies and report a different profile of HRQOL challenges, including sleep disruption and fatigue. Depression screening and psychosocial interventions should be part of survivorship care for CRC patients. CRC survivors should be assessed for income and financial need. Survivorship care should aim at minimizing hospitalizations, depression, and ostomy-related complications among long-term CRC survivors.

C-C4-03:

Examination of the Use of First-Line Chemotherapy Regimens for Colorectal and Lung Cancer: Impact of Patient Characteristics

Debra P Ritzwoller, PhD, *Kaiser Permanente Colorado*; Thomas Delate, PhD, MS, *Kaiser Permanente Colorado*; Doug Roblin, PhD, *Kaiser Permanente Georgia*; Nikki Carroll, MS, *Kaiser Permanenete Colorado*

Background: Chemotherapy has been shown to improve both response and survival rates for patients with cancer. As chemotherapy treatments become more costly, these improvements in survival are coming with a substantial price tag. The financial burden of chemotherapy is forcing both patients and health plans to make difficult decisions regarding cancer treatment. Historically, most HMOs have provided comprehensive cancer care with limited, fixed co-payments. However, in recent years, HMOs have begun to implement benefit design packages that increase patient cost-sharing for cancer care services. **Aim:** To examine the variation in lung and colorectal cancer patients who receive first choice cancer chemotherapy services as defined by American Society of Clinical Oncologist (ASCO)-derived guidelines, which are currently employed by all Kaiser Permanente (KP) regions. The variation in first choice cancer chemotherapy regimen use by stage, age, gender, and variables capturing differences in benefit design is also examined. **Methods and Study Design:** This is a retrospective, observational study of the rates of chemotherapy regimen use for a cohort of HMO cancer patients at two KP regions, Colorado and Georgia. Algorithms were built based on ASCO guidelines, to identify the more than 20 cancer chemotherapy regimens that are based on cancer site (lung vs colorectal), stage, and morphology. These algorithms were mapped to National Drug Codes (NDCs) and patient specific utilization was extracted from legacy pharmacy systems and the Virtual Data Warehouse (VDW) files. A time series for the period 2006–2008 with month-by- month measurement of the proportion colorectal and lung cancer patients who receive first choice cancer chemotherapy services, along with variables denoting variation in patient and tumor characteristics and benefit design, was built. Statistical analyses describing variation were conducted. **Results:** Preliminary findings suggest that variation exists within and across the two health plans and by cancer site and stage. Also, variation in the use of first-choice cancer chemotherapy services may be impacted by recently implemented increases in patient costsharing. **Conclusions:** Additional analyses are required to further investigate the impact of patient cost-sharing and injectable/infusion coinsurance.

C-C4-04:

Trends in Breast Cancer Incidence in a Setting of Increased Mammography Screening and Decreased Use of Oral Estrogen Replacement Therapy

Barbara G Silverman, MD, MPH, *Maccabi Healthcare Services*; Nava Sieglemann-Danieli, MD, *Maccabi Healthcare Services*; Ehud S Kokia, MD, *Maccabi Healthcare Services*

Background: Utilization of estrogen hormone replacement therapy (HRT) has dropped dramatically since the publication of the Women's Health Initiative findings questioning its use for prevention of chronic conditions. Recent publications have suggested a link between this drop in HRT use and a parallel drop in breast cancer. **Methods:** Maccabi Healthcare Services provide services to nearly 1.8 million members. We tracked estrogen use, mammography screening utilization, and breast cancer diagnoses in a cohort of female members from 2000 to 2006. Inclusion criteria were: age 45 and over on 1/1/2000, active HMO member from 1/1/2000 until death or 12/31/2006, no history of breast cancer prior to 1/1/2000. We used a Cox proportional hazards model to estimate the contributions of mammography screening, age at the start of the study period, and use of oral estrogen therapy on breast cancer risk. **Results:** The study, cohort consisted of 168,732 women, of whom 35,606 (21.1%) purchased oral HRT, 116,373 (69%) had at least one screening mammogram, and 3,939 (2.3%) were diagnosed with breast cancer between 1/1/2000 and 12/31/2006. The percent of women undergoing screening mammography was 16.7% in 2000 and peaked at 34.3% in 2005. The proportion purchasing estrogens dropped from 14.4% in 2000 to 5.0% in 2006. Annual cancer incidence was 3.2/1000 in 2000, and peaked at 3.5/1000 in 2006, in parallel with the peak in mammography screening. A Cox proportional hazards model including an interaction term for mammography* oral estrogen use indicated a significant positive association of mammography screening (HR 6.96, 95% C 1.305 – 1.042), oral HRT (HR 2.0, 95% CI 1.32 – 2.90) and age (HR 1.035, 95% CI 1.035 – 1.042) on cancer incidence. **Discussion:** We detected an increase in cancer incidence concurrent with and following a rapid decline in HRT use. Our findings demonstrate the competing impacts of increased mammography screening and decreased HRT use on breast cancer incidence and underscore the value of person-level analysis in assessing such trends. Future work will focus on the impact of estrogen-only and estrogen-progestin, and characterize the effects of HRT estrogen receptor-positive and -negative cancers.

PS2-01:

A Multimodal Reminder Program Improves Routine Mammogram Screening Rates

Adrianne C Feldstein, MD, MS, *Kaiser Permanente Northwest*; Nancy Perrin, PhD, *Kaiser Permanente Northwest*; Gabriella Rosales, MS, *Kaiser Permanente Northwest*; Jennifer Schneider, MPH, *Kaiser Permanente Northwest*; Mary M Rix, RN; Gail Morgan, *Kaiser Permanente Northwest*; Kara Keels, BS, *Kaiser Permanente Northwest*; Michael Lassi, MBA, *Kaiser Permanente Northwest*; Stephanie Schoap, MBA, *Kaiser Permanente Northwest*; Russell E. Glasgow, PhD, *Kaiser Permanente Northwest*

Background/Aims: This retrospective cohort study evaluated the effectiveness of implementation and maintenance phases of a multimodal reminder program to improve routine mammography screening. **Methods:** The program used automated reminder calls and was conducted at Kaiser Permanente Northwest, a nonprofit group-model HMO with an electronic medical record. Study participants were women HMO members aged 42 or older who were 20 months past their last mammogram (index date) during three time periods: pre-reminder (2004), post-reminder implementation phase (2006), and post-reminder maintenance phase (Jan 1–July 1, 2007) (Total n=35,104). The program targeted women aged 50–69 with a mammogram due followed by post card, followed by up to 2 automated phone calls and 1 live call for non-responders. Women aged 42–49 (for whom clinical guidelines also recommend mammography) receiving no reminders constituted the primary comparison group (CG 1). The primary outcome was time until mammogram in the 10 months following the index date. **Results:**

Pre-reminder, 63.4% of targeted women completed a mammogram; this number increased to 75.4% in the post-reminder implementation; 80.6% completed a mammogram in the maintenance phases. After controlling for demographics and clinic visits, intervention women were 1.51 times more likely to complete a mammogram (CI 1.40–1.62) post-reminder implementation, compared to CG 1. The effect was maintained in 2007 (HR 1.81 [CI 1.65–1.99]). Women of other races (Asian, Pacific Island, or Native American) were less likely to complete a mammogram, as were those taking a greater number of medications. Women with a college education, who were married, or who had visited a primary care provider or gynecologist during follow-up were more likely to complete a mammogram. **Conclusions:** We found that a multimodal reminder system could be effectively implemented and maintained in a large health system. If widely implemented, this intervention could substantially improve community mammography screening rates. Insured patients who are sicker, or who are of Asian, Pacific Island, or Native American descent may need more support to complete screening. Future studies should address practice-based factors that assist patients in completing mammograms, as well as other factors that affect the reach and cost-effectiveness of delivering the intervention to diverse patient groups.

PS2-10:
The CRN Cancer Communication Research Center

Sarah D Madrid, MA, *CRN Cancer Communication Research Center [CCRC], Kaiser Permanente Colorado*; James W Dearing, PhD, *Kaiser Permanente Colorado, CRN Cancer Communication Research Center*; Russell E Glasgow, PhD, *Kaiser Permanente Colorado, CRN Cancer Communication Research Center*; Borsika A Rabin, PhD, *Kaiser Permanente Colorado, CRN Cancer Communication Research Center*; Kathleen Mazor, EdD, *Meyers Primary Care Institute, University of Massachusetts Medical School*; Edward H Wagner, MD, MPH, *Center for Health Studies, Group Health Cooperative*

We propose an integrated set of three, large posters that will describe the main components of a new research center that bridges HMORN institutions. **Background:** The CRN Cancer Communication Research Center (CCRC) was established in September 2008 at Kaiser Colorado Institute for Health Research. **Objectives:** The CCRC's objectives are to discover the most promising practice-based approaches to cancer communication and care coordination, and to disseminate those approaches. Integrated care delivery systems represent promising opportunities to study these approaches, and the CRN CCRC, with its embedded organizational focus will take advantage of the CRN as a virtual laboratory. **Specific Aims:** The CRN CCRC 1) leverages the existing infrastructure of the CRN to support both the discovery and dissemination of practice-based communication strategies and organizational resources; 2) supports four investigator-initiated research projects to advance communication theory and to evaluate strategies informed by theory; and 3) provides administrative, financial, and scientific support to new investigators, including clinicians, in the development of pilot projects, and assists in submission of broader, investigator-initiated proposals to be submitted for extramural funding. **Methods:** Two R01-scale investigator initiated research projects will advance and test communication theory. The first will: characterize patients' and providers' experiences communicating about errors in cancer care; investigate the health system factors that promote or inhibit effective communication; and develop, disseminate, and evaluate provider training materials and patient informational materials. The second will develop and test an intervention to decrease patient uncertainty and improve psychosocial and communicative outcomes during the period from suspicion of cancer through diagnosis and plan of care. The Center's research projects will be augmented and supported by Shared Resource Cores. The Discovery Core will identify the most promising practicebased innovations and approaches; the Dissemination Core will focus on data harmonization and applying dissemination science to effective interventions.

PS2-25:
Provider Perspectives on Essential Components of a Cancer Survivor Care Plan

Jody Jackson, RN, BSN, *HealthPartners Research Foundation*; Cheri J. Rolnick, PhD, MPH, *HealthPartners Research Foundation*; Anna Ourada, BA, *American Cancer Society Midwest Division*

Background: This presentation is based on efforts of the Minnesota Cancer Alliance (MCA), a coalition of more than 80 groups and individuals, to improve quality of life for cancer survivors in Minnesota. The MCA is currently developing a comprehensive and userfriendly SCP based on feedback regarding limitations of existing survivorship care plan (SCP) tools. As a first step, a needs assessment of health care providers was conducted regarding essential elements. Aims: To report on components providers wanted incorporated into the tool as well as methods to promote SCPs. **Methods:** In April 2008, participants (e.g., oncologists, primary care providers, nurses, social workers, community health workers) of a working session on SCPs provided feedback on desired components and strategies for communication and promotion. **Results:** A total of 59 health care professionals participated. Treatment given, possible side effects and a follow-up plan were considered the fundamental information needed. Participants wanted a separate psychosocial section which would include information on emotional, spiritual, sexual and economic issues (e.g., work) as well as the ability to document the survivor's support system and any social support services used. A section on family history and genetic counseling/testing was deemed important as well as a section for documentation of other comorbidities. Participants indicated that use of the SCP tool should begin at diagnosis and provide information for both short and long-term survival. **Conclusions:** Feedback obtained from providers indicated that not only were treatment history and side effects important components of a SCP, but addressing the survivor as a whole person and as part of a family system (i.e., psychosocial section, family history and genetic testing, comorbidity section) was crucial. Survivors need information along the entire continuum of cancer care and health care professionals could benefit by a user-friendly process to convey information to their patients and their caregivers. Identifying the needs of health care providers regarding the essential elements of a SCP will help meet patient needs, potentially improve patient care and may help ensure greater use of the SCP among providers.

PS2-27:
Identification of Patients With Nonmelanoma Skin Cancer Using HMO Claims Data

Melody J Eide, MD, MPH, *Henry Ford Health System*; Richard Krajenta, BS, *Henry Ford Health System*; Dayna Johnson, MPH, MSW, *Henry Ford Health System*; Jordan Long, *Henry Ford Health System*; Christine C Johnson, MPH, PhD, *Henry Ford Health System*

Background: Despite the large population affected, the epidemiology of nonmelanoma skin cancer (NMSC) is understudied, and U.S. cancer registries often exclude NMSC. Secondary data analysis has been limited in that squamous cell (SCC) and basal cell carcinoma (BCC) do not have their own unique International Classification of Disease (ICD-9) identifiers. Our aim was to define and compare algorithms for identifying NMSC by secondary analysis using a computerized database of a large health maintenance organization (HMO). **Methods:** A computerized claims database of a large HMO in Southeastern Michigan was used to identify NMSC patients who were diagnosed between January 1, 1988 to December 31, 2007. Three algorithms were examined: NMSC ICD-9 codes, Current Procedural Terminology (CPT) code for treatment of malignant NMSC, or both ICD-9 and CPT codes. A subset of charts for the overall cohort and all charts from 2007 HMO-enrollee members only were reviewed to verify NMSC diagnosis. Positive predictive values were calculated. **Results:** Analyses of data from 1988–2007 identified NMSC in 165,000 patients using ICD-9 codes, 44,875 patients by CPT codes and 113,666 patients who had both codes. A random sample of 1275 cases were selected for chart review to verify NMSC, which was validated in 73.7% of ICD-9 identified patients, 94.6 % of CPT identified patients, and 97.5% of patients identified using both codes. Data was then limited to HMO-health plan

enrollee-only unique patients for the year 2007, and all charts were reviewed (n=1116). NMSC cases were confirmed via chart review in 96.7% of ICD-9 identified patients, 98.5% of CPT-identified patients, and 98.9% of patients identified using both codes. **Conclusions:** HMO computerized claims data can be used to identify NMSC. Preliminary analysis suggests that the use of an algorithm which requires that both a CPT and ICD-9 code be recorded may be slightly better compared to either ICD-9 or CPT codes for case identification. This algorithm should be validated in a population captured by reputable tumor registry to determine sensitivity and specificity.

PS2-35:

Variation in Capture of Chemotherapy Data: Preliminary Findings From the CRN Economic Rx Burden Pilot Study

Debra P. Ritzwoller, PhD, *Kaiser Permanente Colorado*; Tom Delate, PhD, MS, *Kaiser Permanente Colorado*; Jared Freml; Addie Clarke; Maureen O'Keeffe-Rosetti, MS, *Kaiser Permanente Northwest*; Paul Fishman, PhD, *Group Health, The Center for Health Research*; Donald J. Bachman, MS, *Kaiser Permanente Northwest*; Jennifer Elston Lafata; Mark C. Hornbrook, PhD, *Kaiser Permanente Northwest*

Background: A number of high-cost chemotherapy agents, including targeted biologic and genetic therapies, have been introduced to the U.S. in recent years. Much of the literature on use and costs of these new agents has been derived from clinical trials and Medicare/SEER-based studies. To date, few studies have been published describing diffusion and costs of new cancer therapies within or across health plan populations. **Aims:** To describe capture of chemotherapy use (antineoplastics, hormone therapies, immune therapies, infusion time and site, ancillary therapeutics) within and across four Cancer Research Network (CRN) health plans for older (age 50+) cancer patients. **Methods:** Using data from health plan pharmacy systems and the Virtual Data Warehouse (VDW) Tumor Registry (TR), Pharmacy (Rx), and Procedure (PROC) files, we created dichotomous variables from each file separately denoting capture of chemotherapy use for each cancer patient aged 50 and older for the years 2000–2007. Variables were created using chemotherapy-specific national drug codes (NDCs) stratified by type of product (antineoplastic, hormone, immune) and route of administration (oral, infused/injectable) (Rx), procedure codes (CPT4, HCPCS, CPT4 Q codes, and revenue center codes) (PROC), and chemotherapy treatment flags (TR). Data were then stratified by health plan, year, cancer site, and stage. Chi-square analyses were employed to measure variations over time, within and across the four health plans' Group Health, KPCO, KPNW, and HFHS. **Results:** Preliminary findings show significant variation in chemotherapy capture by data source over time within and across the four health plans, and by cancer site and stage. While the VDW TR has complete capture of abstracted data that denote whether or not chemotherapy was recommended in the initial treatment plan, other VDW-based sources may not be as complete with respect to detailed capture of the products by NDC code, dosing, and infusion time and site. **Conclusion:** Additional analyses are required to investigate how missing data affect the use of VDW chemotherapy data for research and to develop the steps to improve data capture. Algorithms may be needed to impute the average cost of some therapies for subsets of cancer cases across the four health plans. This project complements and builds on several components of the CRN infrastructure projects, and will leverage the expansion the VDW with respect to the inclusion of chemotherapy services.

PS2-36:

Influence of Travel Time on the Receipt of Surveillance Mammograms for Women With History of Breast Cancer

Andrea J Cook, PhD, *Group Health Center for Health Studies*; Tracy L Onega, PhD, *Norris Cotton Cancer Center and Dartmouth Medical School*; Xun Shi, PhD, *Darmouth College*; Beth A Kirlin, BA, *Group Health Center for Health Research*; Diana SM Buist, PhD, MPH, *Group Health Center for Health Research*

This presentation will assess the impact of travel time to the nearest breast cancer mammographic facility on receipt of surveillance mammography following completion of breast cancer treatment. The study population includes women (n=1,312) diagnosed with stage I or stage II breast cancer (TNM classification) from 1990 to 1997 at Group Health Cooperative enrolled in either the Breast Cancer Treatment Effectiveness in Older Women (BOW) or Optimizing Breast Cancer Outcomes: BMI, tumor marker, and quality of care (ACS) retrospective cohort studies. We will obtain information on receipt of screening mammograms up to 5 years after enrollment, women's demographics at cancer diagnosis, and link them to a geospatial database created to assess distance to nearest mammography facility and area-level socioeconomic characteristics. We will employ generalized linear regression models to assess the relationship between receipt of surveillance mammography following completion of breast cancer treatment and travel time adjusting for women level socio-demographic factors, tumor stage, type of cancer treatment, and comorbidities if they are found significantly related to receipt of mammography. Receipt of surveillance mammography will be defined in two ways: (1) ever receiving a surveillance mammogram and (2) average surveillance mammogram interval over the 5 years of follow-up. We will account for different censoring mechanisms, such as recurrence, all cause mortality, breast cancer-specific mortality, and disenrollment from Group Health, and their impact on our measure of receipt of surveillance mammography.

PS2-37:

Oral Cancer Information on the Web: Assessing the Quality and Content of English and Spanish Oral Cancer Websites

Jeannie Y Irwin, MS, *University of Pittsburgh*; Thankam Thyvalikakath, MDS, MS, *University of Pittsburgh*; Titus Schleyer, DMD, PhD, *University of Pittsburgh*; Teena Wali, BDS, *University of Pittsburgh*; Ross Kerr, DDS, MSD, *New York University*

Background/Aims: In the United States, about 8,000 people a year die from oral cancer and more than 30,000 new cases are diagnosed annually. A recent study showed that 80% of American adult Internet users have searched the Web for health information and 15% of those specifically searched for dental health information. Having high quality oral cancer information available via the Web is important given the significance of this health problem. The goal of this study was to evaluate the quality and content of multiple English and Spanish oral cancer websites. **Methods:** We developed a search strategy using the keywords: oral cancer, mouth cancer, and tongue cancer to find oral cancer sites via Medline Plus, Google, and Yahoo. We then used the translations cancer oral, cancer de la boca, and cancer de la lengua to search Medline Plus en Español, Google Español, and Yahoo Telemundo. We added sites to the datasets based on inclusion/exclusion criteria. Two native speaking raters evaluated each site within their set for quality using the modified Information Quality Tool (IQT). We then developed a survey tool to asses the content of the sites. Two native speaking oral cancer experts evaluated each site within their set using this new tool. **Results:** Our search strategy produced 24 English language sites and 24 Spanish language sites for evaluation. English language websites had an average IQT score of 74.7 (out of 100) and average content score of 51.5 (out of 100). Spanish-language sites had an average IQT score of 48.8 and an average content score of 25.9. **Conclusions:** Despite higher scores for the English language websites, our analysis showed that there was a great variation in overall quality and content with room for improvement for both language types. English sites could make the biggest improvements by providing more information about their sponsors and who controls site content as well as updated and fixing links and author credentials. The Spanish sites should focus on improving information about their agenda and overall site design. For content, both types of sites need to provide more images and information on etiology and risk factors. Both English and Spanish sites scored highest in coverage of clinical presentation, treatment and follow-up care after treatment. Overall, this study identifies several information gaps and areas for improvements for oral cancer websites. We hope our results will be used to improve online oral cancer information.

PS2-39:

Evaluating Prevalence of Pathology Prognostic Indicators in a Cohort of Women Residing in Rural Pennsylvania (PA) Counties

Melissa Stahl BS, *Geisinger Center For Health Research*; Jeffery Prichard DO, MSc, *Geisinger Health System*; Susan Krum MS, CRNP, *Geisinger Health System*; James Evans MD, MPH, *Geisinger Health System*; Azadeh Stark PhD, *Geisinger Center for Health Research*

Mammography utilization gap has been significantly narrowed between urban and rural settings in recent years. Yet, evaluation of breast cancer incidence and mortality data suggest that women residing in rural areas in the US experience a higher incidence of breast cancer and shorter disease free and overall survival regardless of access to health care services. We have implemented a cohort study design to evaluate the pathologic prognostic indicators of breast cancer at the initial presentation of the disease and their association with shorter survival among women in rural PA. We identified women (n=550) diagnosed with their first primary invasive cancer between January 1, 2001 and December 31, 2007 from the Cancer Registry at Geisinger Health System (GHS). Pathologic, clinical and demographic data were retrieved from electronic health records. The mean age at the initial clinical presentation of the disease was 67(± 12.5). The majority, were diagnosed with either stages I and II, 58.6% and 26.8%, respectively. About 6.9% of women were diagnosed with stage III and 7.6% with stages IV. The proportions of women diagnosed with histologic grade 1, 2, and 3 were 31.8%, 41.7% and 26.5%, respectively. Assessment of the joint distribution of estrogen receptor (ER) and progesterone receptor (PR) yielded 58.6% as phenotypic positive for both receptors and, 26.8% as negative. The remaining 16.5% were discordant for the expression of hormone receptors. Sub-typing of breast cancer biomarkers by the three prognostic markers, ER, PR and HER2/neu, yielded 69.7% as hormone receptor positive, epidermal growth factor negative; 7.5% as triple positive; 3.5% as hormone receptor negative, epidermal growth factor positive and 19.3% as triple negative. Preliminary findings from this ongoing research project suggest that the prevalence of triple negative breast cancer is higher in this population. Expression of other markers such as HER1, Viminetin, CK 5/6, P53 and E-Cadherin are also being evaluated.

Cardiovascular Disease

C-D2-01:

Outcomes Associated With Thiazide Combinations for Second-line Treatment of Hypertension in Older Patients

Robert D Langer, MD, MPH, *Geisinger Center for Health Research*; Jove Graham, PhD, *Geisinger Center for Health Research*; Sean Hennessy, PharmD, PhD, *Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine*; Raymond R Townsend, MD, *Renal, Electrolyte, and Hypertension Division, Department of Medicine, University of Pennsylvania School of Medicine*; Frederick Bloom, MD, *Geisinger Clinic*; Valerie Weber, MD, *Geisinger Clinic*

Context: Consensus guidelines recommend thiazides for first-line treatment in uncomplicated hypertension. Most patients require two or more drugs and little is known about the relative efficacy and outcomes of second-line treatments including thiazide. **Objective:** To compare differences in blood pressure, renal function and medical outcomes between commonly used two drug regimens, each including thiazide. **Design:** Retrospective cohort using data from a longitudinal electronic medical record. **Setting:** Large group medical practice. **Patients:** All patients >60 years treated for hypertension between 2001 and 2006. **Main Outcome Measures:** Changes in blood pressure and renal function, incident medical events, and time to failure indicated by an event or regimen change. **Results:** Of 47,419 patients, 6,534 received second-line therapy including thiazide for > 3 months. Thiazides + angiotensin converting enzyme inhibitors (ACE-I), and thiazides + potassium sparing diuretics (PS) were associated with the greatest reductions in systolic pressure, and thiazides + ACE-I with the greatest reductions in diastolic. However, thiazide combinations with PS and ACE-I were associated with the greatest declines in estimated glomerular filtration rate, and these and thiazides + angiotensin receptor blockers (ARB) with increased incidences of renal disease. ACE-I + thiazide were also associated with high incidences of stroke and diabetes. Thiazide + Betablocker (BB) were associated with high rates of cardiovascular disease while thiazide + antiadrenergics (AA) were associated with low event rates overall. Thiazide + Calcium channel blockers (CCB) had no consistent pattern overall, but performed somewhat better in the oldest patients. Thiazides + BB were associated with low composite event rates and the longest time before regimen change. **Conclusions:** The present study suggests disjunction between blood pressure reduction and the events that treatment is intended to prevent. Thiazide with BB was associated with the best composite outcomes, and thiazide with ACE-I with the poorest. These findings must be interpreted with caution because of potential confounding by indication. Exploration in more robust datasets is warranted.

C-D2-02:

Integrating Clinical Trial Findings Into Practice Through Risk Stratification: The Case of Heart Failure Management

David H Smith, RPh, PhD, *Kaiser Permanente Northwest*; Eric S Johnson, PhD, *Kaiser Permanente Northwest*; Micah L Thorp, DO, MPH, *Kaiser Permanente Northwest*; Kathy A Crispell, MD, *Kaiser Permanente Northwest*; Xiuhai Yang, MS, *Kaiser Permanente Northwest*; Amanda F Petrik, MS, *Kaiser Permanente Northwest*

Background: Heart failure case management programs have been shown to be highly effective at preventing future hospitalizations in clinical trials. But these programs absolute benefits depend on the baseline risk of outcome in the treated population. Since baseline risks of hospitalization in trials are often higher than community-based samples, translating trial results to the community setting may be misleading. One solution is to identify subgroups for intervention that have sufficiently high baseline risk. **Objective:** Using estimates of hospitalizations averted from a previously published systematic review of heart failure (HF) management we estimated a program's efficiency based on level of predicted risk. **Methods:** Medical history and demographic data on HF patients from a large integrated US health plan were used to build a prognostic risk-score for cardiovascular-related hospitalization over 1-year. We calculated the crude rate of hospitalizations for comparison with trial data. We also calculated the program's potential dollar savings from averting hospitalizations. **Results:** The average risk for hospitalization in the systematic review's trials was 45%; our population's average observed risk was 18% and the risk among the highest risk patients was 33%. After accounting for the intervention cost, the base-case analysis shows a savings of $122/patient at highest risk. Failing to intervene according to predicted risk (no targeting) would actually cost $211/patient. **Conclusion:** Our findings illustrate how clinical trial findings can be efficiently integrated into community-settings by using a prognostic risk score to focus attention on high-risk subgroups.

C-D2-03:

Effects of Race and Comorbidities on Differences in Blood Pressure Control in Urban and Rural Populations

Robert D Langer, MD, MPH, *Geisinger Center for Health Research*; Jove Graham, PhD, *Geisinger Center for Health Research*; Mark G Weiner, MD, *University of Pennsylvania School of Medicine*; Judith E Reardon, BA, *Geisinger Center for Health Research*; Susan Eachus, PhD, *University of Pennsylvania School of Medicine*; Mary Ann Blosky, MS, RN, *Geisinger Center for Health Research*; Barbara J Turner, MD, *University of Pennsylvania School of Medicine*

While it is acknowledged that control of blood pressure (BP) in primary care is of major importance in reducing the burden of cardiovascular diseases, control is suboptimal in most populations. Previous work by Turner et al found that the presence of related comorbidities increased the likelihood of a patient's physician addressing hypertension, while unrelated comorbidities competed for attention. We evaluated BP control over a 3 year interval according to JNC-VII guidelines in primary care patients managed in two Pennsylvania health care systems, one urban (Penn = P, n=16,690) and one rural (Geisinger = G, n=79,934). Factors assessed included number of comorbidities (diagnoses occurring >2 times that could compete for clinician attention), number of primary care visits, age, sex, race, insurance and health system. The reduced JNC-VII threshold of 130/80 was applied for diabetes and chronic kidney disease. The G population was more Caucasian (C)(98 vs 49 percent), less African American (AA)(1 vs 46%), marginally older (60.2 vs 59.2 years), and less female (56 vs 61%) than P. Mean months of follow-up

and number of BP readings were 39 and 12.4 at G and 33 and 9.9 at P. The mean number of comorbidities was 3.4 at G and 3.7 at P and, by race, 3.5 for C, 3.9 for AA. Medicare coverage was slightly more common at P (32 vs 29%) and commercial insurance slightly more common at G (63 vs 58%). BP was controlled in a similar proportion of readings overall, 66% and 65% (G and P). Binary logit models were constructed using percent of visits with BP controlled (%vBPc) as the dependent variable as a function of the above factors. Overall, increasing comorbidity was associated with a slightly greater %vBPc (P<0.0001), with an effect size averaging 1–2% for each comorbidity. Increasing number of unrelated comorbidities was associated with better BP control, while the opposite was true for related comorbidities. Stratified analyses conducted because of significant interactions showed the effect of related comorbidities to be more dominant in African Americans than Caucasians, particularly in patients over age 60. Nevertheless, similar effects were seen independent of race, age, gender and insurance. After accounting for race, there were no differences between the urban and rural systems. These findings suggest that race may explain urban-rural contrasts in BP control, and management of comorbidities may complicate control in African Americans more so than in Caucasians.

C-D2-04:

Persistence With Statins and All-Cause Mortality: A Population-based Cohort Study

Varda Shalev, MD, *Maccabi Healthcare Services*; Gabriel Chodick, PhD, *Maccabi Healthcare Services*; Haim Silber, MD, *Maccabi Healthcare Services*; Ehud Kokia, MD, *Maccabi Healthcare Services*; Joseph Jan, MHA, *Maccabi Healthcare Services*; Anthony D Heymann MD, *Maccabi Heatlhcare Services*

Background: The beneficial effects of statins in secondary-prevention on cardiovascular mortality have been established in several long-term placebo-controlled trials; however, the value of statin therapy in reducing overall mortality in patients without coronary heart disease (CHD) is questionable. The study objective was to evaluate the effect of statin therapy in an unselected cohort of subjects with no indication of a cardiovascular-disease (primary-prevention) and patients with known CHD (secondary-prevention). **Methods:** Retrospective cohort study including 229,918 adult HMO enrollees in Israel, who initiated statin treatment in 1998–2006 (mean age 57.6; 50.8% female), and were followed-up for a maximum of 9.5 years. Proportion of days covered (PDC) with statins was measured by the number of dispensed statin prescriptions during the interval between the date of the first statin and end of follow-up. Adjustments were made for baseline values of age, sex and other personal characteristics, chronic medical conditions and healthcare utilization. **Results:** During 4.02 and 4.98 years of mean follow-up, there were 4,259 and 8,906 deaths among primary prevention and secondary prevention cohorts, respectively. In both cohorts, high persistence with statins (PDC>90%) confers at least 45% reduction in risk of death compared to patients with a PDC of <10%. Stronger risk reduction was calculated among patients with baseline LDL of >190 mg/dl and patients initially treated with high-efficacy statins. **Conclusion:** Better persistence with statin treatment provided an ongoing reduction in mortality among patients with and without known history of CHD. The observed benefits from statins were greater than expected from randomized clinical trials.

PS2-02:

Using a Patient's Absolute and Relative Risk for Cardiovascular Disease to Manage Therapy

Nirav R Shah, MD, MPH, *Geisinger Center for Health Research*; JB Jones, PhD, MBA, *Geisinger Center for Health Research*; Walter F Stewart, PhD, MPH, *Geisinger Center for Health Research*

Background: As the patient role evolves from that of a traditional, passive participant in the care process to an engaged, active consumer of health care goods and services, new venues and/or tools for provider-patient communication will be required. The Electronic Health Record (EHR) can be used to facilitate such communication. We consider one model for how measures of individual risk derived from EHR data can be used in different ways to improve and maintain health. **Objective:** To explore how use of absolute risk (AR) or relative risk (RR) of cardiovascular disease can be used to select patients for intervention, communicate risks for informed choice and shared decision making, and then guide clinical decision support for targeted intervention and continuous care. **Methods:** We embedded the Framingham risk score in our EHR to calculate a patient's individual risk for cardiovascular disease. Absolute risk for 10-year mortality from cardiovascular disease (CVD) was calculated based on actual patient data, with decision support automatically ordering any missing values such as labs. A patient's relative risk (compared to a hypothetical, optimally managed age- and sex-matched control) was used to select patients for intervention. Patients then selected therapeutic preferences from among multiple evidence-based and rank-ordered options for their modifiable risk factors, via an interactive touch-screen kiosk in the waiting room. These selections were summarized and used to guide clinical decision support. The specific treatment options presented to each patient were selected as a function of the maximal relative risk reduction that could be achieved by compliance with those treatments. **Application:** Risk scores were used for four purposes in this study: patient stratification, selecting only those patients for intervention who are at high risk, and have available options to reduce that risk; informed choice, allowing patients to model risk scenarios by selecting different combinations of interventions; optimizing decision making, presenting a final list of patient-selected interventions that summarize relative risk reduction across all modifiable risk factors for a patient; and outcomes tracking, following risk over time to guide care. **Conclusions:** Behavior change is most likely to occur when patients understand the severity of their modifiable risks in the context of available treatment options.

PS2-05:

The Readiness of U.S. Health Plans to Manage Cardiometabolic Risk

Thomas E Kottke, MD, MSPH, *HealthPartners Research Foundation*; Courtney O Jordan, MD, *University of Minnesota School of Public Health and Medicine*; Patrick J O'Connor, MD, MPH, *HealthPartners Research Foundation*; Nicolaas P Pronk, PhD, *HealthPartners Research Foundation*; Rita Carreón, BS, *America's Health Insurance Plans (AHIP)*

Background: A large proportion of health status is determined by personal behavior. One manifestation of unhealthy personal behavior is the development of elevated cardiometabolic risk. Because health plans already manage care for a large proportion of the United States population, they are in a position to make a significant contribution to the control of cardiometabolic risk if they are prepared to offer health assessment, feedback, and behavior change support. Our goal in conducting this research was to assess health plan awareness of cardiometabolic risk and their current activities aimed at preventing and managing cardiometabolic risk. **Methods:** In January 2008, Americas Health Insurance Plans, in collaboration with the HealthPartners Research Foundation, surveyed 74 member health insurance plans that offer commercial Health Maintenance Organization, Point of Service and Preferred Provider Organization insurance. The response rate was 47%, representing 47 million lives. **Results:** The 35 responding health plans reported that they identify members with cardiometabolic risk through referral from case or care management (89%), health risk assessment data (86%), claims data (82%), and pharmaceutical utilization data (79%). Nearly all (97%) plans currently offer interventions for tobacco use, obesity/overweight, and nutrition. Ninety-four percent of the plans reported that they offer interventions to increase physical activity. All plans reported that they offer health risk appraisal or assessment with feedback and education, 91% reported that they use web-based tools, and 85% reported that they use health coaching to help plan members lower their risk. Perceived barriers to broader implementation of cardiometabolic risk control programs included lack of resources (79%), limited availability of enrollee level data (74%), and lack the reporting systems that would be necessary to manage individual plan members (79%). While one quarter of the responding health plans viewed lack of purchaser interest in cardiometabolic risk management programs as an important barrier to program implementation, only 6% named lack of purchaser interest as one of the three most important barriers to implementation. **Conclusion:** While the responses probably represent the best case scenario because of potential response bias, U.S. health plans appear to be well positioned to provide cardiometabolic risk control services.

PS2-09:

Combining Clinical Databases With the EHR to Identify a Study Population: An Example Using Acute Myocardial Infarction

Jennifer A Sartorius, MS, *Geisinger Center for Health Research*; G Craig Wood, MS, *Geisinger Center for Health Research*; Kimberly Skelding, MD, *Geisinger Health System*

Background/Aims: Study populations are commonly identified using a single data source. However, the inclusion criteria may result in an unacceptable level of false positives/negatives. The utilization of multiple sources may allow for more complex inclusion criteria, therefore improving the accuracy of identification of cases and controls for use in research. For this study, Geisinger's electronic health record (EHR) was combined with clinical databases to identify a population of patients with suspected Acute Myocardial Infarction (AMI). **Methods:** The Geisinger Acute Myocardial Infarction Cohort (GAMIC) database was created to conduct research on AMI. Geisinger databases were queried to identify all patients who had elevated cardiac enzymes during an inpatient hospital admission at Geisinger Medical Center from Jan. 1, 2001 to Dec. 31, 2006. Data from the resulting patients were gathered and extensively reviewed for validity and coherence. When possible, overlapping data were collected from different sources to check for internal consistency. Discrepancies between sources were reviewed and resolved. The medical charts of patients who did not go to catheterization were manually reviewed to determine the reason for not going. Similarly, charts of patients with elevated cardiac enzymes who also had invasive surgery on the same visit were reviewed to determine the timing of the enzyme elevation. After applying all criteria, a cohort of AMI cases was derived and retained in the final GAMIC database. **Results:** There were 3,625 patients who had elevated cardiac enzymes during an inpatient encounter; 58% went for catheterization. Of the 3,625 suspected AMI cases, the most common reasons for exclusion were elevated enzymes occurring post open-heart surgery (n=275) and admissions with elevated enzymes but with a recent catheterization (n=61). Only 3,265 (90%) fulfilled all criteria applied from the diverse set of data sources. Interestingly, of the 360 that were excluded and the 3,265 AMI cases, 40% and 90% had an AMI discharge diagnosis for the inpatient admission, respectively. **Conclusions:** A more careful approach to identifying a study population and validating the data for internal consistency results in greater accuracy. In addition, more resources utilized in the beginning of the study to better capture the population of interest can lead to a reduction in resources needed later in the study if issues or questions arise from a poorly identified cohort.

PS2-16:

Excessive Gestational Weight Gain is Predictive of Postpartum Weight Retention Among Obese Women

Kimberly K Vesco, MD, MPH, *Kaiser Permanente Center for Health Research*; Victor J Stevens, PhD, *Kaiser Permanente Center for Health Research*; Joanne Rizzo, MPA, *Kaiser Permanente Center for Health Research*; Donald J Bachman, MS, *Kaiser Permanente Center for Health Research*; Patricia M Dietz, DrPH, MPH, *Centers for Disease Control and Prevention*; William M Callaghan, MD, MPH, *Centers for Disease Control and Prevention*; Mark C Hornbrook, PhD, *Kaiser Permanente Center for Health Research*

Background: The prevalence of obesity among reproductive age women has increased significantly. The goal of this analysis was to determine whether gestational weight gain above the Institute of Medicine recommendation for obese women (at least 15 pounds [lbs] for term pregnancy) is predictive of postpartum weight retention at one-year. **Methods:** We conducted a retrospective cohort study of 25,789 pregnancies beginning and ending between January 2000 and December 2005 in a large health maintenance organization (Kaiser Permanente, Northwest) and resulting in live birth. Obesity was defined as BMI >30 kg/m2. Total gestational weight gain (last available pre-delivery weight at pregnancy onset [-180 to +90 days]) was categorized as <0, 0–15, and >15 lbs. Postpartum weight retention (postpartum weight at one year [lowest weight measured within 243–547 days post delivery] weight at pregnancy onset) was defined as <0, 0–10, and >10 lbs, and by mean change. Descriptive, linear regression and multivariate logistic regression analyses were performed. **Results:** There were 1,656 obese women who met eligibility criteria and had weights available at each key time point. Compared to women who lost weight or who gained 0–15 lbs during pregnancy, women who gained >15 lbs were younger, had lower first trimester weights and BMI, had fewer live births, and were less likely to have diabetes or depression. Mean change in weight at one-year postpartum was higher for women who gained >15 lbs during pregnancy, resulting in a net gain (7.2 lbs ± 18.6), compared to a net loss among women who either gained 015 lbs or who lost weight during pregnancy (net loss -1.7 lbs ± 6.2 and -2.3 lbs ± 16.3, respectively) (P<0.001). Total gestational weight gain was a significant predictor of weight gain at one-year postpartum (beta = 0.39, R2 = 0.11, P<0.001). Women who gained >15 lbs during pregnancy were more likely to retain >10 lbs (39.7%) at one year postpartum than women who gained 0–15 lbs (15.6%) and who lost weight (24.1%, P<0.001). There was a 3.6 fold increased odds (Odds Ratio 3.65, 95% CI 2.69–4.95) of weighing over 10 lbs more at one-year postpartum than at pregnancy onset if pregnancy weight gain was >15 lbs compared to 0–15 lbs. **Conclusion:** Weight gain above 15 lbs during pregnancy is associated with significant risk of postpartum weight retention at one year among obese women. Nutritional counseling should be provided to help prevent excessive weight gain.

PS2-18:

The Maccabi Healthcare Services Cardiovascular Information System: Integration of Patient Care Data, Registries, and Gui

Varda Shalev, MD, *Maccabi Healthcare System*; Gabriel Chodick, PhD, *Maccabi Healthcare System*; Iris Goren, MD, *Maccabi Healthcare System*; Haim Silber, MD, *Maccabi Healthcare System*; Ehud Kokia, MD, *Maccabi Healthcare System*; Anthony D Heymann, MD, *Maccabi Healthcare System*

Abstract Background: The present study describes a registry of cardiovascular disease (CVD) patients in a large health maintenance organization in Israel aimed to be used by health professionals to identify CVD patients and follow the courses of their illnesses and risk factors. **Methods:** In 1998, the registry was initiated using advanced information technology that integrated personal computerized community and hospital records, data from laboratory tests, dispensed medications, physiological signals, radiological images, and reports from investigations and procedures. **Results:** Between 1998 and 2007, the number of patients included in the registry has increased from 34,144 to 80,339. During this period, the age-adjusted prevalence rates of known disease have risen from 3.7% to 5.1% and from 1.9% to 2.6%, among men and women, respectively. The percentage of ischemic heart disease patients who reached target LDL was doubled, from 21% in 2000 to 50% in 2006. During the study period, the average stay in hospital declined from 11.7 days to 8.6 days. Primary myocardial infarction rates declined 33% and 54% in men aged 54–65 and women aged 65–74 years, respectively. **Discussion:** The present study provides, for the first time in Israel, data on selected quality of care and clinical outcomes using a large, population-based registry of cardiovascular disease patients. It demonstrate a significant improvement in the adherence with LDL tests and achieving target LDL levels and a subsequent decline in incidence of myocardial infarction within ten years since its establishment. The methods described can be used in establishing similar registries in similar organizations.

PS2-23:

Cardiovascular Disease Surveillance to Optimize Care: Pros and Cons of a Managed Care Research Network System

Thomas E Kottke, MD, MSPH, *HealthPartners Research Foundation*; James M Peacock, PhD, MPH, *Minnesota Department of Health*; Sharon Milberger, PhD, *Henry Ford Health System*; Margaret J Gunter, PhD, *Lovelace Clinic Foundation*

Background: With the goal of identifying where care process improvement could mitigate the impact of heart disease, we have developed a heart disease analysis model, The Perfect Care Model. Accounting for all individuals, all deaths, and all cardiac events in a population, this model estimates the number of deaths that might be prevented or postponed (DPP) with improved care. With data that are usually available in the electronic medical record or health assessment of a managed care organization (MCO), the model can calculate the potential impact of changing any risk factor level, risk factor intervention, or any evidence-based therapy. **Methods:** To assess the feasibility and benefits of basing a CVD surveillance system like the one advocated by the National Forum for Heart Disease & Stroke Prevention in

an MCO research network (MCORN) or state health department (SHD), we compared the data available to an MCORN to the data available to an SHD. **Results:** Data available to the SHD included hospital discharges, case fatality rates by diagnosis for hospitalized patients, counts of surgical procedures, and death certificate data. The disadvantage of organizing a surveillance system through an SHD is that hospitalizations are not linked to services provided during the hospitalization or survival after discharge. Likewise, behavioral risk factor data, medication data and data on ventricular function of patients with heart disease are not available. While MCOs have these data and data linkages, the disadvantage of organizing a surveillance system through an MCORN is that, although covering a significant segment of the US population, the surveillance system would not be strictly population-based. **Conclusions:** The data required to identify clinical opportunities to prevent and postpone deaths are available to a greater extent through MCOs than an SHD. The large populations covered by MCORNs, their geographic range, the relatively stable populations, and the implementation of electronic medical records all make large MCORNs attractive alternatives to SHD surveillance systems.

PS2-33:

Understanding Racial Disparities in Physician Advice and Patient Actions to Control Blood Pressure in an MCO

Douglas W Roblin, PhD, *Kaiser Permanente Georgia*; Peter J Joski, MSPH, *Kaiser Permanente Georgia*; Edmund R Becker, PhD, *Rollins School of Public Health at Emory University*

Background/Objective: The Chronic Care Model (CCM) links proactive practice teams and activated patients with better chronic care outcomes. We studied the associations of blood pressure (BP) control with 1) physician advice and patient actions on lifestyle behaviors (exercise, diet, salt and alcohol intake) to control BP and 2) medication adherence in a cohort of adults with hypertension (HTN) in a managed care organization (MCO). Our primary analysis focused on the apparent paradox that, in this MCO, African Americans were more likely to report receipt of advice and be taking actions to control BP yet had worse BP control. **Methods:** Adults 18–74 years of age with HTN were identified from computerized data. Two independent samples of 3,000 adults each (750 per JNC-VII level) were randomly selected for telephone survey in October 2007 and March 2008. The survey included BRFSS items on advice and actions to control BP and self-reported race and education. Medication adherence was measured as proportion of days covered (PDC) with any HTN-related medication in the 12-month period preceding the survey. Mean SBP and DBP were measured from computerized data in the same period. Associations among receipt of advice, taking actions, PDC, and BP control were estimated using multivariate path analysis (controlling for age, gender, and education) for the 1,330 respondents who were African American (751) or white (579). **Results:** Compared to whites, African Americans had significantly ($p<0.05$) higher SBP (standardized beta of 0.137). Better medication adherence was associated with lower SBP (0.229); however, African Americans had lower medication adherence (0.074). Patients taking action to control BP were more likely to have received physician advice to take action (0.232); and, African Americans were more likely to receive advice (0.187) and to take action (0.056). Poor SBP was associated with greater likelihood of taking action (0.075). A similar pattern of associations was observed for DBP. **Conclusions:** Compared to Whites, African Americans in this MCO were less adherent with antihypertensive medications; and, this contributed to worse BP control. Worse BP control, however, increased the likelihood that physicians advised African Americans to take actions to control BP. Consistent with the CCM, physicians appear to be directing their advice on lifestyle actions to the subset of patients most likely to benefit with improved BP control.

Clinical Effectiveness

C-C3-01:

A Conditional Sequential Sampling Procedure for Drug Safety Surveillance

Lingling Li, PhD, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*

Background: Health plans' administrative claims data are known to be very useful in post-marketing drug or vaccine safety surveillance to detect certain adverse events that are difficult to capture during the preapproval clinical trails. To detect the existence of excess risk for an adverse drug event, hypothesis testing should be conducted whenever data is updated and thus appropriate group sequential or sequential analysis methods should be implemented to adjust for multiple testing and preserve the overall type I error rate. **Methods:** We propose a practical group sequential method, a conditional sequential sampling procedure, to derive valid inference on the parameter of interest, the relative risk for an adverse drug event between the drug of interest and the comparison drug. The method allows the information for both drug groups to be accumulated prospectively and thus, unlike the newly developed maximized sequential probability ratio test (MaxSPRT), doesn't require the availability of a lot of historical data for the comparison drug. Moreover, the method automatically adjusts for population heterogeneity and temporal trend and requires no a priori assumptions on how the baseline incidence rates change across strata and over time. In addition, the method remains valid (i.e., preserves the nominal Type I error rate) even when the number of interim tests is large and/or there are a lot of strata defined based on several potential confounders. We will explain why the standard general group sequential theory method might not be appropriate in such settings. **Results:** We have conducted an extensive simulation study to evaluate the performance of the new method and compare that to the performance of the general group sequential theory method in a subset of scenarios when applicable. The power performance for both methods in the considered scenarios is very similar and our new method applies to much more general settings. **Conclusions:** We will also implement this method to the data collected in the HMO Research Network CERT II study. This method can be particularly useful in prospective drug surveillance studies in which both drugs are relative new and not enough historical data is available.

C-C3-02:

Increasingly Restrictive Definitions of Hyperkalemia Outcomes in a Database Study: Effect on Incidence Estimates

Marsha A Raebel, PharmD, *Kaiser Permanente Colorado*; Colleen Ross, MS, *Kaiser Permanente Colorado*; Leslie A Wright, MA, *Kaiser Permanente Colorado*; Craig Cheetham, PharmD, MPH, *Kaiser Permanente Southeast*; Hans Peterson, MS, *Lovelace Respiratory Research Institute*; Douglas W Roblin, PhD, *Kaiser Permanente Georgia*; David H Smith, PhD, *Kaiser Permanente Northwest*

Background/Aims: Determination of hyperkalemia associated adverse outcomes incidence and risk assessment is complicated by lack of consistent hyperkalemia definitions across studies. Further, information about hyperkalemia from clinical trials, while reflecting the potential of renin-angiotensin-aldosterone system (RAAS) inhibitor treatment to increase serum potassium (K) concentration above a defined level, may not reflect risk or severity of outcomes. We sought to examine to what extent increasing levels of restriction influenced incidence estimates of hyperkalemia outcomes. **Methods:** The study cohort was drawn from a population of adult patients with diabetes at 3 HMORN sites. We identified all new users of a RAAS inhibitor between 01/01/2001 and 12/31/2006 and assessed hyperkalemia-associated outcomes within the first year of therapy. The initial definition of a hyperkalemia outcome to which other definitions were compared included any ambulatory (AV), emergency department (ED) or inpatient (IP) visit with a K level > 5.5 mmol/l or a coded hyperkalemia diagnosis within 7 days of the visit. The following restrictions were then applied: a) increasing minimum K concentration to > 6.0 mmol/l; b) reducing timeframe to 24 hours; and c) removing AV. Crude incidence rates of hyperkalemia-associated adverse outcomes were calculated using person years (p-y) determined as time from drug initiation to first outcome or other censoring event (e.g., drug discontinuation, end of study). **Results:**

The cohort included 27,362 patients. Mean duration of initial therapy was 212 days. Hyperkalemia-associated outcome incidence estimates varied from 33.6 per 1000 p-y (defined as AV, ED or IP visit with K > 5.5 or a coded hyperkalemia diagnosis within 7 days) to 11.0 per 1000 p-y (defined as IP or ED visit with K > 6 or coded diagnosis within 24 hours). Removing AV had the greatest effect and reducing the timeframe to 24 hours had the least effect on incidence estimates. **Conclusions:** Modifying hyperkalemia definition criteria resulted in up to a 3-fold difference in by estimates of hyperkalemia-associated adverse outcomes. Further work linking these findings to adverse events is critical to decisions regarding appropriate definitions to answer specific study questions. We caution against comparing incidence estimates across published studies without considering the severity implications of differences in hyperkalemia outcomes definitions.

C-C3-03:
From Chart to CART: Improving Automated Case-Finding for Ectopic Pregnancy Using CART Analysis

Onchee Yu, MS, *Group Health, Center for Health Studies*; Jane Grafton, BA, *Group Health, Center for Health Studies*; Victoria L Holt, PhD, *Dept of Epidemiology, University of Washington*; Britton Trabert, PhC, *Dept of Epidemiology, University of Washington*; Linda Wehnes, BA, *Group Health, Center for Health Studies*; Patricia Yarbro, MSW, *Group Health, Center for Health Studies*; Delia Scholes, PhD, *Group Health, Center for Health Studies*

Background/Aims: Research and surveillance work addressing ectopic pregnancy (EP) rely largely on ICD diagnostic codes and CPT procedure codes available from automated data sources. However, cases identified in this way may not be true EP cases, as these codes may also be used to rule out, follow up or note a history of EP. Through the use of additional automated data on treatment, procedures, and other aspects of care, we developed a classification algorithm that could improve the accuracy of EP case identification. **Methods:** Using Group Health automated data files, we initially identified 2,632 potential EP episodes occurring in women aged 15–44 years during 1988–2007 using ICD and CPT codes for EP and for surgical or laparoscopic treatment of EP. Chart reviews to verify EP status were conducted on 130 potential EP cases in the algorithm development dataset and on 150 in the algorithm validation dataset. Using additional information on demographic factors, other diagnosis and procedure codes, treatment modalities, site of care (ambulatory vs. inpatient), and laboratory data available with each EP episode, we conducted a classification and regression tree (CART) analysis to create a case finding algorithm for EP. **Results:** From the CART analysis, the case-finding algorithm for EP contained three main predictors: at least two encounter dates with an EP diagnosis or procedure code during an episode; treatment with methotrexate; and presence of an ICD -9 code of 633.1, 633.10 or 633.11 for tubal pregnancy. Sensitivity for the development and validation sets, respectively, was 95% and 91% while specificity was 78% and 83%. The EP misclassification rate using the new algorithm was 10.7% in the development set and 11.5% in the validation set compared to 32% when EP cases were originally defined using EP diagnosis and procedure codes. **Conclusions:** The CART-derived algorithm for identifying EP cases was highly sensitive, had good specificity, and misclassification rates were notably improved over the original case identification techniques. Additional pharmacy and encounter data available in many health plan databases can markedly improve the accuracy of EP identification. In particular, the identified predictors in the algorithm are available in the CRN VDW, and it would be of interest to test this algorithm at other HMORN sites.

C-C3-04:
Using Electronic Health Record Data to Predict Heart Failure Diagnosis

Nirav R Shah, MD, MPH, *Geisinger Center for Health Research*; Jason Roy, PhD, *Geisinger Center for Health Research*; Walter F Stewart, PhD, *Geisinger Center for Health Research*

Background: Heart Failure (HF) is one of the most common and serious progressive illnesses among elderly patients. It is usually detected at a relatively advanced stage, after irreversible damage has occurred. Early detection offers the potential to substantially reduce patient disability and health care costs. **Objective:** To develop a novel detection strategy, making use of longitudinal electronic health record (EHR) data to create an HF early detection prediction model. **Methods:** All data for this study were obtained from Geisinger Clinic's EHR among patients who had a primary care provider. A prediction model was developed using a nested case control study design, where HF cases diagnosed between 2003–2006 were identified and controls were randomly selected matched on sex, age, and clinic. We used conditional logistic regression to model the relation between EHR data and detection of HF 6+ months and 18+ months before the actual date of diagnosis. Variables for the model included diagnoses, the most recent lab and clinical (e.g., SBP, DBP, pulse pressure) measures, medication orders and ambulatory care use in the previous two years, and smoking status. Data were only used if they occurred in the record either 6+ months or 18+ months before the diagnosis date, depending on the specific model. Model results were validated by combining a bootstrap re-sampling approach with a backwards elimination selection method. **Results:** We identified at least one matching control for 2,239 of the 2,764 cases; 9 or 10 controls were identified for 81% of the cases. A total of 24,249 controls were selected. The model for detecting HF 6+ months before usual diagnosis had an AUC of 0.80; the parallel model for detecting HF 18+ months before usual diagnosis had an AUC of 0.75 (95% CI: 0.73, 0.79). The AUC findings were similar for separate models completed on systolic HF and diastolic HF. **Conclusions:** In practice, clinicians do not have the time or ability to process seemingly disparate data points over a series of visits that might suggest a preclinical HF for a given patient. Our analysis of EHR data indicate that HF can be detected 6 or more months before usual diagnosis with good AUC and high specificity. These findings suggest that routine evaluation of EHR data may be useful in screening for patients at high risk of HF, creating numerous opportunities for early and aggressive intervention and potentially altering the natural history of heart failure for many patients.

PS1-04:
Does Mode Matter? A Comparison of Depression Scores from Mail and Phone

Cheryl Wiese, MA, *Group Health Center for Health Studies*; Paula Sandler, BA, *Group Health Center for Health Studies*; Julie Richards, MPH, *Group Health Center for Health Studies*

Background: Researchers often consider mixing modes for data collection to increase response rate. However, it is possible that people respond differently when asked sensitive questions (like questions about depression) by mail compared to phone. **Methods:** A random sample of 4000 adolescent health plan enrollees (ages 13–17 years) were invited to participate in a brief survey examining exercise, sedentary behaviors, and depressive symptoms. Mailings were directed at parents and included an invitation letter, a consent form, survey, and a $2 pre-incentive for the youth. Parents were instructed to complete the consent form and give the survey to their child to complete and return. Non-responders were sent a second survey. Among remaining non-responders, 60% of the adults were phoned, asking them to review and sign the consent form and to ask their child to complete the screener. Forty percent of remaining non-responders were phoned asking the adults' permission to complete the screener with the child by phone. In a second study, 9,838 adults with a history of diabetes or heart disease were invited to participate in a randomized controlled trial. The initial contact was a mailed 5-item survey that included a depression (PHQ2) screener and eligibility questions, along with a study information sheet and a $2 pre-incentive. Approximately 12 days later, non-responders were sent a second survey, and 10 days later, non-responders were called to complete the screener by phone. **Results:** Data collection is being completed as this abstract is submitted. This poster will examine whether there are differences in depression scores among those who are early responders (complete after one mailing), those who complete after a second mailing, and those who complete by telephone. We will also examine whether there are demographic differences at each step. In addition, we will demonstrate the increases in response rate by adding a phone call to complete a mailed survey. **Conclusions:** This poster will indicate whether this mixing of modes compromises data quality or produces different responses than if only one mode was used.

PS1-05:

Predicting the Risk of Hyperkalemia in Patients with Kidney Disease Starting Angiotensin-Converting Enzyme Inhibitors

Eric S Johnson, PhD, *The Center for Health Research, Kaiser Permanente Northwest*; Jessica R Weinstein, MD, *Department of Nephrology, Oregon Health Sciences University*; Micah L Thorp, DO, MPH, *Department of Nephrology, Kaiser Permanente Northwest*; Robert W Platt, PhD, *McGill University, Quebec, Canada*; Amanda F Petrik, MS, *The Center for Health Research, Kaiser Permanente Northwest*; Xiuhai Yang, MS, *The Center for Health Research, Kaiser Permanente Northwest*; Sharon Anderson, MD, *Department of Nephrology, Oregon Health Sciences University*; David H Smith, RPh, MHA, PhD, *The Center for Health Research, Kaiser Permanente Northwest*

Background and Aims: Angiotensin converting enzyme (ACE) inhibitors are widely used in patients with chronic kidney disease (CKD) because the drugs slow disease progression. But some physicians are reluctant to prescribe ACE inhibitors "or use higher doses" because of concerns about the risk of hyperkalemia (high potassium), a potentially fatal adverse effect. Physicians need a tool to help them predict the risk of hyperkalemia; for example, high risk patients could be targeted for intensive laboratory monitoring. We synthesized known predictors of hyperkalemia into a prognostic risk score to predict the risk of hyperkalemia. **Methods:** We assembled a retrospective cohort of adult patients with possible CKD (at least one recently estimated glomerular filtration rate (eGFR) value less than 60 mL/min/1.73m2) who started an ACE inhibitor between 1998 and 2006 at Kaiser Permanente Northwest, a health maintenance organization (HMO). We followed patients for the earliest evidence of hyperkalemia: (1) potassium value > 5.5 mmol/L; (2) diagnosis code for hyperkalemia (ICD-9-CM 276.7). Cox regression synthesized known predictors of hyperkalemia that were recorded in the electronic medical record or KPNW databases into a risk score to predict the absolute risk of hyperkalemia 90 days after starting therapy. **Results:** We followed 5,097 patients who experienced 145 hyperkalemic events, a 90-day risk of 2.1% (95% CI 1.9% to 2.4%). The following baseline characteristics predicted hyperkalemia and contributed to the risk score: age, eGFR, diabetes, heart failure, current use of potassium supplements, current use of potassium sparing diuretics (e.g., spironolactone), and a high starting dose for the ACEinhibitor. The risk score discriminated high-risk patients (top quintile, observed risk of 7%) from low risk patients (bottom quintile, observed risk of 0.7%). Predicted and observed risks agreed closely (within 1%) for each quintile. **Conclusions:** The risk score separated high-risk patients (who may need more intensive laboratory monitoring) from low risk patients (whose physicians could use ACE-inhibitors more confidently). If validated in other clinical settings, the risk score could improve the efficiency of laboratory monitoring for hyperkalemia by focusing attention on higher risk patients.

PS1-06:

Increased Incident Renal Disease with ACE-1 + Thiazide Therapy for Hypertension: The Geisinger Clinic Population

Robert D Langer, MD, MPH, *Geisinger Center for Health Research*; Jove Graham, PhD, *Geisinger Center for Health Research*; Sean Hennessy, PharmD, PhD, *Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine*; Raymond R Townsend, MD, *Electrolyte, and Hypertension Division, Department of Medicine, University of Pennsylvania School of Medicine*; Valerie Weber, MD, *Geisinger Clinic;* Frederick Bloom, MD, *Geisinger Clinic*

Background and Aims: Thiazide diuretics are recommended alone or in combination for uncomplicated hypertension (HTN). Most patients require treatment with 2 or more drugs. Based on studies of mono-therapy, ACE-I are recommended for patients at risk of renal disease, including diabetics. Data are sparse regarding thiazide plus ACE-I combination therapy. We hypothesized that thiazide plus ACE-I is associated with a lower incidence of renal disease compared with other common thiazide combinations, but that confounding by indication for diabetes might attenuate this effect. **Methods:** We conducted a retrospective cohort study of thiazide combinations in a 41-site clinical practice that is the dominant provider in a large rural area. Data were extracted from an electronic medical record for all patients >60 years treated for HTN between 2001 and 2006. Patients with prevalent renal disease, or <6 months of treatment or follow-up, were excluded. Diabetes was defined as ICD9 250.* Renal disease was defined as ICD-9 codes 403.*-404.*, 593.9, 585.*-586.* or an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73m2. Incident renal disease by eGFR required >2 measurements persisting >3 months. **Results:** Among 4700 patients (98% Caucasian, 69% female, mean age 70 yrs, mean follow-up 32.5 months), the incidence of renal disease was 22.7%. Five drug categories accounted for 97% of thiazide combinations: ACE-I, Angiotensin Receptor Blocker (ARB), Beta-blocker (BB), Calcium Channel Blocker (CCB) and Potassium-sparing diuretic (P-S). In Cox models with ACEI + thiazide as the reference group, adjusted for age, sex, and pretreatment blood pressure, patients who used BB + thiazide (HR 0.72, 95% CI, 0.600.86) and CCB + thiazide (HR 0.72, 0.55-0.96) had significantly lower hazard ratios for incident renal disease than those who used ACE-I + thiazide. In analyses stratified on diabetes status, results were generally similar for patients with and without diabetes except for the suggestion of a greater rate of incident renal disease in patients without diabetes who used P-S + thiazide (HR 1.23, 1.01-1.49) compared with ACE-I + thiazide. **Conclusions:** Contrary to expectation, ACE-I with thiazide was associated with an increased incidence of renal disease compared with all other groups except potassium-sparing diuretics. This risk was significantly greater than that observed with BB. The association was not meaningfully changed by accounting for diabetes.

PS1-09:

Clinical Features, Treatment Practices, and Outcomes of Older Patients Hospitalized with Decompensated Heart Failure

Jane S Saczynski, PhD, *Meyers Primary Care Institute and University of Massachusetts Medical School*; Chad E Darling, MD, *Department of Emergency Medicine, University of Massachusetts Medical School*; Frederick A Spencer, MD, *Department of Medicine, McMaster University Medical Center*; Darleen Lessard, MS, *Department of Medicine, University of Massachusetts Medical School*; Joel M Gore, MD, *Department of Medicine, University of Massachusetts Medical School*; Robert J Goldberg, PhD, *Meyers Primary Care Institute and University of Massachusetts Medical School*

Background: Heart failure (HF) disproportionately affects older adults and previous studies have suggested that the demographic as well as clinical profile of older patients with HF is different from that of younger patients. However, generalizable, population-based data on the clinical, treatment, and prognostic profile of older as compared to middle aged and younger patients with HF are lacking. **Methods and Results:** Residents of the Worcester (MA) metropolitan area hospitalized for de-compensated HF at 11 greater Worcester medical centers during 1995 and 2000 (n=4,534) were compared according to 4 age groups (<65, 65–74, 75–84, and >85 years). The mean age of patients with acute HF was 76 years and 24% were >85 years. Older patients (>75) were more likely to be female and to have higher ejection fraction findings, multiple comorbidities, and a lower body mass index. Older patients were significantly more likely to receive symptom modifying medications and less likely to receive disease modifying medications than younger patients. Advanced age was directly associated with increased in-hospital, 30-day, and 1-year death rates in both crude and adjusted analyses. **Conclusions:** The results of this communitywide study suggest that clinical, treatment, and prognostic factors differ by age in patients hospitalized for de-compensated HF. These high-risk patients warrant special attention in future studies in order to improve their management and long-term survival.

PS1-11:

Differences in Prescription Adherence vs. Blood Pressure Control: Linking Electronic Health Record and Claims Data

Jove Graham, PhD, *Geisinger Center for Health Research*; Robert D Langer, MD, MPH, *Geisinger Center for Health Research*; Mark G Weiner, MD, *University of Pennsylvania School of Medicine*; Judith E Reardon, BA, *Geisinger Center for Health Research*; Susan Eachus, PhD, *University of Pennsylvania School of Medicine*; Jonathan Cook, BS, *Geisinger Center for Health Research*; Mary Ann Blosky, MS, RN, *Geisinger Center for Health Research*; Craig Roberts, *PharmD, MPA, Pfizer Inc*; Barbara J Turner, MD, *University of Pennsylvania School of Medicine*

Background: Hypertension (HTN) control may be highly dependent on patient behaviors, including filling of antihypertensive medication prescriptions (AHM Rxs). We examined electronic health records (EHR) for patients of Geisinger Clinic who had prescription benefits through Geisinger Health Plan. **Methods:** Prescriptions in the EHR were defined as filled if a claim was paid within 90 days. We used logistic regression to test if a patient's filling rate (FR) was associated with gender, age, economic status (measured as median household income by ZIP code) and number of vascular comorbidities (angina, MI, PVD, stroke). We then tested whether a higher categorical FR (0, 1-33, 33-67, 67-99 or 100%) resulted in a greater percent of office visits with blood pressure (BP) controlled to JNC7 standards (%BPc). **Results:** All results are reported as Adjusted Odds Ratios (AOR) [95% CI]. Among 20,161 patients who met JNC7 criteria for HTN and had >3 AHM Rxs during plan enrollment from 2002 to 2006, 99% were Caucasian and 53% were female with a mean age of 58.5 years (SD 15.8). Of 191,120 AHM Rxs (mean per patient 9.5, SD 6.5), 49%, 59% and 62% were filled within 30, 60 and 90 days. Based on a 90-day FR, 14.7% of patients filled no Rxs and 36.2% filled all. Factors negatively associated with FR were female gender (AOR 0.89 [CI 0.870.90]), increasing age (nonlinear, 0.30 [0.290.30] for age 60–80 years vs. age 40–60 years), and number of vascular comorbidities (nonlinear, 0.79 [0.770.81] for 1 vs. 0 comorbidities, 0.66 [0.610.71] for 2 vs. 0 comorbidities). Higher economic status was positively associated with FR (1.05 [1.031.07] per $10k estimated annual income). In 19,500 patients who had >3 office visits, the mean number of BP readings per patient was 19.6 (SD 10.6), and 60% of readings were under control. After adjusting for the factors above and baseline blood pressures, there was a positive nonlinear association between FR and %BPc (1.08 [1.06–1.13] for 33–67% vs. 0% FR, 1.09 [1.08–1.16] for 67–99% vs. 0% FR, and 1.34 [1.07–1.46] for 100% vs. 0% FR). Results were similar if we excluded patients with 0% FR who may have used alternate insurance for Rxs. **Conclusions:** These findings suggest that prescription filling differs by gender, age and comorbidity status and that higher Rx filling rates are associated with better BP control.

PS1-29:

Estimation of Glomerular Filtration Rate and Chronic Kidney Disease Using Area-based Imputed Race Measures

Suma Vupputuri, PhD, *Kaiser Permanente Georgia, The Center for Health Research*; Varun Ashok, MPH, *Kaiser Permanente Georgia, The Center for Health Research*; Peter J Joski, MSPH, *Kaiser Permanente Georgia, The Center for Health Research*; Douglas W Roblin, PhD, *The Center for Health Research, Kaiser Permanente Georgia*

Background: The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative recommends the use of the Modification in Diet and Renal Disease (MDRD) equation to estimate glomerular filtration rate (eGFR) from serum creatinine, age, sex, and race. However, in many managed care organizations (MCOs) race is not routinely collected. The current analysis compares the use of areabased imputed race to actual race in using the MDRD equation to calculate eGFRs and to identify chronic kidney disease (CKD) in MCOs. **Methods:** The study population consisted of 9,196 Kaiser Permanente Georgia members with two eGFR measures <90 ml/min/1.73m^2 measured 60–365 days apart in 2007 and who had non-missing race. Residential addresses were geo-coded to 2000 U.S. Census block data. The factor of 1.210 for African American (AA) race in the MDRD formula was adjusted according to the proportion of AAs (pAA) in the Census block using the formula: 1+(0.210*pAA). We compared mean eGFR using actual race and area-based race by decile of percent AAs and by CKD stage. A weighted kappa statistic was calculated to measure the correlation between the two measures of CKD and Bland-Altman plots were constructed to measure agreement. **Results:** By decile of percent AAs in the Census blocks, the differences in mean eGFR estimated using actual race and area-based race were small — ranging from 0 to 1.2 ml/min/1.73m^2. A trend was observed with greater differences among those living in neighborhoods 20–80% AAs and smaller differences in neighborhoods with <20% or >80% AAs. By CKD stage, the differences in mean eGFR using actual and area-based race were also small — ranging from 0.1 to 0.4 ml/min/1.73m^2. The weighted kappa statistic for the correlation between CKD stage estimated by actual versus area-based race was 0.88. Bland-Altman analysis indicated that the 95% limits of agreement between the two methods ranged from 14.2 to 12.5; and, plots demonstrated good agreement. **Conclusions:** Imputing race in the MDRD formula using an area-based measure of proportion AA to calculate eGFR results in values that are comparable to eGFR computed from actual race. These results suggest that area-based race from the U.S. Census may be used to overcome limitations of missing actual race for identifying adults with CKD in MCOs.

PS1-31:

Osteonecrosis of the Jaw in Two Dental PBRN Health Plans

Jeffrey L Fellows, PhD, *Kaiser Permanente Center for Health Research*; D Brad Rindal, DDS, *HealthPartners Research Foundation*; Andrei Barasch, DDS, *University of Alabama at Birmingham*; William Rush, PhD, *HealthPartners Research Foundation*; Christina Gullion, PhD, *Kaiser Permanente Center for Health Research*; Daniel Pihlstrom, DDS, *Permanente Dental Associates*; Lisa A Waiwaiole, MS, *Kaiser Permanente Center for Health Research*; Joshua S Richman, PhD, *University of Alabama at Birmingham for the DPBRN Collaborative Group*

Objectives: Osteonecrosis of the jaw (ONJ) has been recently associated with exposure to bisphosphonates (BPs). Incidence and risk factors are ill-defined. This Dental PBRN study (www.dpbrn.org; support: DE-16746, DE-16747) used electronic records from two participating health plans to estimate ONJ incidence and assess whether BP use increased the likelihood of ONJ. **Methods:** We used multiple search strategies and manual chart reviews to identify ONJ cases in members of Kaiser Permanente Northwest and HealthPartners of Minnesota. Our cohort was members age 35 and older with medical and pharmacy coverage for at least one year during 1994–2006. We used a keyword search of electronic physician notes to flag suspected cases among patients with a diagnosis or procedure indicative of ONJ and then confirmed cases through manual chart review. Oral surgeons and general dentists identified additional cases among cohort members. We used logistic regression to estimate the odds of ONJ from BP exposure, adjusting for other risks. **Results:** 37,290 of 572,602 cohort members had a diagnosis or procedure indicating the potential for ONJ. A key word search of physician notes and chart review found 14 ONJ cases; 5 more cases were found through dental providers. Six cases (31.6%) had an oral BP dispense prior to ONJ onset, compared to 21,163 cohort members (3.7%). Eight cases (42.1%) had a history of cancer, and 5 (26.3%) had osteoporosis, compared to 71,776 (12.5%) and 23,392 (4.1%), respectively, among all cohort members. Univariate and multivariate logistic regression were inconclusive due to the small number of confirmed ONJ cases. **Conclusions:** The incidence of ONJ in this cohort was very low and limited our ability to assess risks. When compared to the larger cohort, the higher frequencies of oral BPs, cancer, and osteoporosis among ONJ cases suggest these may be risk factors for ONJ. The low number of cases resulted in logistic regression outcome predictors that were no better than random. The rarity of ONJ cases in our study may be good news for the millions of adults currently taking oral bisphosphonates, although more data are needed before we know for sure.

PS1-33:
Algorithm for Matched Case/Control Studies

Beth A Molitor, MBA, *HealthPartners Research Foundation*; James Z Baggs, PhD, *Centers for Disease Control and Prevention, Atlanta, GA*; Ned M Lewis, MPH, *Kaiser Permanente Northern California*

Conducting matched case/control studies can be difficult when matching on very large populations. We have developed an algorithm to identify a pair-wise matched case / control population for retrospective cohort studies. We have implemented this method using SAS code at two sites for the Vaccine Safety DataLink (VSD) project. This algorithm is superior as it works on certain extremely large populations such as those at certain Kaiser Permanente sites. The algorithm is thoroughly tested, robust, and effective for use on multiple sites projects to identify a pair wise matched case/control population, regardless of the dataset size each Medical Care Organization maintains.

Comparative Effectiveness

C-A2-01:
Virtual Consults in an Electronic Medical Record: Physician Use, Satisfaction, and Learnings

David W Price, MD, *Kaiser Permanente Colorado*; Ted E Palen, PhD, MD, MSPH, *Kaiser Permanente Colorado*; Kristin Wallace, MPH, *Kaiser Permanente Colorado*; Susan M Shetterly, MS, *Kaiser Permanente Colorado*

Background/Aims: Shared Electronic Medical Record (EMR) systems could increase communication between primary and specialty care. Electronic (virtual) EMR consults (VC) could streamline patient care. We describe physician use of VCs within Kaiser Permanente's HealthConnect EMR, compared with traditional requests for consults (TC). **Methods:** Prospective, observational, case control study comparing VCs with TCs from Kaiser Colorado adult primary care physicians to several specialty departments. Every 2 weeks from June to November 2008, VCs were randomly selected and matched with TCs by requesting physician specialty, reason for referral, referral department, patient gender and age. Referring physicians were asked to complete an online survey on reason for consult, answers received, if answers met immediate patient care needs, likelihood of using (or actual use of) the information in subsequent patient care, the impact of the consult process on physician work flow, and their overall satisfaction with the consult. **Results:** Eighty-two of 205 unique physicians responded on 62 VCs and 49 TCs; overall return rate was 26.4% (30.0% of 207 VCs and 22.9% of 214 TCs). Etiology, screening and evaluation questions were similarly common reasons for both types of consults; requests to initiate treatment or assume care were more common in TCs. Seventy-four percent of physicians requesting VCs and 39% of those requesting TCs received information from the consultant by the time of survey completion; 91% of these physicians used at least some information from the referral in caring for the index patient. Fifteen percent had already used the information in the care of subsequent patients; 41% thought they would likely use the information in the future; 29% thought they would not likely use the information in the future. Sixty percent of physicians who received information were satisfied with the information from the referral, 24% were dissatisfied, with no difference between VCs and TCs. **Conclusions:** Referring physicians received information more quickly from VCs than TCs. Consult reasons, use of information received in the index and subsequent patients, and overall satisfaction with information were similar between VCs and TCs. Additional analysis will explore longer term educational outcomes, patient satisfaction, and economic differences between VCs and TCs.

C-A2-02:
Virtual Consult Use in an Electronic Medical Record: Descriptive Statistics at Mid-Point of Study

Ted E Palen, PhD, MD, MSPH, *Institute Kaiser Permanente Colorado*; David W Price, MD, *Kaiser Permanente Colorado*; Kristin Wallace, MPH, *Kaiser Permanente Colorado*; Susan M Shetterly, MS, *Kaiser Permanente Colorado*

Background/Aims: Secure messaging within electronic medical records (EMR) between primary and specialty providers (virtual consults) may lead to streamlined care processes. **Methods:** An observational study of the use of traditional consults (TC) and virtual consults (VC) by adult primary care physicians to specialty departments conducted from June 2008 to November 2008. We compiled data for all consult orders made within the EMR. We conducted manual chart reviews, physician and patient surveys on a random selection of consults to determine the reason for the consult, the advice returned, the number of people involved in processing the consult, and the turn -around time for the consult. We report mid-study descriptive statistics on the number of patients with consults, patient demographics, the types of consults, and to which departments. We also report on the number of patient satisfaction surveys attempted and completed. **Results:** We identified 33,390 consult orders (93.6% TC, 6.4% VC) for 27,932 patients with ages ranging from 18 to 99 (mean 53.95). Of these patients, 83.8% had one, 13.5% had two, and 2.7% had three or more consult orders. The top departments for TC were: Physical Therapy (29.2%), Orthopedics (11.9%), Cardiology (11.2%), General Surgery (8.8%), and Dermatology (8.3%). The top departments for VC were: Dermatology (18.3%), Neurosurgery (12.3%), Endocrinology (9.6%), Neurology (7.2%), and General Surgery (6.2%). The average response time for VC was 3.2 days (range 130 days) with over 50% returned within one day. We randomly selected 540 patients (equally divided between TC and VC), contacted 340 thus far, and 154 participated in the survey. Forty percent of these patients received VC and 67% of these patients eventually saw a specialist. Of all patients surveyed, 79.4% were satisfied with the specialist recommendations (not significantly different between consult types). **Conclusions:** The primary care providers use virtual consults for different purposes than traditional consults. Physician and patient surveys and chart reviews are scheduled for completion in 2009 allowing a full comparison of virtual consults to traditional consults from multiple perspectives. If effective, virtual consults may improve patient satisfaction and streamline the care delivery process.

C-A2-04:
The Geisinger Transitions of Care Initiative: Overview of an Interdisciplinary Quality Improvement Process

John B Bulger, DO, *Geisinger Health System*; Kenric A Maynor, MD, *Geisinger Health System*; Seth Frazier, MBA, *Geisinger Health System*

Background: Care transitions between inpatient and outpatient providers are quickly becoming a surrogate marker of quality for care of the hospitalized patient. Almost one in six (17.6%) Medicare patients are readmitted within 30 days of hospital discharge. As a result the Centers for Medicare and Medicaid Services (CMS) is targeting readmissions as a probable marker for both poor quality of care and money going down the drain. The Geisinger Transitions of Care Initiative (TOCI) focuses on creating reliable, sustained change that is broad based, cross platform and applicable to all patients. **Methods:** Geisinger's approach to address transitions of care is a team-based model. It begins with nurses screening patients' readmission risk status using an electronic health record tool developed from national evidence and modified based upon GHS's local experience. Once a patient identified as high risk is admitted, nursing performs a checklist of activities for early care activation (e.g. screening for the need for post acute infusion) and care management prepares a discharge plan and completes a detailed assessment of the patient's support environment. On selected units, high risk patients are followed for a month post-discharge using an outpatient care management protocol that leverages telephonic case management and remote monitoring tools that can be customized to the patient's medical plan. The final core pilot encompasses our transition bundle. This includes automation of primary care physician follow-up appointment scheduling and discharge communication. **Results:** The pilots were implemented in May and June of 2008. Because of the low frequency of readmissions, we have yet to evaluate whether early promising results are statistically significant. We have been able to demonstrate reliable emergency

department screening and transition bundle performance and the reliability of implementing this complex model is improving each month. Approximately 2,000 patients have been discharged from units where the pilots were in operation. **Conclusions:** The TOCI approach is interdisciplinary at all level's governance, coordination, and patient care. We believe the methods that are developed and utilized, including specialized screening tools, nursing and care management protocols, interdisciplinary team rounds, discharge protocols and post acute care management strategies, will be essential components of the national strategy to reduce readmissions.

C-B2-01:

Disease and Care Management for Multimorbid Patients in an Integrated System: How Much is Too Much?

Jennifer L Ellis, MBA, MSPH, *Kaiser Permanente Colorado*; Elizabeth A Bayliss, MD, MSPH, *Kaiser Permanente Colorado*; Judy Totsch, RN, *Kaiser Permanente Colorado*; John F Steiner, MD, MPH, *Kaiser Permanente Colorado*

Background: As registry use for disease- and care-management (DCM) has become more common, subsets of patients with multiple chronic illnesses may be listed in multiple registries and subject to outreach by multiple DCM clinicians. While much outreach is beneficial, too many different types of DCM contacts per patient may be inefficient and/or create competing demands for patients. **Methods:** We assessed number and type of DCM encounters in a two year cohort of 23,385 HMO members listed in 2 or more of the following disease registries: diabetes, coronary artery disease, hypertension, congestive heart failure, and chronic kidney disease. Outcomes were 0, 1, or 2+ encounters; and 3+ types vs. 1 or 2 types of encounter. We assessed all types of DCM not just those specific to the five registries. Descriptors included: age group, gender, overall morbidity, specific diagnoses for each registry, utilization, and depression diagnosis. We assessed frequencies of descriptors, and used multivariate techniques to identify those significantly associated with outcomes. **Results:** Ages ranged from 17 to 98, and 55% were male. 5,626 had no DCM encounters, 3,090 had one, and 14,669 had two or more. Of the 17,759 persons with DCM encounters, 45% received one type of DCM (e.g. diabetes care management), 31% received two types, 15% received 3 types, and 9% (or 1,668 persons) received 4 or more types of DCM. The most common types of care management received were lipid management, chronic care coordination (a global care management service that includes hospital follow-up), diabetes care management, and nutritional counseling. In multivariate analyses, female gender, higher morbidity level, emergency department or inpatient admission, diagnosis of depression, and each of the individual registry diagnoses were significantly associated with receipt of 2 or more DCM encounters. All of these characteristics except gender were also associated with receiving 3+ types of care management encounters relative to 1 or 2 types. **Conclusions:** Within a clinical environment that is able to make near-optimal use of DCM technology and processes, we explored the potential limitations of outreach-based care management for a subset of multimorbid patients. Certain patients characterized by higher morbidity, a diagnosis of depression, and high utilization receive more numbers and types of DCM and may benefit from careful assessment of their care needs.

C-B2-02:

Measuring the Effect of a Patient-Centered Health Initiative on Clinic-Level Outcomes

Janet Tomcavage, RN, MSN, *Geisinger Health Plan*; Jove Graham, PhD, *Geisinger Center for Health Research*; Jason Roy, PhD, *Geisinger Center for Health Research*; Richard J Gilfillan, MD, *Geisinger Health Plan*; Roy Goldman, PhD, *Geisinger Health Plan*; Karena Weikel, *Geisinger Health Plan*; Allan Wolstein, *Geisinger Health Plan*

Background: Geisinger Health Plan's ProvenHealth Navigator (PHN) Program, a "Patient Centered Medical Home" initiative is designed to improve patient experience, optimize patient's health status, and improve efficiency. Components include 24-hour primary and specialty care access, a GHP funded nurse case manager embedded in each practice site to coordinate services for patients with complex medical conditions, home based monitoring, interactive voice-response surveillance, and support for end-of-life care decisions. We analyzed hospitalization rates as well as financial outcomes to measure the effect of the PHN intervention in 11 clinics. **Methods:** Monthly data from 44 Geisinger clinic sites from 2005 to 2008 were retrospectively analyzed to test for a significant effect of the PHN intervention on admissions, readmissions, and expense outcomes. Eleven sites began the ProvenHealth Navigator at different times during the study period between 2006 and 2008. Statistical analysis was performed (SAS 9.1.3, Cary, NC) using Poisson regression to model admissions per member and readmissions per admission, or using linear regression to model inpatient expenses and total pre-prescription (PreRx) expenses per member. Each of these clinic level outcomes was modeled as a function of year, month, mean risk score, percent males, mean age and PHN status. PHN status was modeled using a within clinic and betweenclinic variable (Berlin et al., Biometrics 1999) to minimize confounding due to center-exposure association. The significance of the within clinic variable was tested at the $p<0.05$ level. Repeated measures from clinics were clustered using the Generalized Estimating Equation method with exchangeable covariance. **Results:** Results are expressed as parameter estimates [95% confidence interval]. The PHN intervention was associated with a 17.1% lower admission rate [10.2 to 23.4, $P<0.001$], a 14.5% lower readmission rate [0.8 to 26.2, $P=0.04$], a non significant \$27 or 15% lower inpatient allowed expense per member per month [\$60 to +\$5, $P=0.099$], and a \$59 or 11% lower PreRx expense per member per month [\$25 to \$93, $P<0.001$]. **Conclusions:** Geisinger's ProvenHealth Navigator was associated with significantly improved outcomes in the clinics where it was implemented. Non-randomized clinic selection and varying intervention times were considered in the model. Future work should investigate interactions between PHN and clinic characteristics and cost-benefit relationships.

C-B2-03:

Patient and Clinician Experience in a Patient-Centered Medical Home Demonstration

Tyler R Ross, MA, *Group Health, Center for Health Studies*; Robert J Reid, MD, PHD, *Group Health, Center for Health Studies*; Paul Fishman, PhD, *Group Health, Center for Health Studies*; Onchee Yu, MS, *Group Health, Center for Health Studies*; James T Tufano, MHA, *Group Health, Center for Health Studies*; Eric B Larson, MD, MPH, *Group Health, Center for Health Studies*

Background: Many have called for the adoption of the patient-centered medical home (PCMH) model with the expectation that such a model will alleviate ills of the American health care system. Little has been published that evaluates implementations of the PCMH as a comprehensive primary care practice redesign intervention in an actual care setting. We present reported patient experience and clinician burnout following the adoption of this model. **Methods:** To assess patient experience, a total of 6,187 adult patients from the PCMH clinic and two control clinics were surveyed prior to the PCMH deployment and again twelve months following its adoption. Patient experience was measured using the Ambulatory Care Experiences Survey – Short Form (ACES) and two subscales from the Patient Assessment of Chronic Illness Care (PACIC). To assess clinician experience, we surveyed all clinicians (n=132) at the PCMH clinic and two control clinics at baseline and twelve months. Clinician experience was measured using the three Maslach Burnout Inventory (MBI) sub scores of emotional exhaustion, depersonalization, and lack of personal accomplishment. **Results:** Patient survey response rate was 55% at baseline and 80% at 12-month follow-up. Twelve months after the PCMH deployment, 4 of 7 patient experience subscales improved at the PCMH clinic (quality of doctor-patient interactions, coordination of care, patient activation, and goal setting). Only 2 of 7 improved at the control clinics. After adjusting for baseline patient experience, age, education, and self reported health status at baseline in the linear regression, patients at the PCMH clinic had significantly improved patient experience in 6 of 7 subscales compared to patients at the control clinics. Clinician survey response rate was 76% at baseline and 83% at 12-month follow-up. At baseline, burnout in all three sub scores was not significantly different between the PCMH clinic and control clinics. At twelve months, clinicians at the PCMH clinic reported significantly lower burnout compared to the control clinics on the emotional exhaustion and lack of personal accomplishment subscales and trended lower on the depersonalization subscale ($P=0.06$). **Conclusions:** Twelve months following adoption, patients at the PCMH clinic reported superior patient experience compared to control clinics. Clinicians at the PCMH clinic also reported significantly less burnout compared to their control counterparts.

C-B2-04:

Helping Women be a Part of the Answer: Cognitive Interviews to Assess Attitudes on Hormone Therapy

Eric J Bieber, MD, MHCM, *Department of OB/GYN and System Support, Geisinger Clinic*; Melissa E Pauling-Kotch, BA, *Center for Health Research, Geisinger Clinic*; and Robert D Langer, MD, MPH, *Center for Health Research, Geisinger Clinic*

Background/Aims: In 1993, the Women's Health Initiative (WHI) began to recruit postmenopausal women to be part of the answer by participating in a study assessing benefits and risks of hormone therapy (HT). From these trials, a complicated picture emerged. Some of this information has made it to the media and it is important to understand how this has shaped women's perceptions of HT. The purpose of this study was to use cognitive interviews to gain a detailed understanding of how a group of women's opinions of HT are shaped, what their opinions are, and to test their knowledge of the risks and benefits of HT. **Method:** Ten subjects who were menopausal were recruited by letter prior to a visit at a rural women's health clinic. A survey was administered to gauge women's opinions, attitudes, and the source of their knowledge. Then, retrospective probing was used to explore the answers given by the women. A qualitative analysis of the interviews was conducted and surveys were evaluated. To verify the accuracy of the women's self report, their responses relating to past medical history, HT exposure, menopause status, hysterectomy status, and demographics were compared to their electronic health records. **Results:** Ten subjects between the ages of 54 and 65, with a mean age of 58, completed interviews. The survey contained 27 questions and took an average of eight minutes to complete while the interviews lasted approximately 45 minutes. All participants preferred response options not asking for specific numbers, indicating it was not something they generally paid attention to. Although 8 out of 10 women answered that taking HT increased a women's chances of developing breast cancer, more than half still thought that it positively affected a women's quality of life and overall health. A recurring theme was the idea that hormone therapy was a personal choice and its benefits or harm depended on the individual's circumstances taking it and her physician's advice. **Conclusions:** In general, the women seemed to value their physician's advice and their personal experiences over other information they had encountered. Their knowledge of HT's actual risks according to the research from the WHI studies was limited. Understanding what shapes a woman's perception of HT, and what they know may make patient education concerning the risks and benefits associated with HT more effective, helping women make the most appropriate decisions for their own health.

PS1-07:

Evaluating the Status of "Translating Research into Practice" at a Major Academic Healthcare System

M Hasan Rajab, PhD, *Scott & White Healthcare*; Christie Cummings, RN, MA, *Scott & White Healthcare*; Jim Rohack, MD, *Scott & White Healthcare*; Frank Villamaria, MD, MPH, *Scott & White Healthcare*

Background: This survey was conducted to assess the status of translating research findings into practice at a major academic healthcare system in Central Texas. **Methods:** We conducted a cross-sectional survey addressing knowledge of and participation in translational research of physicians, residents, nurses, and third and fourth year medical students in a major academic healthcare system in Central Texas. Some of the research questions were adapted from an in-house HMORN survey (personal communication). **Results:** Out of 508 respondents, 428 (84.3%) completed all questions. A total of 68.9% of faculty reported having sufficient education and training to conduct research vs. 44.4% of residents and 35.6% of nurses. Fifty-eight percent of faculty, 53% of residents and 9% of nurses reported current involvement in research activity. A total of 55.6% of residents reported that their departments provide them with protected time for research vs. 18.4% of faculty and 10.3% of nurses. In addition, 33.9% of nurses reported interest in participating in research but do not know how to start. A majority of faculty and residents and 58% of nurses indicated they were familiar with translational research. Yet only 42.7% of residents and 35% of faculty, 46.7% of residents and 35.6% of nurses indicated they were aware of any changes in delivery of care that resulted from research projects. **Conclusions:** The study results suggested failure to leverage members of the healthcare team in a systematic process to ensure translation of research findings into practice. Results highlighted the need to merge the culture of safety and quality improvement with research while dealing with the daily pressures of patient care.

PS1-12:

Acceptability of Group Acupuncture Clinics at a Health Maintenance Organization

Carmit McMullen, PhD, *The Center for Health Research, Kaiser Permanente Northwest*; Shauna McCuaig, BS, *Oregon College of Oriental Medicine*; Jeff Weih, PA LAc, *The Center for Health Research, Kaiser Permanente Northwest*; Charles Elder, MD, MPH, *The Center for Health Research, Kaiser Permanente Northwest*

Background: This project aims to assess whether group clinics represent an appropriate and viable mechanism for delivering acupuncture services in a conventional managed care setting. **Methods:** We are conducting a qualitative analysis with adult patients complaining of back or neck pain who have recently received acupuncture services at Kaiser Permanente Northwest. About half of these patients are receiving acupuncture in a group setting. During group acupuncture sessions, about 4–6 patients are treated at one time by a single practitioner. During treatments, patients are seated in reclining chairs in a shared treatment room. Distal acupoints are used so that patients do not need to remove clothing. Patients are asked about satisfaction with their clinician and care received, as well as level of overall clinical improvement. We also ask participants to comment on the advantages and disadvantages of the group clinic setting, and to offer suggestions for improvement. **Analysis:** Data analysis involves three steps. First, we use aggregate respondent answers to each interview question to generate a list of response themes for each question. Second, we summarize each respondent's answers, to highlight individuals' reactions to group acupuncture. We then return to the data to identify overarching themes or new themes that were not addressed in the first two efforts. **Results:** We have conducted fourteen out of an anticipated fifty telephone interviews. Preliminary analysis of patient responses revealed the following themes: both groups reported improvements in quality of life and pain control, but expressed concerns about appointment availability. Patients receiving group acupuncture reported that they were generally satisfied with their care. Patientreported advantages of group acupuncture include greater flexibility in length of time of appointment, and more time with the clinician. Disadvantages include perceived lack of privacy. In contrast, participants attending individual acupuncture sessions stated strong preferences for remaining in individual sessions, and were unable to imagine how group care could be feasible. **Conclusions:** We conclude that, despite misgivings expressed by patients who have not experienced group acupuncture, those who did participate in the group sessions were generally satisfied and reported clinical improvement.

PS1-14:

Coordination and Integration of Care for Chronically Ill: Meaning and Measurement

Hubertus JM Vrijhoef, MSc, PhD, *MacColl Institute for Healthcare Innovation*; Edward H Wagner, MD, MPH, *MacColl Institute for Healthcare Innovation*

Background: Innovative strategies in chronic care delivery are welcomed as responses to a set of problems that are evident to some degree in all health care services. Uncoordinated or fragmented arrangements for the delivery of care are one example of such problems. Notwithstanding the theoretical conceptualization of coordination and integration, in practice variation exists in how these concepts are applied and measured and in their impact on care. Consequently, difficulties are experienced in deciding how to best resolve care fragmentation. **Methods:** An exploratory, qualitative design is used to make the phenomena understandable and identify the perceptions of experts in chronic care coordination and integration. A purposive sample of 20 experts from the U.S., Canada, Australia, and Europe is in-depth interviewed by telephone or face-to-face. An interview guide is being applied to initiate and guide the interview. Three central topics are addressed: care fragmentation, coordination and integration, measurement. Interviews are audio-recorded and transcribed with the consent of interviewees. A grounded theory

approach is used to analyze the data. Approval for the study is received from the Center's Human Subject Review Office. **Results:** Preliminary results indicate an urgent need to resolve care fragmentation, and concepts of coordination and integration of care being interrelated and partially overlapping. By identifying a plethora of factors and stakeholders involved, the complexity of resolving care fragmentation gets revealed. Diversity is reflected by the type of indicators being identified to measure the impact of coordination or integration on care. **Conclusions:** Final conclusions will be drawn after completion of the data analysis and available in April 2009. Support for this research was provided by The Commonwealth Fund. The views presented here are those of the authors and should not be attributed to The Commonwealth Fund or its directors, officers, or staff.

PS1-15:

What has the HMO Research Network Done for You, Lately? How the Network is Responding to Investigators' Needs

Ella E Thompson, *Group Health Center for Health Studies*; Sarah M Greene, MPH, *Group Health Center for Health Studies*; Eric B Larson, MD, MPH, *Group Health Center for Health Studies*

In late 2007, HMORN leaders surveyed investigators to learn how to better foster and support multi-site projects. This poster recaps survey results, reviews 2008 progress to address findings, and summarizes ongoing efforts. **Methods:** The 2007 HMORN investigators' survey was anonymously administered via www.surveymonkey.com. Directors emailed the survey link to their faculty, including one email reminder. A total of 279 surveys were reportedly distributed. **2007 Survey Results:** Surveys were completed by 161 investigators (58%) from 14 of 15 Centers. Full/senior Investigators represented 49% of responders, 19% were associate and 24% assistant level researchers. Years of experience averaged 15. The top 5 features investigators identified that would make multi-site research more attractive were: ways to find and connect with colleagues (32%); central or streamlined IRB (12%); more opportunities and better dissemination of them (11%); coordinated budget development and grant administration (10%); boilerplate, website, guides, clear processes (9%). Investigators also shared the top five ways the HMORN could assist investigators. These were: PI directory with bios, virtual scientific interest groups, streamlined grants and contracts administration, web based guides and resources and improved communications. **2008 Progress Made:** The Network responded to investigator priorities in 2008 in a number of ways, and there are now many more resources available than when the survey was conducted. A directory of Investigators by site and research interests is now on the HMORN website with links to biographical information on external Center websites. Search features will be added to the PI Directory in 2009. An SOP for streamlined, facilitated IRB review of low-risk, data only studies was adopted across the Network. Templates for coordinating budget and grant development are available as well as a variety of boilerplate, guides, toolkits and best practices. The Network is working to finalize template subcontract and data use agreements and expand functionality of the Network's website. To support and maintain all of this, every HMORN Center has made a financial commitment to the Network, beginning in 2009. **Next Steps:** With the funding of the 2009 HMORN Operating Budget, the Network is continuing to implement improvements to the website, administrative resources, VDW, communications and more.

PS1-21:

Evaluation of Commercial Workflow Engine for Modeling Clinical Processes in Quality Improvement and Decision Support

Vojtech Huser, MD, PhD, *Marshfield Clinic Research Foundation (Biomedical Informatics Research Center)*; Peggy L Peissig, MBA, *Marshfield Clinic Research Foundation (Biomedical Informatics Research Center)*; Carl A Christensen, MS, *Marshfield Clinic Research Foundation (Biomedical Informatics Research Center)*; Justin B Starren, MD, PhD, *Marshfield Clinic Research Foundation (Biomedical Informatics Research Center)*

Background: Workflow technology (WT) is a new emerging technology which offers support for modeling, execution and analysis of processes within information systems. WT has been successfully implemented in many industries resulting in increased efficiency and decreased variability and costs. Similar potential exists in healthcare; however the penetration of this technology, according to Gartner, is less than 5%. Marshfield Clinic is considering integration of a workflow technology within their electronic health record system to enable user friendly creation and customization of numerous EHR features. **Methods:** We have evaluated the suitability of a commercially available workflow editor and engine for modeling clinical processes. The evaluated editor was used to model several sample processes (e.g., osteoporosis QI process and laboratory monitoring processes). Robustness of the features was evaluated with three target users in mind: programmer, designated workflow process engineer, and champion clinician. Compliance with the XPDL standard (XML process definition language) was also evaluated. Modeled sample processes were then loaded into the tested workflow engine and support for process deployment and execution was evaluated (specifically ability to interface with external databases, web services and legacy systems). We have also briefly evaluated modules for process analysis and discovery (ability to mine process definition from existing healthcare event logs. **Results:** We have successfully installed both the workflow editor and engine of a chosen commercial WT Vendor and were able to execute several example processes. The installation of the engine required some assistance from the vendor. The evaluated workflow editor did not provide a separate perspective for a non-expert in WT (e.g., champion clinician) and lacked several graphical and modeling features. The tested editor did use XPDL as the underlying standard, however make heavy use of external attributes which is a special part of the standard for vendor specific features. Deployment of interfacing processes required repeated assistance from the vendor and a few duplicate steps in the editor and the workflow engine. **Conclusion:** Marshfield Clinic is one of the very few healthcare institutions pioneering the integration of workflow technology with an EHR system. Our results were shared with the vendor and further collaboration talks are planned.

PS1-25:

Patient Outcomes in Systemic Lupus Erythematosus: A Collaborative Study Fostered by a New CTSA-based Partnership

Robert T Greenlee, PhD, MPH, *Epidemiology Research Center, Marshfield Clinic Research Foundation*; Christie Bartels, MD, *University of Wisconsin School of Medicine and Public Health*; Kevin Buhr, PhD, *University of Wisconsin School of Medicine and Public Health*

Introduction: This project catalyzes a strategic partnership between Marshfield Clinic Research Foundation (MCRF) and the University of Wisconsin (UW), supported by an NIH Clinical and Translational Science Award (CTSA), to explore outcomes of systemic lupus erythematosus (SLE) in a community setting. The study pairs pilot funding and study staff from MCRF with a KL2 scholar/rheumatologist from the UW Institute for Clinical and Translational Research (ICTR). The project also uses ICTR-supported core resources at MCRF (Marshfield Epidemiologic Study Area [MESA]) and at UW (biostatistical support). **Background:** Survival among SLE patients has improved in recent decades, although studies continue to demonstrate excess mortality and cardiovascular disease. Whereas typical SLE studies represent urban tertiary referral populations, this study explores a community base, where the presence and extent of any mortality or cardiovascular excess is not clearly established. A past study described the spectrum of SLE in MESA from 19912001, finding cases were older, were less predominantly female, and had milder disease than in published reports from tertiary referral centers. **Methods:** Incident cases from 2002–2007 in this rural, population-based cohort are being ascertained and validated using the same American College of Rheumatology diagnostic criteria as the previous study. All incident cases 1991–2007 are being followed longitudinally to examine rates of all-cause and cardiovascular mortality, and of non-fatal cardiovascular events including MI, stroke, or heart failure hospitalization. Outcomes are to be compared with a matched set of MESA cohort members without SLE. **Results/Conclusions:** Automated data queries identified 167 new potential cases of SLE. After applying proportions of invalidation and non-incidence from the previous study, we estimate there will be an additional 31 incident cases from 2002–2007 to join the 44 cases previously identified. This represents one of only two rural US-based SLE cohorts with reported mortality outcomes. We anticipate that study results will support future funded research opportunities to ultimately inform evidence-based prevention strategies for SLE patients in real-world community practice.

PS1-32:

Doctor's Role in Their Patient's Healing: Practices of the Highest Performing Physicians by Patient Survey

Elizabeth Sutherland, ND, *National College of Natural Medicine, Portland*; Nancy Vuckovic, PhD, *Intel Corporation, Portland*; John Hsu, MD, *Division of Research, Kaiser Permanente, Oakland*; Karen Tallman, PhD, *The Permanente Federation, Oakland*; Richard Frankel, PhD, *University of Indiana School of Medicine*; Terry Stein, MD, *The Permanente Medical Group, Oakland*; Sue Hee Sung, MS, *Division of Research, Kaiser Permanente, Oakland*

Background: The MD Patient Communication Study aims were to improve the best practice communication behaviors of physicians during outpatient clinic visits and to collect physician perspectives of communication behaviors. Researchers have consistently found the top predictors of overall patient satisfaction are quality of the physician-patient relationship and contributing communications. There is limited understanding however, of the range of specific behaviors in the interaction associated with positive and negative patient perceptions and reactions. **Methods:** In phase 1, we conducted a naturalistic, observational study of 55 Kaiser Permanente Primary Care physician-patient visits using videotape recordings, and incorporating patient and physician reactions to the tape. The physicians, who practiced in Los Angeles and Honolulu, spanned the three strata of high, medium, and low historical patient satisfaction scores. In phase 2, a standardized six-question set was posed in semi-structured, 60-minute interviews to 77 of the highest-performing physicians on this patient survey, including 20 of the highest performers (top 5%) from the LA and Honolulu groups and 42 and 15, respectively, of the highest performing physicians in Portland and Oakland. These interviews were audio taped with permission, transcribed and coded for patterns. **Results:** This abstract addresses the 4th question: What role do you feel you play in your patients' healing? Do you think you, as a doctor, contribute to your patients' healing through non-technical, non-physical, or non-scientific ways? All physicians agreed but varied in their role. Representative quotes: Giving people the confidence to go through something. People feel better coming in and seeing/talking to you. People realizing they have the power to heal themselves their involvement is essential. Our relationship: Interpersonal connection is so powerful. The art of medicine is the art of healing. These narratives provide deep, coherent learning about physicians' role in healing: relationship, education, empowerment, emotion, personal connection, hope. **Conclusions:** With primary care in crisis nationally, and specialists increasingly procedure-focused, understanding physicians' role in patients' healing, especially as it creates high patient satisfaction, is of great importance to sustaining the highest quality medical care and service.

Diabetes

C-B4-01:

Educator Experience with Group Interactive Dialogue to Educate and Activate (IDEA) Using Conversation Maps

JoAnn M Sperl-Hillen, MD, *HealthPartners Research Foundation*; Sarah J Beaton, PhD, *Lovelace Clinic Foundation*; Omar Fernandes, MPH, *HealthPartners Research Foundation*; Ann Von Worley, RN, CCRP, *Lovelace Clinic Foundation*; Ann M Hanson, BS, *HealthPartners Research Foundation*; Dorothy Baumer, MS, *Lovelace Clinic Foundation*; Jodi M Lavin-Tompkins, RN, CNP, CDE, *HealthPartners Research Foundation*

Aims: In order to improve self- efficacy and clinical outcomes for people with diabetes, new approaches using more interactive methods of group education are being promoted. We report results of an educator evaluation of IDEA to assist others who may be interested in starting similar groups in their care settings. **Methods:** A qualitative analysis was conducted as part of an ongoing randomized trial comparing two different educational interventions (Group IDEA and Individual Education) to Usual Care. As part of the study, educators at HealthPartners clinics in Minneapolis, MN and ABQ Health Partners in Albuquerque, NM were trained on how to use Conversation Maps (CM). All educators completed a Likert scale questionnaire after each CM session with responses from 1-10 (10 being the best). An open- ended evaluation form was also used to solicit positive and negative opinions about the sessions. **Analysis:** The data consisted of 48 nurse and dietitian evaluations from two sites. The mean Likert scores of the educational experience were calculated and compared for each site and for each of the four CM topics (general information, monitoring, nutrition, and complications). All eight research team members also reviewed answers to the open-ended questions and group consensus was used to describe positive and negative themes. **Results:** Educator rated Likert scores of map sessions were excellent (mean scores for Maps 1, 2, 3, 4: Overall success 8.3, 7.6, 7.7, 8.8; Ease and comfort levels in facilitation 8.9, 8.9, 9.2, 9.5; Patient motivation to self-manage 7.7, 6.9, 8, 8.8). Scores did not differ significantly across sites or between maps. Positive comments on the maps outweighed the negatives. The challenges identified were: (1) Disruptive (especially angry or negative) people; (2) Distracting topics raised by patients and late arrivals; (3) Variable reading levels among patients (too hard or too easy); and (4) Not enough time to cover the content (especially nutrition). **Conclusions:** The IDEA method was perceived positively by educators due to its ability to promote patient interaction, sharing, and meaningful discussion. To be successful, however, educators need tips and practice on handling disruptive patients, distractions, variance in literacy, and covering intended nutritional content in a group context.

C-B4-02:

Effect of Point-of-Care A1c Testing in Primary Care Clinics on Diabetes Medication Intensification

Karen L Margolis, MD, MPH, *HealthPartners Research Foundation*; A Lauren Crain, PhD, *HealthPartners Research Foundation*; William A Rush, PhD, *HealthPartners Research Foundation*; Gerald H Amundson, BS, *HealthPartners Research Foundation*; Tessa J Kerby, BA, *HealthPartners Research Foundation*; Anne D Murray, MPH, *HealthPartners*

Background: A1c results are often not available until after the outpatient visit is completed. Despite the potential for rapid point- of- care (POC) A1c testing to improve the process of diabetes care, published results have not conclusively shown a link to improved diabetes care in primary care settings. **Methods:** All HealthPartners Medical Group primary care clinics use protocols for nurses to remind patients with diabetes to have A1c tested before upcoming medical appointments. In June 2007, one clinic began POC A1c testing for all diabetic patients who did not have an A1c in the previous six months or if the most recent A1c was more than 1 month ago and >7%. Using generalized linear mixed model regression, we compared diabetes medication intensification at encounters with diabetes patients in the pre testing period (PRE, 6/1/06 5/31/07, 22932 encounters) and post testing period (POST, 6/1/07 5/31/08, 27056 encounters) at the intervention clinic and five comparison clinics with no POC A1c testing capability. **Results:** The analysis included 3261 patients (mean age 57, 29% minority, median encounters 8/year) seen by 42 primary care physicians (PCP). The median A1c PRE was 7.2% at the intervention clinic, 6.9% at comparison clinics. At intervention clinic encounters, mean days since A1c testing fell from 72 to 44 (with 60% of POST encounters preceded by an A1c less than 1 month old), while there was no change PRE to POST at the comparison clinics. Medication was intensified at 16.3% of PRE encounters with the PCP when A1c was >7% at the intervention clinic, compared to 15.6% at the comparison clinics. Medication was intensified at 12.8% of POST encounters with the PCP when A1c was >7% at the intervention clinic, compared to 12.6% at the comparison clinics (P=0.92). Medication intensification also did not differ at other types of encounters (A1c <7%, not with PCP). **Conclusions:** These results add to previous research by examining a mediating step between POC A1c testing and improved glycemic control. Despite more recent A1c test results, medication intensification was not greater in the primary care clinic using POC A1c testing.

C-B4-03:

EMR-based Clinical Decision Support System Improved Glucose and Blood Pressure Control in Adults With Diabetes

Patrick J O'Connor, MD, MPH, *HealthPartners Research Foundation*; JoAnn M Sperl-Hillen, MD, *HealthPartners Research Foundation*; William A Rush, PhD, *HealthPartners Research Foundation*; Paul E Johnson, PhD, *Carlson School of Management, University of Minnesota*; Jerry H Amundson, BS, *HealthPartners Research Foundation*; Stephen E Asche, MA, *HealthPartners Research Foundation*; Heidi L Ekstrom, MA, *HealthPartners Research Foundation*

Context: Medical groups have invested billions of dollars in outpatient Electronic Medical Records (EMR), but few studies demonstrate a positive impact of EMR-based clinical decision support on clinically important patient outcomes. **Objectives:** To assess the impact of an EMR-based diabetes clinical decision support system on control of glycated hemoglobin (A1c), blood pressure (BP) and LDL Cholesterol (LDL) in adults with diabetes. **Design, Setting, and Participants:** The study was conducted from October 2006 to May 2007 in Minnesota. Eleven clinics with 41 consenting primary care physicians (PCP) and these physicians' 2556 diabetes patients were randomized either to receive or not to receive an EMR-based clinical decision support system designed to improve A1c, BP, and LDL in diabetes patients not at recommended clinical goals at the time of an office visit. **Main Outcome Measures:** Post-intervention levels of A1c, BP, and LDL controlling for pre-intervention levels. **Results:** Intervention group PCPs used the EMR-based decision support system at over 62.6% of all diabetes patient visits, and intensified drug therapy at 61.9%, 43.6% and 18.8% of visits with uncontrolled A1c, BP, and lipids, respectively. Intervention group diabetes patients had significantly better A1c (*P*=.014) and SBP (*P*=.035) but not LDL (*P*=.63) relative to patients of PCPs randomized to the control arm of the study based on general linear mixed models with a repeated time measurement to control for clustering. Additional analytic models that adjusted for patient age, gender, and co-morbidity showed similar results. Ninety-four percent of PCPs expressed satisfaction with the intervention, and moderate rates of use persisted for over a year after withdrawal of feedback and incentives to encourage use. **Conclusions:** An EMR-based diabetes clinical decision support significantly improved glucose control and BP control in adults with type 2 diabetes who were not at recommended clinical goals.

C-B4-04:

Personalized Physician Learning Intervention Improved Glucose Control in Adults With Diabetes

JoAnn M Sperl-Hillen, MD, *HealthPartners Research Foundation*; Patrick J O'Connor, MD, MPH, *HealthPartners Research Foundation*; William A Rush, PhD, *HealthPartners Research Foundation*; Paul E Johnson, PhD, *Carlson School of Management, University of Minnesota*; George Biltz, MD, *Carlson School of Management, University of Minnesota*; Stephen E Asche, MA, *HealthPartners Research Foundation*; Heidi L Ekstrom, MA, *HealthPartners Research Foundation*

Context: Personalization of learning interventions using opinion leaders improves care but is expensive. Automated methods to deliver personalized learning interventions to physicians have not been widely studied or rigorously evaluated. **Objectives:** To assess the impact of a computer-based personalized learning intervention for primary care physicians designed to improve control of glycated hemoglobin (A1c), blood pressure (BP) and LDL Cholesterol (LDL) in adults with type 2 diabetes. **Design, Setting, and Participants:** The randomized trial was conducted from October 2006 to May 2007 in Minnesota. Eleven clinics with 40 consenting primary care physicians (PCP) were randomized either to receive or not to receive a simulated personalized learning intervention designed to improve A1c, BP, and LDL in actual diabetes patients not at recommended clinical goals. **Main Outcome Measures:** Post-intervention levels of A1c, BP, and LDL controlling for pre-intervention levels and nesting of data. **Results:** Patients of intervention group PCPs had significantly better A1c (*P*=.044), SBP (*P*=.018), and DBP (*P*=.001), but not LDL relative to patients of PCPs randomized to the control arm of the study based on general linear mixed models with a repeated time measurement to control for clustering. Additional analytic models that adjusted for patient age, gender, and co-morbidity showed similar results. Nearly all PCPs were very satisfied with the intervention, which most completed in fewer than three hours in split sessions over one to two days. **Conclusions:** An inexpensive simulated personalized physician learning intervention for primary care physicians significantly improved glucose and BP control in adults with type 2 diabetes who were not at recommended clinical goals.

PS2-19:

Validation of Self-Reported Diabetes From the Women's Health Initiative (WHI) Clinical Trials

Jody Jackson, RN, BSN, *HealthPartners Research Foundation*; Karen L Margolis, MD, MPH, *HealthPartners Research Foundation*; Terese A DeFor, MS, *Health Partners Research Foundation*; Feifei Wei, PhD, *HealthPartners Research Foundation*; Cora E Lewis, MD, *University of Alabama of Birmington*; Mara Vitolins, DrPH, *Wake Forest University School of Medicine*; Denise E Bonds, MD, MPH, *University of Virginia, Department of Public Health Sciences and Medicine*; Evelyn Whitlock, MD, *Kaiser Foundation Research Institute*

Background: The Women's Health Initiative (WHI) clinical trials offer a wealth of data on patient outcomes including cancer, coronary heart disease, and hip fracture, which were confirmed via medical record review. Diabetes was self-reported, but was not validated by independent review. The literature shows wide variations on the validity of self-reported diabetes in diverse populations. **Aims:** To compare the rates of positive and negative predictive values of self-reports of incident and prevalent diabetes during the WHI trials. **Methods:** At four WHI field centers (Minneapolis MN, Winston-Salem NC, Birmingham AL, Portland OR), all WHI trial participants with a self-report of diabetes at baseline or follow-up were identified. A random sample of participants who did not self-report diabetes was also identified. Women were surveyed regarding details of their diagnosis and treatment of diabetes. Medical records were obtained and reviewed for consenting subjects using a standardized protocol based on documented treatment with anti-diabetic medications, or physician diagnosis of diabetes supported by laboratory measurements of glucose. **Results:** A total of 1280 eligible subjects were available across the four sites. To date, subject information from the Minneapolis field center has been collected and analyzed. Of the 295 eligible subjects contacted at the Minneapolis site, 227 (77%) consented to participate and provided survey data. Medical records were obtained for 224 (57 prevalent, 81 incident, and 86 no self-reported diabetes). Medical records confirmed 84% (95% CI 74%–94%) of self-reported prevalent diabetes and 85% (95% CI 74%–94%) of self-reported incident diabetes. Among those who never self-reported diabetes there was no medical record evidence for diabetes in 99% (95% CI 92% to 100%). Results from all four sites will be presented. **Conclusions:** Preliminary data suggest a high positive predictive value of both prevalent (84%) and incident self-report of diabetes (85%) from WHI and a low false negative rate of about 1%. These results indicate that self-reports of diabetes may be sufficiently accurate for use in epidemiologic studies.

PS2-20:

Racial Disparities in A1c Change and Medication Intensification

William A Rush, PhD, *HealthPartners Research Foundation*; A Lauren Crain, PhD, *HealthPartners Research Foundation*; Gerald H Amundson, BS, *HealthPartners Research Foundation*; Tessa J Kerby, BA, *HealthPartners Research Foundation*; Anne D Murray MPH, *HealthPartners Research Foundation*; Karen L Margolis, MD, MPH, *HealthPartners Research Foundation*

Introduction: While it is well documented that disparities exist across racial groups of diabetes patients relative to glucose control, the underlying causative factors are not well understood. The purpose of this study was to examine differences in physician orders for adjustments of glucose control medications in diabetes patients between African Americans and Caucasians. **Methods:** A cohort of 434 African American and 1,471 Caucasian diabetes patients was followed for a period of 18 months from 6/1/2006 through 11/30/2007. All patients were being treated in one of 6 primary care clinics within a large mid-western medical group. First and last A1c values were collected during the study period and an A1c change score was calculated. Patients were also classified as to whether English was their primary

language and whether they were on medical assistance at any time during the study period. The presence of a medication adjustment was tracked for metformin, thiazolidinediones, sulfonylureas (initiation or titration) and insulins (initiation only). Medication adjustment data was from the prescribing data in the medical record and thus represents physician actions. **Results:** There was a significant difference between African Americans and Caucasians on their initial A1c values (8.2% vs 7.3%; *P*<0.0001). Adjusted for the initial A1c, mean number of visits was similar between the two groups (16.9 vs. 15.8, *P*=.50). When change in A1c was calculated while controlling for initial A1c African Americans had less than half the decline found in Caucasians (.20% vs .45%; *P*=0.0009). English as a primary language (*P*=.81) and medical assistance (*P*=.81) status were not related to the disparity in change value. Examination of medication adjustment for African Americans relative to Caucasians found that they were less likely to have adjustments of metformin (OR .69; *P*=.0021) and TZDs (OR .65; *P*=.0122) but no differences were found for Sulfonylureas (*P*=.49) or insulins (*P*=.30). **Conclusions:** This study suggests that part of the racial disparity in glucose control is related to physician orders for medication intensification. This indicates a need for better understanding of the reasons for medication adjustment disparities and effective interventions to reduce them.

PS2-22:

Disease Management Strategies to Optimize Cardiovascular Risk in Type 2 Diabetes Mellitus

Patrick J O'Connor, MD, MPH, *HealthPartners Research Foundation*; JoAnn M Sperl-Hillen, MD, *HealthPartners Research Foundation*; Thomas E Kottke, MD, *HealthPartners Research Foundation*

Abstract: A number of disease management strategies have been developed in the last decade to reduce cardiovascular (CV) risk in adults with type 2 diabetes. On average such programs improve glycated hemoglobin (A1c) only 0.5%, and often have little or no effect on blood pressure (BP) control or low-density lipoprotein (LDL) control, which are critically important CV risk factors. In a large randomized Medicare demonstration program, diabetes disease management programs were unable to recover fees through cost savings to the Centers for Medicare and Medicaid Service (CMS). Available data suggest several strategies to improve the effectiveness and reduce the cost of diabetes disease management: (a) integrate disease management operationally and fiscally with primary care, (b) focus on treatment intensification, (c) focus on BP, LDL, aspirin use, and smoking cessation, as well as glucose control, and (d) individualize patient goals based on potential CV risk reduction potential and patient preference to maximize clinical benefit and return on investment for each patient.

PS2-30:

Study Recruitment Challenges for a Clinical Trial of Diabetes Education Interventions

Ann Von Worley, RN, CCRP, *Lovelace Clinic Foundation*; Dorothy Baumer, MS, *Lovelace Clinic Foundation*; Omar D Fernandes, MPH, *HealthPartners Research Foundation*; Ann M Hanson, BS, *HealthPartners Research Foundation*; Sarah J Beaton, PhD, *Lovelace Clinic Foundation*; and JoAnn Sperl-Hillen, MD, *HealthPartners Research Foundation*

Background: While a scientifically sound study design is the basis for all clinical trials, activities such as patient recruitment present ongoing challenges. The availability of electronic data greatly enhances recruitment efforts, but also may bring new problems. The Journey for Control of Diabetes: the IDEA Study, a randomized clinical study conducted in two distant healthcare settings, utilizes an advanced electronic data system to identify and recruit eligible participants. We believe that communication of difficulties encountered could help researchers who face similar recruitment challenges. **Methods:** The inclusion criteria included: Type 2 diabetes (DM), an A1C > 7 within 6 months of enrollment, and diabetes educationnaïve within the last year. Preliminary estimates of patient availability were calculated with the following assumptions: 1) two ICD-9 codes for Type 2 DM (10,000 patients); 2) 52% with A1C > 7 (5,200); 3) 60% with no DM education in the last 12 years (3,120); 4) 15% excluded with Type 1 or gestational DM (2,652); and 5) 15% willing to participate (397). Recruitment of 311 subjects was estimated to take five months. **Results:** Recruitment has been much slower than predicted (50% of subjects recruited at seven months). Recruitment results to date are: 1) 3,706 individuals identified as eligible using electronic data; 2) 156 enrolled; 3) 1,921 (50.4%) individuals not interested, 4) recent DM education (8.3%), and 5) Type 1 DM (2.1%). The electronic data on the pool of potential subjects is often out of date by the time the subject is screened and randomized. Refreshing the electronic data creates a moving target of potential candidates. A1C data and date of last diabetes education change at a rate faster than the recruitment mailing, screening and randomization process. Therefore, more time, programming, and staffing resources have been needed than originally anticipated to recruit study participants. **Conclusions:** This analysis of recruitment data demonstrates that initial recruitment capability estimates did not account for the inefficiencies created by outdated data and refreshed electronic encounter data. Daily tracking of all criteria for database accuracy has been a difficult and time-intensive task.

Genetics

C-B3-01:

Variation in Seven Obesity-Related Genes and Risk of Postmenopausal Breast Cancer

Heather S Feigelson, PhD, MPH, *Kaiser Permanente Colorado*; Lauren R Teras, MS, *American Cancer Society*; W Ryan Diver, MS, *American Cancer Society*; Weining Tang, PhD, *Emory University*; Alpa V Patel, PhD, *American Cancer Society*; Eugenia E Calle, PhD, *American Cancer Society*; Mark Bouzyk, PhD, *Emory University*

Background/Aims: Obesity has been consistently associated with postmenopausal breast cancer risk. Proteins secreted by adipose tissue or involved in regulating obesity may play a role in breast tumor development. We conducted a nested case- control study among white, postmenopausal women from the American Cancer Society Cancer Prevention Study II (CPS -II) Nutrition Cohort to determine whether genes associated with obesity increase risk of breast cancer. **Methods:** Tagging single nucleotide polymorphisms (tagSNPs) were selected to capture common variation across seven candidate genes that encode adipose- related proteins: ADRB2, ADRB3, GHRL, HSD11B1, IRS1, IRS2, SHC1. Thirty-nine SNPs were genotyped in 648 cases and 659 controls. Logistic regression models and haplotype analysis were used to examine the association between each tagSNP and risk of breast cancer while adjusting for matching factors and potential confounders. We also examined whether these SNPs were associated with measures of adult adiposity. **Results:** Two of five tagSNPs in HSD11B1 were associated with breast cancer (rs11807619, *P*=0.006; rs932335, *P*=0.0002). The rs932335 C allele was associated with a nearly two-fold increased risk of breast cancer (OR=1.83; 95% CI: 1.01–3.33 for C/C versus G/G). The rs11807619 and rs932335 were highly correlated (r2=0.74), and when modeled as a haplotype, only haplotypes containing the rs932335 C allele were associated with breast cancer. Three of the eleven SNPs for IRS2 were associated with breast cancer (rs4773082, *P*=0.007; rs2289046, *P*=0.016; rs754204, *P*=0.03). When these 3 SNPs were examined as a haplotype, only the haplotype that included the G allele of rs2289046 was associated with breast cancer (OR=0.74, 95% CI: 0.62–0.90 for TGC compared to CAT). IRS2 rs2289046 and rs754204 were also associated with adult weight gain. None of the other SNPs in any gene investigated were associated with breast cancer or adiposity. **Conclusions:** Our results suggest that these tagSNPs in HSD11B1 and IRS2 mark regions of the genome that may harbor risk alleles for breast cancer, and these associations are likely independent of adiposity.

C-B3-02:

Association of FTO, INSIG2, MC4R, and PCSK1 Obesity SNPs With Binge Eating in Morbidly Obese Patients

Glenn S Gerhard, MD, *Weis Center for Research*; Christopher D Still, DO, *Geisinger Health System*; G Craig Wood, MS, *Geisinger Center for Health Research*; Xin Chu, PhD, *Weis Center for Research*; Robert Erdman, BS, *Weis Center for Research*; Meghan Susek, *Weis Center for Research*; Heather Gerst, DO, *Geisinger Health System*; Kim Derr, BS, *Weis Center for Research*; Mouna AlAgha, MD, *Weis Center for Research*; Christina Hartman, BS, *Geisinger Health System*; David Carey, PhD, *Weis Center for Research*; Peter Benotti, MD, *Geisinger Health System*

Background/Aims: Obesity has a strong genetic component. Recent genome-wide association studies have identified single nucleotide polymorphisms (SNPs) in or near over a dozen genes that are related to body mass index (BMI). Despite the association of these SNPs with BMI, the mechanism by which they influence the determination of body weight is not yet known. Recently, the fat- mass and obesity-associated (FTO) obesity SNP was related to energy intake and preference for foods of high caloric density in children. FTO genotype was not associated with resting energy expenditure. We have extended this type of analysis to eating behaviors in the morbidly obese. **Methods:** DNA was obtained from approximately 900 morbidly obese (BMI>40 kg/m^2) patients and used to genotype obesity SNPs in or near the FTO, INSIG2, MC4R, and PCSK1 genes. Binge eating status (normal, episodic overeating, or any binge eating) was determined using the validated Questionnaire on Eating and Weight Patterns (QEWP). Binge eating status was correlated with each individual genotype, the combined obesity allele burden, and the combined homozygous obesity gene burden. **Results:** Binge eating data was obtained from 640 patients who had completed the QEWP. Of these 640, 116 (18%) were classified as manifesting binge eating behavior. No association was present between heterozygous or homozygous FTO (P=0.59), MC4R (P=0.30), or PSK1 (P=0.77) obesity SNPs. However, 29% of those who were homozygous for the INSIG2 obesity SNP were classified as binge eaters, versus 17% of heterozygous or homozygous normal patients (P=0.006). Association was also found with binge eating status and the presence of 2 or more homozygous obesity genotypes (28% versus 17%, P=0.041), likely due to the INSIG2 gene. Cumulative obesity allele burden (0–8 alleles for the 4 genes) was not associated with binge eating status (P=0.42). **Conclusions:** The INSIG2 obesity SNP appears to influence binge eating behavior in morbidly obese adults. The FTO obesity SNP appears to influence eating behavior in children suggesting that different genes may influence obesity at different ages. For both genes, excess caloric intake appears to be the major mechanism influencing BMI. How other obesity genes influence body weight regulation has not yet been determined.

C-B3-03:

Association of Epidemiologic and Genetic Factors With Abdominal Aortic Aneurysm (AAA)

Diane T Smelser, PhD, *Geisinger Center for Health Research*; Alicia Golden, BS, *Geisinger Health System*; Katherine Masker, BS, *Geisinger Health System*; James R Elmore, MD, *Geisinger Health System*; David J Carey, PhD, *Weis Center for Research*

Background: Abdominal Aortic Aneurysm (AAA) rupture is the thirteenth leading cause of death in the U.S. and a major cause of death in the elderly. Since most AAAs are asymptomatic, mortality could be greatly reduced by determining which patients are at risk, then screening those patients prior to a rupture. Our aim was to determine which clinical and genetic risk factors are associated with AAA. **Methods:** This was a case- control study of patients from the Geisinger Vascular Clinic and the Geisinger MyCode Project (a biobanking project of Geisinger Clinic patients who volunteered to participate in genetic research projects). Clinical and environmental risk factor data was obtained from patient electronic medical records (EMR) and analyzed by multivariate logistic regression. In a subset of participants, we also analyzed three promising genetic polymorphisms, two from a prior genome-wide association study in this population (rs12039875, 1q41; rs7635818, 3p12.3) and one from the recent literature (rs10757278, 9p21). The genetic data was combined with the clinical data using multivariate logistic regression. **Results:** In the clinical analysis the number of Vascular Clinic and MyCode AAA cases totaled 722, with 11,761 controls. Adjusted OR showed a significant AAA risk for age, gender, smoking, intermittent claudication and peripheral artery disease, while body mass index (BMI) and diabetes were surprisingly protective. The genetic analysis consisted of 502 AAA cases and 295 controls from the Vascular Clinic. The GC genotype of rs7635818 showed an increased risk, but the rs12039875 AA genotype showed a significant protective effect when controlling for the clinical variables. This SNP is located in KCNK2, a gene in the potassium channel protein family. Although this gene has not previously been linked with AAA, our laboratory showed that this gene is expressed in vascular tissue. **Conclusions:** Our study indicates a significant elevated risk of AAA for individuals who are older, male, ever smoked, have peripheral artery disease and a GC genotype of rs7635818. Higher BMI, diabetes and the AA genotype of rs12039875 in the KCNK2 gene significantly lower AAA risk. This is one of the first studies to utilize the MyCode population in a research study and establish this population source as a valuable and convenient asset of Geisinger Health System for clinical research.

C-B3-04:

Media Analysis of Genetic Testing Information for Common Disease Presented to the Public

Alanna Kulchak Rahm, MS, *Kaiser Permanente Colorado*

Background/Aims: With the advent of personalized medicine, consumers are routinely exposed to information and direct- to- consumer (DTC) advertising of various genetic tests. Specifically, 2007–2008 saw a return of the DTC advertisement for BRACAnalysis® in the eastern US, and the advent of three new companies offering DTC genetic screening for under $1000. This abstract presents the results of a media analysis for information presented to the general public on genetic testing for common diseases, such as cancer or heart disease, or for full genome scans for disease risk in general. **Methods:** Lexis Nexis search was conducted using the broad term genetic testing. The search was limited to all major world publications, news wire services, TV and radio transcripts, blogs, and web publications between the dates of September 1, 2007 and September 30, 2008. The purpose was to assess information presented to the lay public; therefore, scientific literature was not searched. These media reports were examined for number of reports, report type (print, television, online), target audience, polarity of information (positive for genetic testing or negative against genetic testing), and test type. **Results:** One- thousand articles were retrieved from the initial search. Immediately excluded were articles about ancestry testing, diagnostic testing, psychiatric testing, food safety, forensic testing, cloning, and pre-marital genetic testing due to ethnicity or consanguinity. Additional exclusions were made for all areas surrounding prenatal genetic testing, including pre-implantation diagnosis and paternity testing. Stock announcements, hearing testimonies, and reports on non-U.S. companies or from non-U.S. sources were also excluded. This resulted in a total of 173 media reports over the one year time period to which the lay public was exposed. These 173 reports were analyzed further for specific information presented. **Conclusions:** Over a one year period, consumers are routinely exposed to information about genetics through the media. These reports span all methods of media delivery and vary in polarity.

PS2-08:

Development and Implementation of a Genetic Fingerprinting Assay for the Personalized Medicine Research Project

Deanna S Cross, PhD, *Marshfield Clinic Research Foundation*; Lynn C Ivacic, *Marshfield Clinic Research Foundation*; Elisha L Stefanski, *Marshfield Clinic Research Foundation*; Catherine McCarty, PhD MPH, *Marshfield Clinic Research Foundation*

Background: For any biorepository, it is necessary to develop measures that determine sample quality and ensure each sample can be correctly identified. One method of devising this type of quality control measure is to rely on DNA polymorphism panels developed for forensic applications. Although valid for identification, these panels are not useful for other purposes, such as medical research. **Aims:** We developed an identification panel for the Personalized Medicine Research Project (PMRP) that uses medically relevant polymorphisms. This panel not only uniquely identifies samples and tests for sample quality but can also be used by investigators for candidate gene studies. **Methods:** Polymorphism candidates were taken from investigator

requests, PharmGKB (www.pharmgkb.org) and the disease association database (http://geneticassociationdb.nih.gov/). To be considered, a polymorphism had to be associated with disease in two independent populations and it had to have a reported minor allele frequency in a Caucasian population of at least 0.20. The final assay was developed on the Sequenom platform and all individuals within the PMRP cohort were analyzed. Probability of identity for the panel was calculated and each polymorphism was tested for Hardy Weinberg equilibrium. The allele frequencies found in our population of 20,000 were compared to reported allele frequencies. The allele frequencies in the PMRP population were compared between males and females and between different age categories. **Results:** From a list of 116 potential polymorphisms we developed a single assay of 36 medically relevant somatic polymorphisms with at least one polymorphism on each chromosome and a single sex marker. The probability of identity for the assay was 6.132×10^{-15} and the sibling probability of identity was 3.077×10^{-8}. Three polymorphisms differed from previously reported allele frequencies by more than 10%. In our population, four polymorphisms were different in males and females and four polymorphisms varied in allele frequencies between age groups. Furthermore, the chosen polymorphisms have been used in two studies and as preliminary data in several other studies. **Conclusions:** We were able to create a DNA panel of 36 medically relevant polymorphisms that successfully tested DNA quality, increased the knowledge of population wide allele frequencies, and is useful to investigators for candidate gene studies.

PS2-13:

Genetic and Environmental Risk Factors for Prescription Opioid Dependence in the Healthcare Setting

Joseph A Boscarino, PhD, MPH, *Geisinger Center for Heath Research*; Stuart N Hoffman, DO, *Department of Neurology, Geisinger Health System*; Glenn Gerhard, MD, *Weis Center, Geisinger Health System*; John Han, MD, MS, *Pain Management Center, Geisinger Health System*; Margaret Rukstalis, MD, *Geisinger Center for Health Research*; Porat M Erlich, PhD, *Geisinger Center for Health Research*; Walter F Stewart, PhD, MPH, *Geisinger Center for Health Research*

Background: Research on the genetics of opioid addiction among illicit drug users is difficult given challenges to case ascertainment and selection of an appropriate control group. To address this limitation, we tested a model by studying prescription opioid users. **Methods:** We undertook a case-control, candidate-gene study of opioid-dependent users and nondependent users among Geisinger Clinic outpatients. Electronic health record (EHR) data were reviewed for patients who were prescribed opioids. Patients were selected for a phone interview if they had five or more prescription orders for opioids in the prior 12 months for non-cancer pain. Cases were identified based on the Diagnostic and Statistical Manual of Mental Disorder, Version IV (DSM-IV) criteria for opioid dependence. A modified Composite International Diagnostic Interview (CIDI) was used to obtain data on dependence status and history. Data were also gathered on detailed drug, psychological, and environmental exposures. Altogether, 703 patients completed the CIDI; 512 of these patients (73%) provided DNA for genotyping and completed the NEO Five-factor Personality Inventory. **Findings:** Altogether 37.4% (95% CI = 33.8–41.1) of patients met DSM-IV criteria for lifetime opioid dependence and 30.7% (95% CI = 27.3–34.3) met criteria for current dependence. Significant predictors of opioid dependence included younger age, unemployment, psychotropic medication use, as well as history of PTSD, anxiety, depression, alcohol abuse, anti-social personality, illicit drug use, trauma exposure, and substance abuse treatment (all *P*-values < 0.001). Preliminary Genetic analyses suggested that opioid dependence was associated with dopamine receptors D2 and D3 and the COMT genes. Gene by environment (G x E) interactions were also detected related to opioid dependence and exposure to mental trauma. **Conclusion:** The prevalence of drug dependence is high among pain patients on long-term opioid therapy in the outpatient setting. This disorder is associated with a history of other mental health conditions, employment status, psychotropic medication use, illicit drug use, and exposure to mental trauma. Genetic analyses suggested associations with genes related to neurocognitive processes associated with impulse control and reward regulation. Several G x E interactions were also detected.

Health Economics

C-C2-01:

Financial Assessment of a Comprehensive Cardiac Care Program for Patients With Occlusive Coronary Artery Disease

Thomas Delate, PhD, MS, *Kaiser Permanente Colorado*; Kari Olson, PharmD, BCPS, *Kaiser Permanente Colorado*; Jon Rasmussen, PharmD, BCPS, *Kaiser Permanente Colorado*; Kara Hutka, PharmD, BCPS, *Kaiser Permanente Colorado*; Brian Sandhoff, PharmD, BCPS, *Kaiser Permanente Colorado*; Roseanne Hornak, PharmD, BCPS, *Kaiser Permanente Colorado*; John Merenich, MD, *Kaiser Permanente Colorado*

Background: While early and aggressive comprehensive cardiac care (CCC) programs in patients with coronary artery disease (CAD) have been associated with improvements in clinical outcomes, information on the financial outcomes of such programs are limited. The purpose of this investigation was to assess the financial impact of a CCC program on total healthcare expenditures after an initial coronary event. **Methods:** This was a matched, retrospective cohort analysis of the Kaiser Permanente Colorado (KPCO), a group model HMO, nurseand pharmacist-managed CCC program that was designed to provide evidence-based lifestyle and medication support at the earliest opportunity after a coronary event. Patients with an incident occlusive CAD event between January 1999 and June 2004 were categorized into intervention and comparator groups, respectively, by enrollment or never enrollment (No CCC) into the CCC. Patients were matched 1:1 on chronic disease score (CDS) and 180-day pre-coronary event (baseline) total healthcare expenditures. Pharmacy and medical utilization events were extracted from electronic administrative and claims databases. Utilization events were collected after the initial coronary event until death, health plan termination, three years, or December 31, 2005, whichever came first (follow up). Expenditure estimates from the KPCO Decision Support System (in 2007 dollars) were applied to utilization events. An intervention cost of $1/follow-up-day was applied to all CCC patients. Expenditures/day were modeled with adjustment for matching variables, patient characteristics, baseline expenditures, and intra-correlations of matched patients. **Results:** 628 CCC patients were matched to 628 No CCC patients. Patients in the No CCC group were slightly older, more likely to be female, and to have had a myocardial infarction. Mean/median baseline expenditures and CDS were equivalent. During follow-up, 12 and 98 cardiac-related deaths occurred in and mean/median total healthcare expenditures/day were $57/$30 and $159/$45 for the CCC and No CCC groups, respectively (both $P<0.001$). After adjustment, CCC patients were associated with -$103/day lower total healthcare expenditures ($P<0.001$; adjusted R-square=0.71 with log-transformed expenditures). **Conclusions:** Comprehensive and aggressive implementation of secondary cardiac prevention strategies with close monitoring and follow-up of CAD patients is associated with reduced healthcare expenditures.

C-C2-02:

Validation and Uses of the ACG-DX Predictive Modeling and Risk Adjustment Tool in an Israeli HMO

Isaac Hoch, MD, *Maccabi Healthcare Services*; Anthony D Heymann, MB, MHA, *Maccabi Healthcare Services*; Tomas Karpati, MD, *Maccabi Healthcare Services*; Liora Valinsky, MPH, *Maccabi Healthcare Services*

Background: With an ever increasing population of HMO members with chronic disease and continuing economic pressures to provide good medical care as efficiently as possible, there is a need for methods to stratify populations by health status and their future risk for using limited healthcare resources. **Methods:** We used the ACG-DX program developed at Johns Hopkins University for validation testing on an Israeli PPO population. This program uses same year data to provide a risk adjustment analysis for that year and predict high-users (top 5%) for the following year. The Maccabi Healthcare Services has an extensive demographic and medical database keyed by a unique identifier for each member. We provided age and gender data as well as all diagnoses for year 2006 and total cost for years 2006 and 2007 for each member as input to the ACG-DX program. We truncated total costs over the 99.9% for both pharmacy and total costs. The explanatory value for costs in 2006 (R^2) and positive predictive value for total costs in 2007 were calculated for the entire population of 1.7 million subscribers. The R^2 results were compared to results based on American data and reference values (ref.) generated by the

program. **Results:** The R^2 explanatory power for same year costs for age 65 and over was 18.7% for total cost (ref. 16%) and 45.5% for pharmacy cost (ref.10%). For those under age 65, the values were 20.5% (ref. 21%) for total cost and 39.1% (ref. 29%) for pharmacy cost. In predicting which members would be in the high (top 5%) cost bracket, we correctly identified 33,479 members (based on 2006 data) as being at risk for high total cost out of the 85,059 members who did have a high total cost in 2007. The positive predictive value was 39.4%. **Conclusions:** We have validated the ACG-DX tool for an Israeli population for both risk management and predictive modeling. This tool can be now used for a large variety of managerial and medical uses, including population, disease and case management, budget allocation and provider payment as well as improving health care equity and quality assurance.

C-C2-03:

Incidence-based Costs of Multiple HAART Switches Among HIV-infected Patients in an HMO

Richard T Meenan, PhD, MPH, MBA, *Kaiser Permanente Northwest*; Maureen C O'Keeffe Rosetti, MS, *Kaiser Permanente Northwest*; Terry Kimes, MS, *Kaiser Permanente Northwest*; Wendy Leyden, MPH, *Kaiser Permanente, Oakland, CA*; Michael J Silverberg, PhD, *Kaiser Permanente, Oakland, CA*; Diana Antoniskis, MD, *Kaiser Permanente Northwest*; Michael A Horberg, MD, MAS, FACP, *Kaiser Permanente, Oakland, CA*

Background: Highly active antiretroviral therapy (HAART) or combination antiretroviral (ARV) therapy is associated with reduced morbidity and mortality. Yet, many HIV-infected patients endure incomplete HIV suppression from HAART or combination ARV therapy, increasing cost and limiting effectiveness. Little is known about the direct healthcare costs of HIV+ patients requiring multiple HAART regimen switches because of incomplete HIV suppression. In an HMO-based population of HIV+ patients, we examined resource and cost implications of multiple relative to single (or no) HAART switches starting from first HAART regimen. **Methods:** Retrospective analysis of HIV+ patients of the Northern California and Northwest regions of Kaiser Permanente during 2004. Continuous active 12-month membership and minimum 12 months of continuous HAART. Cases on third or later HAART regimen; controls on 1st or 2nd regimen. Regimen switch is combination change of two or more additions of ARV drugs to an existing HAART regimen. Cost categories drugs, outpatient, inpatient, lab, and radiology. Patients followed from first HAART regimen to death, disenrollment, or end of study up to 60 months. **Results:** 287 cases (19% female); 1,645 controls (12% female) followed from 1st regimen. Mean total per-patient follow-up costs were $105,132 (cases) vs. $70,004 (controls). Mean pharmacy costs were $70,672 (cases) vs. $49,668 (controls) ($P$ <.04). Of cases mean pharmacy costs, 85% were antiretroviral-based (90% for controls). Mean dispenses of both ARV and non-ARV drugs were higher for cases (80 vs. 60 for antiretrovirals, 64 vs. 60 for non-antiretrovirals). Mean outpatient costs were $13,100 (cases) vs. $8,952 (controls) ($P$<.0001). Mean ER and mean non-specialty visits were both higher among cases (P <.03). Fourteen percent of cases had at least one inpatient stay vs. 10% of controls. Inpatient costs per patient with at least one stay were $101,396 (cases) vs. $72,000 (controls) (not significant). Mean radiology costs were $1,412 (cases) vs. $956 (controls) ($P$=.05); mean lab costs were $4,728 (cases) vs. $3,472 (controls) ($P$<.0001). **Conclusions:** HIV-infected patients on a third or later HAART regimen incurred costs in total and across most categories that greatly exceeded costs of similar patients on earlier regimens. Working to ensure success with initial HAART regimens appears to lower total cost of HIV care.

PS2-12:

How to Move From Belief to Proof? Economic Evaluation of Care Programs for Chronically Ill

Lotte MG Steuten, MSc PhD, *Care Innovations Research and Consultancy & MacColl Institute for Healthcare Innovations*; Hubertus JM Vrijhoef, MSc, PhD, *MacColl Institute for Healthcare Innovations*

Worldwide, care programs for chronically ill are implemented without evidence that these programs make worthwhile use of scarce resources. Generally, these programs aim to improve quality of care and mitigate healthcare costs. They seek to identify chronic conditions more quickly, treat them more effectively and thereby slow the disease progression. This is pursued through a combination of 1) more effective team care and planned interactions; 2) self-management support; 3) integrated decision support; 4) electronic patient registries and other supportive information technology. Although some positive results with regard to quality of care are shown, published evidence on cost-effectiveness remains largely inconclusive. Previous research also demonstrates that this uncertainty around cost-effectiveness of chronic care programs is not simply due to heterogeneity in programs. Rather, ignorance of the relation between healthcare structures, program-design and outcomes might be the cause. Hence, we hypothesized that the decision uncertainty around cost-effectiveness of chronic care programs decreases when parameters reflecting healthcare structure and program design are explicitly included in the economic evaluation of such programs. To test this hypothesis, the relation between structure parameters, program design and cost-effectiveness is investigated in a comparative international study including programs for adults with diabetes, heart failure, depression, asthma or Chronic Obstructive Pulmonary Disease. Subsequently, a decisionanalytic model is developed to estimate the short and long-term cost-effectiveness of programs for a given healthcare structure. Dependent on the remaining uncertainty around program cost-effectiveness, stakeholders can decide if these should be further implemented or that more information is required. Additionally, it is determined how the cost-effectiveness of programs can be maximized by adjustments in their design. With tools to better estimate the cost-effectiveness of chronic care programs in a given setting, and optimize their design accordingly, we will be able to improve care for the chronically ill in a systematic and cost-effective way. An outline of this advanced cost-effectiveness model and its potential application to case studies will be presented at the conference.

PS2-34:

Implementation Cost Analysis of Telephone and Internet-based Interventions for the Maintenance of Weight Loss

Richard T Meenan, PhD, MPH, MBA, *Kaiser Permanente Northwest*; Victor J Stevens, PhD, *Kaiser Permanente Northwest*; Kristine Funk, MS, RD, *Kaiser Permanente Northwest*; Alan Bauck, BS, *Kaiser Permanente Northwest*; Gerald J Jerome, PhD, *Towson University and The Johns Hopkins University*; Lillian F Lien, MD, *Duke University*; Lawrence Appel, MD, MPH, *The Johns Hopkins University*; Laura P Svetkey, MD, *Duke University*

Objectives: The Weight Loss Maintenance Trial (WLM) was a multi-center, randomized trial comparing two weight loss maintenance interventions, a telephone-based personal contact program (PC) with monthly contacts primarily by phone and an Internet-based program (IT), to a self-directed control group, among overweight or obese individuals at high cardiovascular risk. This presentation describes the implementation costs of both interventions as well as the development costs of the IT program. **Methods:** Intervention costs were micro-costed using both internal and external measurement sources. Length of trial participation was 30 months. IT development costs were assessed over the 36 months of development. Primary analytic perspective was that of a healthcare system considering adoption of an extant intervention, rather than development of its own intervention. Uni-variate and multivariate sensitivity analyses were performed. **Results:** 30-month implementation costs for 342 PC participants were $558.3K ($1,632 per participant), and for 348 IT participants were $223.3K ($653 per participant). Under all plausible scenarios, IT implementation costs were below PC implementation costs. Total estimated IT development costs over 36 months were $879.4K ($2,527 per IT participant). **Conclusions:** When hosted in a facility with substantial resources devoted to and expertise in website delivery, costs of implementing and maintaining a Web-based intervention for the maintenance of weight loss are substantially less than similar costs of a conventional intervention using a combination of phone and in-person contacts. In such a situation, per-participant website cost remains less than the personal contact intervention, even including development costs. If future trials demonstrate the effectiveness of these or similar interventions in maintaining initial weight loss, our results can be used to inform the economic evaluations that will assess the true value for money produced by their implementation.

Health Informatics

C-C1-01:
A Strategic Plan for Developing Natural Language Processing Capacity at HMORN Sites

David Carrell, PhD, *Group Health, Center for Health Studies*; Virginia Immanuel, *Group Health, Center for Health Studies*

For the specific purpose of crafting a strategic plan for developing scientific and technical capacity for applying natural language processing (NLP) techniques to clinical text in HMO Research Network (HMORN) sites we convened a working conference in Seattle, December 17–18, 2008. Expert consultation in the strategic planning process was provided by six NLP experts from three institutions considered national leaders in the development and application of NLP technologies: the Mayo Clinic, the University of Pittsburgh Medical Center, and Vanderbilt University. Conference participants included representatives of five HMORN sites, Northwestern University, and the University of Washington. Specific aims of the conference were: 1) To develop a strategic plan for acquiring natural language processing capacity including, potentially, development of in-house capacity, subcontracting NLP tasks to one or more external collaborators/contractors, some combination of these approaches, or none at all; and 2) To educate investigators and technical staff about the processes of developing, testing, and applying NLP algorithms for extracting data from clinical text in the context of typical HMORN-style research programs. Traditional conference presentations addressed "What is natural language processing," "Illustrations of potential NLP projects," "Considerations when developing and applying NLP algorithms," and "Comprehensive, large-scale information extraction systems." A round-table-style discussion sessions focused on issues of human capital requirements for NLP projects, subcontracting NLP tasks to outside entities, multi-site collaboration on NLP projects, and a strategic plan for developing NLP capacity. This presentation summarizes the strategic planning products of the conference, currently in draft form and undergoing edits by a working group of the expert consultants and conference participants. Preliminarily, the strategic plan recommends incremental development of NLP capacity in HMORN-like sites through sequential execution of thoughtfully-selected small-scale NLP and NLP-like projects that represent key technical aspects of what can become a mature program of NLP capacity within 3–5 years. Initially, small-scale projects would be conducted in close collaboration with outside informatics experts to provide scientific and technical guidance to the immediate project and to assure fidelity with a longer-term locally-adapted strategic plan.

C-C1-02:
Data Extraction From Text, Step 1: Preparing Test for Machine Processing

David Carrell, PhD, *Group Health, Center for Health Studies*

Background: Natural language processing (NLP) uses software to assist in the extraction of information from clinical text, a process usually performed entirely by chart abstractors. Before NLP can be applied the text in question must be prepared for machine processing. In research settings this pre-processing work often involves several successive and related tasks, requiring substantial amounts of time and attention from people representing various types of clinical, scientific and technical expertise. Appreciating the tasks and participants involved in pre-processing clinical text can make the work more manageable, efficient, and effective. **Methods:** The information presented here comes from case study analyses of three small-scale projects involving preparation of clinical text (pathology reports, radiology reports, and progress notes) for processing by the Cancer Text Information Extraction System. Supplementing these experiences is information from anecdotal conversations with natural language processing experts. **Results:** Ten separate pre-processing tasks were identified: 1) obtaining source feeds, 2) assessing completeness, 3) de-duplication, 4) universe description, 5) cleaning and formatting, 6) de-identification, 7) database loading, 8) sampling, 9) preparation of the NLP system input feed, and 10) quality assurance. Nine types of expertise or task participants required for pre-processing were identified: 1) IRB representative, 2) source-system manager, 3) network/dbase administrator, 4) programmer, 5) statistician, 6) investigator, 7) informaticist, 8) clinical domain expert, and 9) manual chart abstractor. **Conclusions:** Pre-processing clinical text is an important phase and potentially challenging aspect of extracting information from clinical text using NLP. Because researchers require accurate information about the larger universe of documents or patients represented by the sampled and processed text, pre-processing can present numerous challenges, the solutions to which draw on many areas of expertise in a multi-step and sometimes iterative process.

C-C1-03:
Identifying Respiratory-Related Clinical Conditions From ED Reports With Topaz

Wendy W Chapman, PhD, *University of Pittsburgh*; Henk Harkema, PhD, *University of Pittsburgh*

Background: Identifying patients for research studies often requires timely and expensive manual chart review. Automated searching on textual records results in many false positive cases, because a large proportion of clinical conditions described in reports occurred in the past history (past history of pneumonia), were experienced by a relative and not the patient (father suffered from CHF), or are described as being absent (patient denies chest pain). Natural Language Processing (NLP) promises to automatically encode clinical conditions and modifiers necessary for accurate identification of patients matching a given case definition. **Methods:** We developed an NLP system called Topaz that currently identifies 55 respiratory related clinical conditions from clinical reports, assigning the value acute, chronic, or absent to each of the conditions in a three-step process. Module 1: Find instances of the conditions in the text. Module 2: For each condition marked by Topaz, assign the following values: Existence (present, absent); Temporality (recent, historical, hypothetical); Experiencer (patient, other). Module 3: Integrate information from individual annotations to assign a single value to each of the 55 conditions. **Results:** We evaluated each module on a set of 60 emergency department reports by comparing against physician annotations. Sensitivity and positive predictive value for Modules 1 and 2 are as follows: Module 1: Mark conditions: 99%, 89%; Module 2: Negation (98%, 96%), Historical (76%, 50%), Hypothetical (100%, 81%), Experiencer (100%, 33%). Weighted kappa score between values assigned to the 55 conditions by Topaz (Module 3) compared to physician annotations was 0.85, indicating high agreement between Topaz and a physician. **Conclusion:** In spite of mistakes in marking conditions and assigning contextual features, Topaz performed similarly to a physician in assigning 55 conditions the values acute, chronic, or absent based on the ED report. Topaz could improve sensitivity of case retrieval by addressing linguistic variation common in clinical reports (e.g., synonymy, abbreviations, etc). Topaz could also improve precision of case retrieval by addressing temporality, experiencer, and negation of clinical conditions.

C-C1-04:
Building a Health Services Information Technology Research Environment

David W Gehrum, BS, *Geisinger Information Technology*; JB Jones, PhD, MBA, *Geisinger Center for Health Research*; Gregory J Romania, MS, *Geisinger Information Security Office*; David L Young, BS, *Geisinger Information Technology*; Virginia R Lerch, MPH, *Geisinger Center for Health Research*; Christa A Bruce, MPH, *Geisinger Center for Health Research*; Diane Donkochik, BA, *Geisinger Information Technology*; Walter F Stewart, PhD, MPH, *Geisinger Center for Health Research*

Background: The electronic health record (EHR) has opened a new era for health services research (HSR) where information technology (IT) is used to re-engineer care processes. While the EHR provides one means of advancing novel solutions, a promising strategy is to develop tools (e.g., online questionnaires, visual display tools, decision support) distinct from, but which interact with, the EHR. Development of such software tools outside the EHR offers an advantage in flexibility, sophistication, and ultimately in portability to other settings. However, institutional IT departments have an imperative to protect patient data and to standardize IT processes to ensure system-level security and support traditional business needs. Such imperatives usually present formidable process barriers to testing novel software solutions. We describe how, in collaboration with our IT department, we are creating an environment and a process that allows for routine and rapid

testing of novel software solutions. **Methods:** We convened a working group consisting of IT and research personnel with expertise in information security, database design/management, web design, EHR programming, and health services research. The working group was tasked with developing a research IT environment to accomplish two objectives: 1) maintain network/data security and regulatory compliance; 2) allow researchers working with external vendors to rapidly prototype and, in a clinical setting, test web-based tools. **Results:** Two parallel solutions, one focused on hardware, the second on oversight and management, were developed. First, we concluded that three separate, staged development environments were required to allow external vendor access for testing software and for transitioning software to be used in a clinic. In parallel, the extant oversight process for approving/managing access to internal/external personnel had to be altered to reflect the scope and scale of discrete research projects, as opposed to an enterpriselevel approach to IT management. **Conclusions:** Innovation in health services software development requires a flexible, scalable IT environment adapted to the unique objectives of a HSR software development model. In our experience, implementing the hardware solution is less challenging than the cultural change required to implement such a model and the modifications to administrative and oversight processes to sustain an environment for rapid product development and testing.

C-D3-01:
Developing and Implementation of Secure Linear Regression on Distributed Databases

Fang Zhang, PhD, *Harvard Pilgrim Health Care*; Lingling Li, ScD, *Harvard Pilgrim Health Care*; Ken Kleinman, ScD; Jeff Brown, PhD, *Harvard Pilgrim Health Care*; Kimberly Lane, MPH, *Harvard Pilgrim Health Care*; Richard Platt, MD, MS, *Harvard Pilgrim Health Care*

Background/Aims: Improving access to multiple sources of electronic health information is crucial for population-based health care research. But it also raises serious issues relating to data confidentiality and security. We propose to develop methods and tools (e.g., SAS macros) to enable multivariate analyses to be conducted using multiple datasets that are stored separately without exposing any patient level information. Phase I of this project focuses on linear regression. **Methods:** A two-step process is carried out by SAS macros. The macros will be installed on both the central and site computers that hold the analytic datasets. After the central computer initiates the process, each site computer executes the SAS program locally and submits intermediate summarized statistical results to the central computer. The central computer then combines the intermediate results, and computes the parameter estimates. A second round of program execution delivers the variance/covariance estimates of the parameter estimates. **Results and Conclusions:** Simulated separated data sets were used to test the macros. The results were identical to the outputs from the SAS PROC REG procedure when the data sets were combined. The macro enables remote execution of multivariate linear regression analysis within the context of a multi-institutional distributed research network. The successful implementation of the secure statistical analysis within a distributed database model will overcome one of the largest hurdles in fully developing such a model, namely, the current need to combine data for multivariate analyses. Obviating this need will save the time and resources currently spent developing data-sharing agreements and will greatly minimize the patient confidentiality and proprietary concerns

C-D3-02:
Syndromic Surveillance Reporting Via CDCs Public Health Information Grid

Michael Klompas MD, MPH, *Harvard Pilgrim Health Care*; Ross Lazarus, MBBCh, MPH, *Harvard Pilgrim Health Care*; Gillian Haney, MPH, *Harvard Pilgrim Health Care*; Katherine Yih, PhD, *Harvard Pilgrim Health Care*; Richard Platt, MD, MSc, *Havard Pilgrim Health Care*

Background: CDC is building a public health information grid to connect public health stakeholders nationwide. The grid will enable efficient and secure sharing of data and applications between public health authorities at the national, state, and local levels as well as researchers and other interested parties (JAMIA 2008;15:705). The grid may also support federated analysis of distributed data sources to detect clusters that might be invisible to smaller, isolated systems. Grid protocols allow data owners to control data access. Broad sharing of data, however, requires a model to customize the level of patient identifiers seen by users depending upon their role. We describe here a work-in-progress implementation of an ambulatory syndromic surveillance module on the public health grid, including a model for sharing reports with different levels of granularity depending upon user privileges. **Methods:** We are installing a grid node at Atrius Health, a large multisite, multispecialty ambulatory medical practice serving over 600,000 patients predominantly in eastern Massachusetts. Standard CDC-defined ICD-9-and temperature-based syndrome algorithms developed for the National Bioterrorism Demonstration Project (MMWR 2004;53 Suppl:43) will be applied to ambulatory encounter data gathered nightly by the Electronic medical record Support for Public Health system (ESP, esphealth.org). ESP consists of a dedicated server populated with nightly extracts of comprehensive encounter data from the electronic medical record system of Atrius Health (JAMIA 2009:16:18). ESP currently analyzes this data to submit fully-identifiable case reports on patients with notifiable conditions to the state health department (MMWR 2008; 57:373). The syndromic surveillance addition to ESP will modify ESPs reporting module to vary the level of report granularity according to users' access privileges. ESP reports will include fully de-identified aggregate counts stratified by time period and zip code for basic grid users; semi-identified unit records with age, gender, and geo-code for intermediate users; and fully identifiable unit records with patient names and addresses for highly privileged users such as the state health department. **Results:** Installation is currently underway. **Conclusions:** Controlled distribution of syndromic surveillance data through the CDC's nascent grid will help develop the emerging paradigm for sharing public health information and applications.

C-D3-03:
Developing a Distributed Research Network to Conduct Population-based Studies and Safety Surveillance

John H Holmes, PhD, FACMI, *University of Pennsylvania School of Medicine for the HMO Research Network CERT DEcIDE Center Distributed Research Network project team*

Introduction: The overall objective of this project is to design a scalable distributed research network (DRN) that supports secure data analyses for research on the comparative effectiveness and safety of therapeutics. The plan for achieving this objective includes designing an information system architecture, implementation of a prototype of the specified system architecture, and completion of a proof of concept pilot project conducted in partnership with the Agency for Healthcare Research and Quality (AHRQ). Methods already implemented by the HMORN provide the foundation for the development of this DRN. These include established procedures for: 1) use of decentralized data files that remain in possession of the covered entities; 2) governance methods emphasizing local control and decision-making about participation in research projects; 3) transparency in choosing projects, protocol development, and communication of results; and 4) best practices for preserving privacy, ensuring data integrity, and accurate data interpretation. **DRN System Architecture**: The DRN architecture is being modeled as a federation of separate, heterogeneous databases that will be accessible through a common exchange model, implemented as a common query system (CQS). Under the common exchange model, heterogeneous data and systems do not need to be physically integrated, but the model affords interoperability, such that users can access these data resources using a single interface using a common syntax and semantic representation of data elements and coding schemes. This is a distinct advantage for the DRN, since there will be different data resource providers, some of which place strict constraints on the use of data. The common exchange model obviates the need for users to learn the syntactic and semantic characteristics of the resources available across the entire DRN. **Prototype Development:** The DRN is being developed using a rapid prototype life-cycle. This user centered approach employs incrementally-developed system prototypes such that all participants become stakeholders in the development process and have access to increasingly complex, concrete representations of the final system.

C-D3-04:
Governing Access to a Distributed Research Network's Data Resources

Beth L Syat, MPH, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; Kimberly Lane, MPH, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; Jeffrey S Brown, PhD, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; David Magid, MD, MPH, *Institute for Health Research, Kaiser Permanente Colorado*; Joe V Selby, MD, MPH, *Division of Research, Kaiser Permanente Northern California*; Richard Platt, MD, MS, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; Andrew Nelson, MPH, *HealthPartners Research Foundation*

To answer many public health questions, it is essential to use information from more than one electronic data system, and efficient ways are needed to securely access and use data from multiple organizations while respecting the regulatory, legal, proprietary, and privacy implications of this data use and access. One approach centers on the development of distributed research networks that allow data owners to maintain confidentiality and physical control over their data, while permitting authorized users to ask essential questions. Once such a network is fully operating and key elements are in place, sharable data resources can be made available to approved network users, under approved conditions. For instance, data from a large cohort of hypertensive patients with five years of utilization (a hypertension cohort) could be available on the network. The following questions will need to be addressed: Who can have access? Under what conditions should access be granted? What policies/procedures are required? To address the specific needs associated with governance of a network's resource(s), the authors call for the establishment of user eligibility requirements, policies to deal with funders (i.e., access rules for study funders), clear standard operating procedures, and guidelines for accessing the network. Recommendations to meet to those needs include: 1) establishing data oversight policies; 2) defining responsibilities for data resource access; 3) defining responsibilities for data owners at each site (i.e., responding to queries when requests come in); 4) creating standard operating procedures for the data resource; 5) creating collaboration guidelines for external partners; and 6) monitoring overall resource use. For the purpose of this poster, we propose to illustrate responsibilities for data owners at each site.

PS1-01:
Digital Scholarship: Scientific Publishing at the Crossroads

Virginia D Scobba, MLS, MA, *Group Health Center for Health Studies, Group Health Cooperative*

Background/Aims: Scholarly communication is the system through which research and other scholarly writings are created, evaluated for quality, disseminated to the scholarly community, and preserved for future use. The traditional formal means of interchange, publication in peer reviewed journals, is at the core of the communication infrastructure. However, the structures and processes by which scholars communicate have undergone a major transformation in recent years with the advent of the digital age. New electronic technologies for access to information appear to be revolutionizing scholarly publishing, aptly defined by the term, digital scholarship. Current trends in the chaotic scholarly publishing market can be perceived as both opportunities for and threats to digital scholarship. **Methods:** Digital scholarship is in a state of unprecedented upheaval as publishers, librarians, legislators, scholarly societies, scientists and other scholars engage in tactics to propel change in directions that promote their individual goals. Strategies involve remodeling the publishing market, modifying academic and research institutional procedures, and influencing public policy. **Results:** Emerging digital publishing technologies, increasing volume of scholarly works, and decreasing satisfaction with a costly and dysfunctional economic model are changing the fundamental structure of scholarly publishing. Research institutions, as well as government and funding agencies, are implementing or exploring strategies which promote free and open access to research results. These include alternative copyright arrangements, e-print archives and digital repositories. **Conclusion:** Scholars, researchers, and society at large gain tremendous benefits from the expanded dissemination of research findings. However, several factors have impeded the progress of digital scholarship, including efforts to protect publishing revenues and profits, legal licensing restrictions, and the traditional culture of academia. It is therefore critical that the scientific community is actively engaged to ensure that the advancement of scholarship takes priority in the development of new publishing models.

PS1-17:
Developing an Analytical Tool for Assessing the Adequacy of State Health Information Exchange Laws

Randy McDonald, JD, *Lovelace Clinic Foundation*; Maggie Gunter, PhD, *Lovelace Clinic Foundation*; Shelley Carter, RN, MPH, *Lovelace Clinic Foundation*; Bob Mayer

Aims: To develop and test an analytic legislative tool that provides states with the ability to analyze and propose reform to laws related to the exchange of electronic health information. **Background:** Through extensive research, the multi-state Harmonizing Security and Privacy Law Collaborative (HSPLC) found myriad barriers to health information exchange in laws and business practices. In some cases, barriers are beneficial because they protect people's privacy. However, barriers can be problematic when they prevent the timely exchange of information needed for the treatment of patients. There are many inconsistencies in state and federal laws and among state statutes in their definitions, organizational structure, and content. Some states have adopted new legislation that addresses the exchange of health information that may further exacerbate differences among states and impede interstate exchange of electronic health information. **Methods:** HSPLC developed a set of analytical tools and a narrative guide, the Roadmap, to assist states in implementing an effective legal framework for the review and adoption of legislation that supports health information exchange (HIE). The tools and Roadmap were created through extensive research to identify best practices for identifying, evaluating, and reforming state laws related to the disclosure of electronic health information. **Results:** HSPLC found that various state resources (legal, legislative, healthcare policy, healthcare providers, and consumers) are necessary for successful completion of the Roadmap to identify opportunities for legislative reform. HSPLC believe that states will have greater likelihood of success in achieving legislative reform if they use the Roadmap and reach out to other states contemplating a change in legislation. Interstate collaboration and coordination are essential if we are to achieve a national legal and technical infrastructure that facilitates health information exchange. **Conclusions:** Legislation in most states does not adequately address the exchange of electronic health information. Drafting of legislation must take into account a state's unique environment and culture, and the needs and support of stakeholders. The goal of using the analytic tool is to protect health information while removing barriers that impede the exchange of vital information. The HSPLC Roadmap provides a step by step process to analyze and reform state legislation.

PS1-28:
Optimizing Health Informatics Interventions From the Patient's Perspective: Focus Group on Improving Safe NSAID Use

Douglas W Roblin, PhD, *Kaiser Permanente Georgia*; Richard M Shewchuk, PhD, *University of Alabama at Birmingham*; Jeroan J Allison, MD, MSc, *University of Alabama at Birmingham*; Renny Varghese, MPH, *Kaiser Permanente Georgia*; Suzanne Baker, MPH, *University of Alabama at Birmingham*; Catarina I Kiefe, MD, PhD, *University of Alabama at Birmingham*

Background: Patient-provider messaging in an electronic medical record (EMR) system provides an opportunity to create and sustain productive patient-provider interactions. We elicited patient perspectives on design, benefits, and concerns to improve usability and efficacy of a proposed health informatics intervention to support surveillance of, and provider feedback on, over the counter (OTC) non-steroidal anti-inflammatory drug (NSAID) use. **Methods:** We conducted four focus groups involving Kaiser Permanente Georgia (KPG) adults 25–70 years old who had a medical condition for which NSAIDs should be used cautiously or had a recent prescription for NSAIDs. The focus group elicited information regarding: OTC NSAID use (including recognition of risks and side effects), design of an OTC NSAID survey to be delivered via KP.Org (the secure KP Internet portal for patient-physician messaging), benefits and concerns about transmission of this information via electronic messaging to their primary care physicians, and

willingness to participate in a health informatics intervention to improve safe NSAID use. We then developed a concept map and classification scheme for analyzing transcripts from the focus groups. Two trained coders labeled the transcripts using ATLASti. **Results:** Forty-eight KPG adults participated in the focus groups: 83% female; 50% African American; median age 54 years. Fortyseven participants indicated current or recent use of OTC NSAIDs. Easy access to OTC NSAIDs (low cost, no prescription required) promoted their use; however, self-medication strategies often combined multiple OTC NSAIDs or increased OTC NSAID dosing to obtain pain relief. Participants acknowledged that the proposed intervention would benefit their health care through more complete reporting and documentation of OTC NSAID use in their EMR. Concerns were expressed about: keeping this information up-to-date, if the information would be used or (if used) evaluated by a qualified provider on their health care team, and mode (e-mail or telephone) and timeliness about how they would be informed about potential risks from their OTC NSAID use. **Conclusions:** Consistent with the Chronic Care Model, participants acknowledged that the proposed intervention would create productive interactions with their providers and likely improve their health outcomes. Their perspectives also yielded some unexpected insights (e.g. importance of timely updating of OTC NSAID use) and have resulted in modifications to the overall intervention design.

PS1-30:

Research Mentor: A Web-based Reference for Planning and Preparing a Research Proposal

Ingrid Glurich, PhD, *Office of Scientific Writing and Publication, Marshfield Clinic Research Foundation*; Marie Fleisner, *Office of Scientific Writing and Publication, Marshfield Clinic Research Foundation*

Background: National emphasis on interdisciplinary and translational research as research priorities has created new challenges in grantsmanship. The Office of Scientific Writing and Publication at Marshfield Clinic Research Foundation utilized an informatics approach to create a comprehensive educational resource to assist new and established investigators engaged in research design. An interactive website accessible on the institutional intranet was designed to provide links to information, resources and support personnel to assist with navigating the central and peripheral processes required for successful procurement of institutional and external grants. **Methods:** Research Mentor was designed to provide comprehensive guidance to research fundamentals in a conveniently accessible interactive, user-friendly, online format. The website included resources and links to guidelines for grant development including feasibility analysis and study design planning, biostatistical considerations, peer review, grantsmanship, intellectual property protection, regulatory policies, computer-based training, institutional and national policies governing research, and access to funding agencies, forms, and appropriate support staff. The website was beta-tested by 25 physicians and scientists with varying degrees of research experience and refined based on user comments before the website was launched in spring of 2008. **Results:** Research Mentor proved to be an effective orientation tool for researchers by enhancing grantsmanship skills and providing access to research resources. Research Mentor has been effective in linking the researchers with appropriate support personnel who offer further assistance to researchers in producing competitive proposals. Tools custom-designed for Research Mentor to assist in project planning and design have been frequently accessed by investigators and reduce time spent by support staff on assisting with project planning. **Conclusions:** Informatics venues such as interactive user-friendly online educational websites can offer step-by-step guidance to research design and processes by providing a comprehensive cross-disciplinary research resource that offers value to new and established investigators alike. These tools promote networking with experienced support personnel to facilitate production of competitive grants.

PS1-35:

Use of Web-based Rheumatology Practice Visual Display Tools With an Electronic Health Record (EHR)

Eric D Newman, MD, *Department of Rheumatology, Geisinger Clinic*; Virginia R Lerch, MPH, *Geisinger Center for Health Research*; JB Jones, PhD, MBA, *Geisinger Center for Health Research*; Walter F Stewart, PhD, MPH, *Geisinger Center for Health Research*

Background: A variety of different types of data (i.e., patient-reported, lab, imaging, clinician-documented) are required to guide and improve rheumatologic treatment decisions. Although these data elements are available in the electronic health record (EHR), the demands of a busy practice do not allow sufficient time to effectively review all sources of data. Moreover, the EHR does not offer a facility to bring relevant but disparate data together in an integrated visual display. We developed a novel web-based software program–Rheum-PACER (Patient Centric Electronic Redesign) that displays relevant data in a web-based dashboard format. We report on the results of the first phase of implementing Rheum-PACER, i.e., identifying key data elements and designing the user interface. **Methods:** Rheum-PACER is a web-based program that obtains, aggregates, and/or exchanges information from/with four sources: patients, nurses, rheumatologists, and the EHR. It is separate from, but accessed seamlessly from within, the EHR. An iterative consensus process was used to identify the data elements desired by/from each of these four sources. **Results:** The Rheum-PACER dashboard is comprised of four key tabs, each of which allows the provider to complete a specific task within a single interface. The "Outcomes General" tab displays parallel temporal trends of patient reported outcomes (PRO), labs, and rheumatic medications. The "Outcomes Composite" tab displays temporal trends of composite PRO scores and physician-recorded data (e.g., tender joint counts), labs, and rheumatic medications over a 12-month period. The "Demographics" tab visually parses rheumatic versus other diagnoses and medications and allows for entry of data not typically found in the EHR (i.e., date of first rheumatic disease diagnosis). The "Construction" tab is used to construct a visit progress note. This tab incorporates pre-populated patient reported data (e.g., events since last visit, review of systems) and EHR data (e.g, medications, lab values) and allows for entry of nurse and physician-derived measures (e.g., physical exam, global scores). **Conclusions:** Web-based software tools that are external to, but which interact with, the EHR have the potential to improve clinical practice and clinical decision-making by providing clinicians with information that is aggregated, formatted, and presented in a way that reflects their cognitive clinical decision-making process.

Pharmacoepidemiology

C-A4-01:

Computerized Clinical Decision Support During Drug Ordering for Long-term Care Residents With Renal Insufficiency

Terry S Field, DSc, *Meyers Primary Care Institute*; Paula Rochon, MD, *Kunin-Lunenfeld Applied Research Unit*; Monica Lee, PharmD, *Kunin-Lunenfeld Applied Research Unit*; Linda Gavendo, RPh, *Kunin-Lunenfeld Applied Research Unit*; Joann L Baril, BS, *Meyers Primary Care Institute*; Jerry H Gurwitz, MD, *Meyers Primary Care Institute*

Objective: To determine whether a computerized clinical decision support system (CDSS) providing patient specific recommendations in real- time improves the quality of prescribing for long-term care residents with renal insufficiency. **Design:** A randomized trial within the long-stay units of a large long-term care facility. Randomization was within blocks by unit type. Alerts related to medication prescribing for residents with renal insufficiency were displayed to prescribers in the intervention units and hidden but tracked in control units. **Measurement:** The proportions of final drug orders that were appropriate were compared between intervention and control units within alert categories: 1) recommended medication doses; 2) recommended administration frequencies; 3) recommendations to avoid the drug; 4) warnings of missing information. **Results:** The rates of alerts were nearly equal in the intervention and control units: 2.5 per 1000 resident days in the intervention units and 2.4 in the control units. The proportions of dose alerts for which the final drug orders were appropriate were similar between the intervention and control units (relative risk 0.95, 95% confidence interval

0.83, 1.1). For the remaining alert categories significantly higher proportions of final drug orders were appropriate in the intervention units: relative risk 2.4 for maximum frequency (1.4, 4.4); 2.6 for drugs that should be avoided (1.4, 5.0); and 1.8 for alerts to acquire missing information (1.1, 3.4). Overall, final drug orders were appropriate significantly more often than a relative risk 1.2 (1.0, 1.4). By tracking personnel time and expenditures, we estimated the cost of developing the CDSS as $48,668.57. Drug costs saved during the 12 months of the trial are estimated at $2,137. **Conclusion:** Clinical decision support for physicians prescribing medications for long-term care residents with renal insufficiency can improve the quality of prescribing decisions. However, patient well-being and quality of care rather than the business case related to cost savings are likely to be the key drivers for adoption of this HIT application.

C-A4-02:

Do Automated Phone Calls Improve Adherence to Inhaled Corticosteroids (ICS)?

W M Vollmer, PhD, *Kaiser Permanente Northwest*; C S Rand, PhD, *Johns Hopkins University*; A C Feldstein, MD, *Kaiser Permanente Northwest*; A Waterbury, MPH, *Kaiser Permanente Northwest*; J P Dubanoski, PhD, *Kaiser Permanente Northwest*; J Schneider, MPH, *Kaiser Permanente Northwest*; S Clark, RN, *Kaiser Permanente Northwest*; A Cibildak, MBA, *Eliza Corporation*; F Rizzo, *Eliza Corporation*; D H Smith, PhD, *Kaiser Permanente Northwest*; J Donovan, MS, *Kaiser Permanente Northwest*

Rationale: Adherence to ICS among individuals with asthma is poor and associated with increased asthma symptoms and acute health care utilization; diminished quality of life; and increased health care costs. **Objective:** To determine if a brief, automated telephone intervention using speech recognition (SR) technology improves ICS adherence among adults with asthma. **Methods:** PEANUT is an ongoing randomized clinical trial involving 14,064 members of a health maintenance organization (HMO), aged >18 years, taking medication for the management of asthma. Participants receive usual care (UC) or an 18-month SR intervention. SR participants receive monthly refill reminder calls, as needed, based on dispensing data derived from the electronic medical record. The calls provide educational information, explore barriers to adherence, and offer transfer to an automated refill line as appropriate. The primary outcome is the continuous measure of medication adherence (CMA), a measure of medication days dispensed relative to total observation days. Preliminary data through the first 8 months are presented. **Results:** Of over 10,000 calls attempted so far, we successfully reached the target participant 45% of the time and left a voice message on an additional 40% of calls. CMA scores are significantly higher for SR than UC participants (0.48 vs. 0.45, $P<0.01$), with the strongest effects (a five percentage point net differential) in those aged >60 yrs. One in 16 calls results in a direct transfer to the HMO's automated prescription refill service. **Conclusion:** Early results suggest a small, significant intervention effect. Because small changes in adherence on a population basis can have important public health benefits, this study supports the potential value of SR-based adherence interventions for asthma and other chronic diseases.

C-A4-03:

Risks to the Newborn Associated With In-Utero Exposure to Beta-Blockers and Calcium-Channel Blockers

Robert Davis, MD, MPH, *Kaiser Permanente Georgia*; Susan Andrade, ScD, *Meyers Primary Care Institute*; David Rubanowice, BS, *Group Health Cooperative*; Heather McPhillips, MD, MPH; Denise Boudreau, PhD; Marsha Raebel, PharmD, *Kaiser Permanente Colorado*; David Smith, PhD, MHA, *Kaiser Permanente Northwest*; M Ulcickas-Yood, DSc, MPH, *Henry Ford Health System*; Kim Lane, MPH, *Harvard Pilgrim Health Care*; Renny Varghese, MPH, *Kaiser Permanente Georgia*; Richard Platt, MD, MSc, *Harvard Pilgrim Health Care*

Background: While medication use to manage cardiovascular disease during pregnancy is widespread, data on its safety for the developing infant is scarce. We used population-based data from 5 HMOs to study risks for perinatal complications and congenital defects among infants exposed in-utero to beta -blockers and calcium-channel blockers. **Methods:** We studied women older than 15 years who delivered an infant between 1/1/96 to 12/31/00, and who had been continuously enrolled with prescription drug coverage for one year prior to delivery. We further limited our study to mother-infant pairs with 30 and 365 days follow-up for the evaluation of perinatal outcomes and congenital anomalies, respectively. Information on prescription drug dispensing, and inpatient and outpatient diagnoses and procedures was obtained from automated databases at each health plan. **Results:** There were a total of 87,407 mother-infant pairs with at least 30 days follow- up in the five health plans. Of these, a total of 405 full- term infants were exposed during pregnancy to beta-blockers and 721 full- term infants were exposed to calcium-channel blockers. Infants exposed to beta-blockers in the third trimester of pregnancy were at over three-fold increased risk for hypoglycemia (RR 3.1; 95% CI 2.2, 4.2), for feeding problems (RR 1.8; 95% CI 1.3, 2.5) and for prolonged hospitalization (RR 2.0; 95% CI 1.3, 3.1). Infants exposed to calcium-channel blockers in the third trimester had an increased risk for neonatal seizures (RR 3.6; 95% CI 1.3, 10.4), and for hematological disorders (RR 2.6; 95% 1.4, 5.1). A chart review confirmed the seizures and hypoglycemia cases but found no serious hematologic conditions common to the calcium-channel exposed infants. There were no increased risks for congenital anomalies among either group of infants. **Conclusions:** Infants whose mothers receive beta-blockers are at increased risk for neonatal hypoglycemia. Beta-blockers can cross the placenta, increasing insulin and decreasing glucagon in the newborn, leading to hypoglycemia. Infants whose mothers take calcium-channel blockers are at increased risk for neonatal seizures, although the mechanism leading to this increased risk is less clear. These data should be disseminated to the obstetric and neonatal community so that appropriate newborn management strategies may be developed.

PS2-04:

Impact of Medication Therapy Management Delivered to Home-based Medicare Beneficiaries

Thomas Delate, PhD, MS, *Kaiser Permanente Colorado*; Elizabeth Chester, PharmD, MPH, BCPS, *Kaiser Permanente Colorado*; Erin Welch, PharmD, *Kaiser Permanente Colorado*; Troy Stubbings, PharmD, *Kaiser Permanente Colorado*

Background: Medication Therapy Management (MTM) is a voluntary patient-participation program mandated for Medicare Part D sponsors by the Centers for Medicare and Medicaid Services for chronically-ill beneficiaries with high medication costs/utilization. MTM is intended to optimize therapeutic outcomes for individual patients. The objective of this study was to assess the impact of a pharmacist-managed MTM program on mortality, healthcare utilization, and prescription medication costs and quantify drug-related problems (DRP) identified during MTM. **Methods:** This quasi-experimental, controlled study was conducted at Kaiser Permanente Colorado, a group model HMO, among beneficiaries who were targeted for MTM in 2006. The MTM intervention was designed to identify potential DRP, educate the patient/caregiver about appropriate medication use, and ensure that the patient was appropriately integrated into clinical services. Data were collected from administrative databases and manual chart abstractions. Study outcomes included all-cause death (primary outcome), hospitalization, and ED visit rates and medication cost changes in the 180 days post-MTM targeting (follow-up) and quantification of DRP. Multivariate logistic regression was used to adjust the outcomes for baseline risk and other potential confounders. Beneficiaries who declined MTM and experienced death, hospitalization, or ED visit received a mock MTM intervention. **Results:** A total of 459 (Opt-in) and 336 (Opt-out) beneficiaries who agreed and declined, respectively, to receive MTM were included in the analysis. At baseline, groups were similar in age, sex, disease burden, healthcare utilization, and medication spend. Opt-in compared to Opt-out beneficiaries were less likely to die; adjusted odds ratio (AOR)=0.5, 95% confidence interval (CI)=0.3–0.9) but more likely to have had a hospitalization (AOR=1.4; 95% CI=1.1–2.0) and an increase in medication costs (AOR=1.4, 95% CI=1.1–1.9) during follow-up. There was no difference in ED visit rates. At least one DRP was identified in >83% of beneficiaries in both groups, with the most common DRP being drug interaction. **Conclusions:** Our investigation supports the use of MTM, with its optimization of medication therapy and increased coordination of information between healthcare providers and patients, since it may positively impact mortality in a population of high-risk Medicare beneficiaries.

PS2-07:

Medication Use in Pregnancy and Birth Outcomes Program

Susan E Andrade, ScD, *Meyers Primary Care Institute*; Robert L Davis, MD, MPH, *Kaiser Permanente Georgia*; Sally Beaton, PhD, *Lovelace Health Systems*; Craig Cheetham, PharmD, MS, *Kaiser Permanente Southern California*; Sascha Dublin, MD, PhD, *Group Health Cooperative*; Kimberly Lane, MPH, *Harvard Pilgrim Health Care*; De-Kun Li, MD, PhD, *Kaiser Permanente Northern California*; Marsha A Raebel, PharmD, *Kaiser Permanente Colorado*; Sharon J Rolnick, PhD, *Health Partners Research Foundation*; David H Smith, PhD, *Kaiser Permanente Northwest*; April Duddy, BA, *Harvard Pilgrim Health Care*; Richard Platt, MD, MS, *Harvard Pilgrim Health Care*

Background/Aims: Our knowledge of safe medication use during pregnancy is limited, due primarily to the lack of rigorous studies evaluating birth outcomes associated with in utero exposure to medications. A collaborative research program, the Medication Use in Pregnancy and Birth Outcomes Program, between the Food and Drug Administration (FDA) and researchers at the HMO Research Network Center for Education and Research in Therapeutics (CERT), Kaiser Permanente Northern and Southern California, and Vanderbilt University, aims to develop common, necessary data linkages to enable the conduct of multiple studies of medication use and outcomes in pregnancy across participating sites. **Methods:** Specific components of the program include: 1) maternal-infant record linkage of all women delivering an infant between 2001 and 2007, 2) linkage to birth certificate data for infants delivered between 2001 and 2007, 3) validation of data elements within the datasets through medical chart abstractions, and 4) annual update of the datasets. **Results:** This collaboration will provide a large ethnically and geographically diverse population, with approximately 90,000 births per year. Data files on maternal and child enrollment, outpatient drug dispensing, and inpatient and outpatient diagnoses and procedures, in addition to data elements obtained from birth certificate data, will be developed and maintained at each of the program sites. The proposed poster will describe the program and the available standard file definitions and data elements. **Conclusions:** The program will be an important resource for the evaluation of birth outcomes (birth defects and other perinatal events) associated with medication use during pregnancy, patterns and trends in medication use during pregnancy, and studies of the risks and benefits of medication use for the pregnant women themselves.

PS2-11:

Characteristics of Medicare Part D Beneficiaries Who Obtain Prescriptions at Pharmacies External to Their Health Plan

Anna Hoai Thuong T Nguyen, PharmD candidate, *University of Minnesota*; Jennifer L Ellis, MSPH, *Kaiser Permanente Colorado*; Thomas Delate, PhD, *Kaiser Permanente Colorado*; Marsha A Raebel, PharmD, *Kaiser Permanente Colorado*

Background: For Medicare Part D beneficiaries, drug costs after reaching the drug benefit threshold (DBT) could contribute to non-adherence and adverse outcomes. Because beneficiaries who reach the DBT might take prescriptions (Rx) to pharmacies that offer low-priced generic drugs, there is potential for loss of integrated care, as those pharmacies may not be affiliated with beneficiaries' health plans. Potential implications of Rx dispensing external to members' health plans include drug interactions, adverse events, lack of monitoring, and inaccurate adherence data. We sought to examine the extent to which Medicare beneficiaries take Rx outside a health plan and to describe those patients. We hypothesized that beneficiaries who reach the DBT are more likely than those who do not reach the DBT to have Rx dispensed at external pharmacies. **Methods:** This retrospective study included all Kaiser Permanente Colorado (KPCO) Medicare beneficiaries with membership in 2006 and 2007 (n=37,092). Data collected from electronic databases included demographics, membership, benefit structure, and comorbidities (Quan comorbidity index, QCI). A random sample of electronic medical records (n=100) was abstracted for information not available from administrative data. Chi-square and Wilcoxon Rank Sum tests were used to compare beneficiaries. **Results:** Among 27,354 beneficiaries who had a DBT, 1,655 (6%) took Rx to external pharmacies in 2007. Of 1,785 beneficiaries who reached the DBT, 12.4% (n=222) had external Rx compared to 5.6% (n=1433) of 25,569 who did not reach the DBT (P<0.001). Of those who reached the DBT, beneficiaries with external Rx had more comorbidity (external Rx mean QCI 4.2 [±2.8]; no external Rx mean QCI 2.4 [±2.1]; P<0.001). Chart review determined that not all Rx written externally were filled at pharmacies offering low price Rx: only 14% were documented taken to pharmacies advertising low price Rx, while 16%, 21%, and 43% were documented taken to military pharmacies, hospice/nursing homes, or no dispensing location, respectively. Additionally, 11% of external Rx were nonformulary drugs. Subsequent prescriptions for 20% of all external Rx were dispensed at KPCO pharmacies. **Conclusions:** KPCO Medicare beneficiaries who reached the DBT more often had Rx dispensed externally. Of those who reached the DBT, beneficiaries with external Rx had more chronic illnesses. Clinical consequences of Rx dispensed outside integrated health plans require further study.

PS2-15:

Sex-Specific Differences in the Protective Effect of Statins on Skeletal Fractures

Michael R Shainline, MS, MBA, *Lovelace Clinic Foundation*; Scott B Robinson, MA, MPH, *Lovelace Clinic Foundation*; Margaret J Gunter, PhD, *Lovelace Clinic Foundation*; Shelley Carter, MPH, *Lovelace Clinic Foundation*; Sarah J Beaton, PhD, *Lovelace Clinic Foundation*; James Nawarskas, PharmD, *College of Pharmacy, University of New Mexico*; Ludmila N Bakhireva, MD, PhD, MPH, *College of Pharmacy and Department of Family and Community Medicine, University of New Mexico*

Background: Recent reports indicate that HMG-CoA reductase inhibitors (statins), used for prevention and treatment of dyslipidemia and CVD, might have a beneficial effect on bone metabolism. Limitations of previous studies do not allow unequivocal conclusions about bone-sparing effect of statins. **Methods:** This study examined statin use and osteoporosis-related skeletal fractures. Members of a large New Mexico Health Plan served as the study population (n=7,539). The sample included women > 50 years old and men > 60 years old who had > 1 prescription fill or > 1 encounter with a healthcare provider between 1999 and 2005, but excluded patients with cancer, osteomalacia, and end stage renal disease. Patients with incident fractures of the hip, wrist/forearm, and spine occurring between 1999 and 2005 were identified as cases (n=1,880). Controls were selected from the same population based on timing of enrollment to controls in 1:3 ratio (n=5,659). The prevalence of statin use (> 3 fills a year prior to the index date) was compared among study groups by Chi-square analysis in univariate and by logistic regression in multivariate analyses. To explore duration -response effect, statin use was classified as current (3 months prior to the index date) and continuous (> 10 annual fills prior to the index date). **Results:** The mean age was 71.4±10.2 years among cases and 63.8±9.2 among controls, with 72.8% females. 15.9% of cases and 17.1% of controls reported any statin use, and the most prevalent statins were simvastatin followed by lovastatin, atorvastatin, and pravastatin. In men, no association between fractures and either current (OR=0.81; 95% CI: 0.55; 1.20) or continuous statin use (OR=0.86; 95% CI: 0.51; 1.44) was observed after adjustment for age, corticosteroids use, chronic kidney disease, and comorbidities. In women, significant protective effect was observed among both current (OR=0.58; 95% CI: 0.44; 0.78) and continuous (OR=0.66; 95% CI: 0.45; 0.99) statin users independent of age, corticosteroid use, bisphosphonates, chronic kidney disease, comorbidities, and postmenopausal hormone therapy. **Conclusions:** We observed a protective effect of statins on osteoporosis-related fractures in women but not in men. These findings suggest sex-specific effect of statins on bone metabolism.

PS2-17:

Characteristics of Medicare Beneficiaries Who Repeatedly Reach the Drug Benefit Threshold

Elizabeth A Bayliss, MD, MSPH, *Kaiser Permanente Colorado*; Jennifer L Ellis, MSPH, *Kaiser Permanente Colorado*; Tom Delate, PhD, MS, *Kaiser Permanente Colorado*; John F Steiner, MD, MPH, *Kaiser Permanente Colorado*; Marsha A Raebel, Pharm D, *Kaiser Permanente Colorado*

Background: Reaching a drug benefit threshold (DBT) (e.g. the Medicare donut hole) has been associated with poor health outcomes. This risk may be greater for those who repeatedly reach the DBT; however there is little information that characterizes this group of Medicare Advantage beneficiaries. We describe a population of beneficiaries who repeatedly reach the DBT over the first two years of Medicare Part D in order to determine if some might

benefit from anticipatory care management. **Methods:** We developed a historical cohort of 27,470 Medicare Advantage beneficiaries in an integrated HMO during 2006 and 2007. We used descriptive analyses to characterize three sub-populations (those who reach the DBT in 2006 only, in 2006 and 2007, or neither year) in terms of demographics, morbidity, generic and brand name medication use, utilization, diagnoses, procedures, use of catastrophic benefits, and smoking status. **Results:** 859 members reached the DBT in both 2006 and 2007 (repeaters), 904 in 2006 only, and 25,707 in neither year. Relative to those who reached the DBT in neither year, repeaters had significantly higher morbidity; as reflected by significant differences between groups in all descriptive categories. However, only a subset of these characteristics significantly differentiated between repeaters and those who reached the DBT in 2006 only: repeaters had higher rates of outpatient utilization (primary care, specialty care, and emergency department); were more likely to have a history of tobacco use, diagnoses of COPD, history of stroke, long-term anticoagulation, and dementia; and had greater use of specific trade name medications, particularly those used to treat respiratory symptoms. Repeaters and those who reached the DBT in 2006 only did not differ in socioeconomic status, use of specific generic medications (except prednisone), reaching catastrophic coverage, or multiple chronic diagnoses and procedures. **Conclusions:** In this initial exploration, Medicare Advantage beneficiaries who repeatedly reached the DBT differ from those who only reached it in one year in utilization, selected diagnoses, and use of certain trade-name medications. Several of these brand medications are for pulmonary conditions in individuals with a history of smoking—a finding that deserves additional investigation.

PS2-21:
The Return on Investment of a Laboratory Program to Decrease Adverse Events of ACE Inhibitors and ARBs

David H Smith, PhD, *Kaiser Permanente Northwest*; Marsha A Raebel, PharmD, *Kaiser Permanente Colorado*; K Arnold Chan, MD, ScD, *Harvard School of Public Health*; Eric S Johnson, PhD, *Kaiser Permanente Colorado*; Amanda Petrik, MS, *Kaiser Permanente Northwest*; Jessica Weinstein, MD, *Oregon Health and Science University*; Xiuhai Yang, MS, *Kaiser Permanente Northwest*; Adrianne Feldstein, MD, MS, *Kaiser Permanente Northwest*

Introduction: The efficiency of patient safety interventions is not well studied, including laboratory monitoring for drug therapy. Although 30% of patients receiving inhibitors of rennin-angiotensin system (RAS i.e. ACEI and ARB medications) are not monitored according to guidelines, knowledge of the efficiency of decreasing adverse drug events through monitoring programs above usual care is lacking. **Methods:** We focused on laboratory monitoring of new users of RAS inhibitors to help prevent adverse events of hyperkalemia and acute renal failure. We used a probabilistic decision model to synthesize multiple data sources to inform how increasing monitoring above usual practice changes cost and outcomes from the payer perspective. We accounted for differential timing of costs and benefits and discounted at a 5% rate. Costs included the monitoring program, offsets from reduced care (e.g., hospitalization) and litigation costs. Data from a large integrated health plan were used to estimate the community-based probability of adverse events. The potential to reduce adverse events was estimated from chart review. We examined cost-effectiveness at $30K and $100K per QALY in the overall population, patients with diabetes, and patients with chronic kidney disease (CKD). **Results:** Adverse events were most common in those with CKD; their cumulative incidence rate was 0.041 (95% CI, 0.047 to 0.037) compared to 0.016 (0.017 to 0.014) and 0.010 (0.011 to 0.010) in the diabetes and overall populations, respectively. Intervening on all new users or the subset with diabetes was cost saving <1% of the time. A monitoring program restricted to patients with CKD was cost saving with a probability of 95% in the base case. In CKD patients, if the program was only half as effective, the probability of cost savings was 65%; if the program had a lower uptake rate (49% instead of 82%) the probability of cost-savings was 30%. Intervening on all patients, or the subset with diabetes, was never cost-effective with a probability exceeding 5%. Intervening on patients with CKD was cost-effective at least 65% of the time even under the most pessimistic scenario. **Discussion:** Our findings illustrate that, for laboratory monitoring to be cost-effective using commonly accepted definitions, the patient population must be at high enough baseline risk of adverse events. Further inquiry into the willingness to pay for patient safety interventions is needed.

PS2-29:
Development, Implementation and Evaluation of a Web-based Curriculum on Pharmaceutical Marketing and Prescribing

April L Salisbury, MBA, *Lovelace Clinic Foundation*; Margaret J Gunter, PhD, *Lovelace Clinic Foundation*; Robert White, MD, *Lovelace Clinic Foundation*

Background/Aims: To develop, implement, and evaluate a web-based curriculum on drug marketing and prescribing with funding from off-label marketing lawsuit settlement funds. **Methods:** Content experts developed a course entitled "Optimal Prescribing" in two stages: a live pilot and a web-based course consisting of modules with slides, video clips, narration, cases, interviews, and interactive elements. The course was presented to physicians and midlevel providers from the Lovelace Health System in Albuquerque, New Mexico. Feedback was collected at the live pilot and participants were surveyed later, as well as a control group of providers who did not attend the pilot course, to assess the impact of the education on attitudes about relationships with industry representatives, the amount and source of information that guides prescribing decisions, and self-reported changes in prescribing patterns. Data were analyzed and summarized to revise the material to produce web-based modules for use by prescribers in the public domain. The final web-based, 3-credit course includes a pretest, posttest, and a 90-day follow up survey, which are currently being collected. **Results:** In the first two months the course was available, 173 people accessed it and 40 successfully completed it, earning credit (16 more took the posttest, but did not pass). Initial reports on the learner's performance show improvements on all posttest questions. Of the 20 questions 17 showed >10% improvement, with a maximum 37.12% improvement. The greatest improvements were in the learner's ability to: 1) acknowledge the fact that even very brief sales calls can result in a 16% increase in drug sales, 2) distinguish absolute from relative risk reduction, and 3) identify acceptable evidence for off-label choices. Of the total users, 78% would recommend this course to colleagues (29.35% said yes, enthusiastically). **Conclusions:** Optimal Prescribing has been piloted, revised, and launched as a web-based course, and is being accessed by a number of people with positive results; however, less than 25% have fully utilized the course and earned continuing education credit. Data collection and analysis will continue over the remainder of the 3-year life of the course and may lead to improvements in course design.

Research Administration

C-A1-01:
HMORN Administrator's Annual Review and Planning

The administrator's group will review the activities and projects that were planned during the 2008 conference and solicit ideas for the coming year. Please join in the discussion — we'd love to have participation from all member organizations. Current activities being discussed include Effort Reporting, Subcontract and Data Use Agreement Templates, Website Development, Organizational Structures and Benchmarking, Recruitment and Development of Research Administration Staff.

C-B1-01:
Using an Electronic Medical Record to Document and Track Research Activities and Expenditures

Ted E Palen, PhD, MD, MSPH, *Institute for Health Research, Colorado Permanente Medical Group*; Deanna Kurz, BA, CCRP, *Institute for Health Research, Kaiser Permanente Health Plan of Colorado*

Background: Patients enrolled in research studies need to have research related events such as laboratory orders and results, radiology orders and results, study related medications, diagnoses, adverse events, and other clinical events documented and tied to research encounters. Recording these activities within an electronic medical record (EMR) facilitates efficient tracking of resource utilization and cost accounting related to research activities. **Session Goals:** Using Epic Systems Corporation (Verona, Wisconsin) EMR, we will demonstrate how research encounters are scheduled, tied to a research study guarantor account, and how the research encounter is used to document research activities. We will demonstrate how

to track research specific activities for utilization management, for cost accounting, for study related reporting, and for reimbursement of ancillary departments for research services. We will discuss the documentation of regulatory and compliance requirements within a research encounter and link them to research related activities.

C-D1-01:
Moving From Island of Excellence in Oceans of Secrecy to Supporting Scientific Excellence as a Team

Helga S Ding, DDS, MBA, MHA, *Group Health, Center for Health Research*; Ylanda Thomas, BA, *Group Health, Center for Health Research*

Background/Aims: Group Health Cooperative has adopted the Lean management system as a key organizing methodology for eliminating waste and inefficiency in the healthcare environment by organizing the work around value provided to the customer. This poster presentation demonstrates how the Center for Health Studies, the research arm of Group Health Cooperative, applied Lean principles to the grant application submission process with the goals of improving quality and customer service by reducing waste and defining standard work. Before applying Lean methodology, the application submission process was inefficient, often requiring timeintensive, heroic efforts from project and administrative members to submit an application for funding on time. Roles were not clear and work was performed in isolation or silos. Duplicate and rework often occurred. This resulted in poor staff morale and customer requirements not being met. There were no established standards and best practices were often not shared resulting in different and inconsistent approaches to the work with variable outcomes. **Methods:** Using the two organizing principles of Lean, "continuous improvement and respect for people," as the foundation for this project, we used a combination of quantitative and qualitative research methods. We conducted a survey of key stakeholder groups and observed work processes during a major grant-application funding cycle. Once the data was collected, a cross-functional group of stakeholders held a rapid process improvement workshop over a period of one week to review data, develop improvement targets, and develop a standardized process. The process improvements were implemented over a period of three months. **Results:** By reducing waste and implementing standard work across the application submission process, the project and research teams improved their working relationships, improved stakeholder and customer satisfaction, improved workflow, eliminated significant non value added steps and improved their capacity to respond to fast turnaround requests. **Conclusions:** Lean tools and processes enabled the Center to reduce waste and inefficiency across the application submission process and grow internal capacity. Teams are better equipped to recognize and remedy daily work issues, increasing overall responsiveness to changes and challenges in the funding environment. Daily leadership and management is a critical element to succeeding in sustaining these improvements.

Virtual Data Warehouse

PS1-36:
VDW Pharmacy File: Strengths, Weaknesses, and Recommendations

Kristen M Moore, MPH, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; T Craig Cheetham, PharmD, MS, *Department of Research and Evaluation, Kaiser Permanente Southern California*; Sascha Dublin, MD, PhD, *Group Health Center for Health Studies*; Julia Hecht, PhD, MPH, *Group Health Center for Health Studies*; Scott Robinson, MA, MPH, *Lovelace Clinic Foundation*; Jeffrey S Brown, PhD, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*

Background: The HMO Research Network (HMORN) Virtual Data Warehouse (VDW) is a series of dataset standards and automated processes designed to facilitate the process of multisite research. It is virtual in that there is no centralized database; data continue to reside locally. Our objective was to assess the cross-site availability and completeness of the outpatient prescription dispensing or Pharmacy file. **Methods:** The VDW Pharmacy Working Group created a data checking plan to assess overall data availability and completeness of the Pharmacy file. A distributed SAS program was run at each HMORN site with a VDW Pharmacy file (n=11), with de-identified summary count data returned for analysis. The key Pharmacy file variables were National Drug Code (NDC), days supplied, and amount dispensed. NDCs were considered nonstandard for these reasons: not having exactly 11 digits; containing a character; or consisting of a single repeated number (e.g., 99999999999). For days supplied and amount dispensed, values of < 0, 0, > 500, or missing and values of < 0, 0, > 1000, or missing were considered out of typical range, respectively. **Results:** Eleven sites have Pharmacy data from 2000 June 2007; some have data going back more than 10 years. There were 61 million dispensings in 2007, with an average 5.1 million monthly dispensings among 2 million monthly users. Average monthly dispensings per user was 2.5, and the range across sites was 2.2–2.9. Across all sites from 2000–2007, < 0.1% and 0.3% of dispensings had a missing or nonstandard NDC, respectively; and 0.1% and 0.3% had days supplied and amount dispensed out of typical range, respectively. Few dispensings were for over-the-counter medications (5%), medical supplies (2%), or infusions (0.1%). 89% of elderly (age > 65) with a drug benefit had at least 1 annual dispensing (average monthly dispensings per user, 3.5), compared to 52% of those without a benefit (average, 3.2). **Conclusions:** The VDW Pharmacy file has good overall data quality, with few problems found, especially since 2000. Investigators can have confidence in the data in the Pharmacy file but may choose to limit studies to more recent years.

PS1-08:
The VDW Census File: Strengths, Issues, and Recommendations for the Future

Roy Pardee, JD, MA, *Group Health Center For Health Studies*; Chyke Doubeni, MD, MPH, *Meyers Primary Care Institute*; Tracy Onega, PhD, *Dartmouth Medical School*; David Carrell, PhD, *Group Health Center For Health Studies*; Wansu Chen, MS, *Kaiser Permanente Southern California*; Irina Miroshnik, PhD, *Harvard Pilgrim Health Care*

Background/Aims: The VDW's Census file contains demographic and socioeconomic data not available anywhere else. This makes it a unique resource for VDW research including studies using Geographic Information Systems data. However, the extent and quality of Census file data at implementing sites has not been subjected to systematic scrutiny. The VDW Census Workgroup was formed under the auspices of the new HMORN governance of the VDW. This workgroup is charged with assessing the census file specification and the quality of the implemented files at HMORN sites. The objectives for the workgroup are to: 1) document area-level data that are currently available at each HMORN site; 2) determine the completeness and consistency of the data; and 3) provide recommendations for improving the scope and completeness of the data in the VDW Census file. **Methods:** The workgroup has prepared specifications for a set of descriptive tables, and a metadata survey inquiring how sites have implemented the current Census file. We are currently writing a VDW program to generate site-specific descriptive data. **Results:** Our report to the Operations Committee will focus on extent and quality of the Census file data at the various sites, and the consistency in implementation of the specifications across sites. The proposed poster will highlight our findings and provide a more comprehensive view of the available data. The workgroup is currently analyzing data from the metadata survey. A VDW program is being written to generate a rich set of site-specific data. The final report will serve as a basis for establishing the current state of the Census files at each site, and for making recommendations for future improvements. It will also serve as a useful reference for future grant writing efforts. **Implications:** We anticipate that the products will facilitate use of the Census File data within and across sites to augment and/or generate research within the CRN that requires detailed geographic data. Our data completeness and quality summaries will enable researchers to assess the feasibility and potential utility of the Census File within their research projects. **Conclusions:** We expect to conclude that the data are of general high quality at the sites, but that current ambiguities in the specification will need to be remedied.

PS1-10:

Laboratory Content Area Development Within the Virtual Data Warehouse

Marsha A Raebel, PharmD, *Kaiser Permanente Colorado Institute for Health Research*; Gwyn Saylor, BA, *KPCO Institute for Health Research*; Richard J Krajenta, BS, *Henry Ford Health Systems*; Jeremy McCauley, MBA, *Marshfield Clinic Research Foundation*; Paul Hitz, BS, *Marshfield Clinic Research Foundation*; Terese A DeFor, MS, *HealthPartners Research Foundation*; Susan Andrade, ScD, *Meyers Primary Care Institute*

Background: HMORN leadership charged several Workgroups to check and describe Virtual Data Warehouse (VDW) data areas, provide observations on data quality across sites, and recommend needed actions. Availability of laboratory (lab) results data in the VDW in a standardized format is desirable, but across HMORN sites, lab content is either incompletely developed or not built at all. Further, there is little consistency across sites with regard to the approach to adding lab content. The work of the VDW Lab Content Area Workgroup (Lab Workgroup) therefore focused on developing a standardized approach to incorporating lab content. We describe development and implementation efforts to create and maintain a standardized lab result content area across HMORN sites. **Methods:** The Lab Workgroup identified priorities: 1) Establishing standardized naming conventions for variables; 2) Determining test results to be initially incorporated; 3) Encouraging site-specific exploration and development of lab information system content as well as lab department contacts; 4) Developing a lab test reference document; 5) Serving as content area experts; and 6) Conducting content quality checks. A list of possible tests to incorporate was circulated to HMORN sites. The Lab Workgroup wrote code to generate descriptive data and data checks across sites for glycated hemoglobin (HGBA1C) and serum potassium result content. A lab test metadata table was posted for site data managers to complete. **Results:** Incorporation of chemistry tests that were most often requested for research was identified as an initial priority. Microbiology and tumor markers content were other high priority areas. Standardized lab variable naming conventions were determined for the list of initial tests. Results of data checks for HGBA1C and potassium concentration results will focus on describing the extent and quality of these files at sites, as well as identify potential issues to be addressed. Sites were surveyed about the barriers, facilitators, and priority of adding lab content to VDW. Results of all this work as well as an excerpt from the lab test reference document will be presented. **Conclusions:** The availability of lab test results information in the VDW in a standardized, extractable format across HMORN sites is a technological advance in data availability and sharing. The work described here will provide important initial insights into the lab content area potential of the HMORN VDW.

PS1-16:

Quality Assurance in the VDW TUMOR File

Richard J Krajenta, BS, *Henry Ford Health System*; Lois E Lamerato, PhD, *Henry Ford Health System*; Karen Wells, BA, *Henry Ford Health System*

Background: The VDW TUMOR database is constructed using nationally standardized variable definitions. The North American Association of Central Cancer Registries (NAACCR) is a professional agency for establishing data standards. The database is NAACCR compatible with respect to variable definitions and record layout. Many of the CRN sites are also Surveillance, Epidemiology, and End Results (SEER) Program sites. SEER collects data from specific geographic regions representing 26% of US population and is demographically diverse. Access to SEER data provides a mature data source and familiar variable list for use in cancer research. Non SEER site can access comparable data using either hospital based or State based data collection systems. **Methods:** The TUMOR content quality team was formed to examine data quality to report back to the VDW operations committee. Frequency of values in selected fields can be used to indicate data quality. The team has decided to test for non standard values, number of unknowns (stage, anatomic site others), sex specific cross tabs (i.e., males with female GYN cancer, females with prostate cancer) and histology frequencies by year to detect outliers. In addition to identifying areas for quality improvement, the TUMOR content team will evaluate the need for additional references to be appended to the VDW data area and suggest future directions to improve the utility of the TUMOR database. The team will also review the need for additional data processing tools (i.e. macros) to facilitate ease of content use. **Results:** Data from 9 sites have tumor data posted to the CRN web counter. This represents 725,000 tumors. Over 77,000 un-staged cancers (10.6%) were identified using the CRN web based cancer counter. The next step is to determine the proportion for which un-staged is an appropriate designation by examining the tumor behavior and other clinical parameters. This process will be used to examine additional variables and provide the TUMOR quality team with guidance on which specific content areas require attention. This work will allow the TUMOR quality team to identify areas for data improvement without distributing many work-plans to each participating sites. **Conclusion:** Examining and documenting the findings of the TUMOR content team will provide a mechanism to establish best practices for use of the TUMOR data. Expanded knowledge of current status will facilitate future additions to the content.

PS1-19:

Method for Using the Electronic Health Record to Create Population Denominators

G Craig Wood, MS, *Geisinger Center for Health Research*; Joseph B Leader, BA, *Geisinger Center for Health Research*; Walter F Stewart, PhD, MPH, *Geisinger Center for Health Research*

Background/Aims: The HMORN includes research centers that are part of integrated delivery systems where the practice and insurance entities are independent. Rules for defining a population denominator at these centers require a consideration of the practice population that is not a member of the insurance entity, as the notion of enrollment and disenrollment is not relevant. We describe methods for defining a population denominator for primary care patients using data from only the electronic health record (EHR), including consideration criteria for dates that are analogous to membership enrollment and disenrollment. The aim of this study was to create a method for calculating population denominators from the EHR based on utilization activity. **Methods:** We modeled data on the pattern of utilization over time to determine start and termination dates for time under observation. Survival analysis was used to estimate the probability of cohort with drawl after various lengths of utilization inactivity. Optimal cutoffs were derived that balanced false positives with false negatives. Since the length of time required for a patient to become inactive is likely dependent upon age and gender (i.e. a typical gap in utilization will tend to be longer for young males as compared to older males), the cutoffs for defining termination dates varied based on patient demographic. **Results:** For each unique patient, the number of encounters were counted for each 6-month time period (i.e. January 1 – June 31, and July 1 – December 31). To define cohort entry, the 6-month period in which the first office visit encounter occurred was used to define a starting date. Enrollment was considered active until the patient failed to have any encounters with a primary care clinic for an age/gender specific cutoff of number of consecutive 6-month periods, at which point the end date will be retroactively assigned to the end of the 6-month period in which the final encounter occurred. **Conclusions:** EHR utilization can be used to define population denominators. Validation of the proposed method needs to be conducted by comparing results to insurance enrollment spans. This application is limited to clinical areas where there is evidence of relatively complete capture.

PS1-20:

VDW Operational Committee: Current Activities and Future Directions

Jeffrey Brown, PhD, *Department of Ambulatory Care and Prevention, Harvard Pilgrim Health Care*; Sarah McDonald, BA, *Group Health Center for Health Studies*; Kristen Moore, MPH, *Department of Ambulatory Care and Prevention, Harvard Pilgrim Health Care*; Gwyn Saylor, BA, *Institute for Health Research, Kaiser Permanente Colorado*; Gene Hart, MS, *Group Health Center for Health Studies*; Mark Hornbrook, PhD, *Center for Health Research, Kaiser Permanente Northwest*; David Magid, MD, MPH, *Institute for Health Research, Kaiser Permanente Colorado*; Alan Go, MD, *Division of Research, Kaiser Permanente Northern California*

Background/Aims: The Virtual Data Warehouse (VDW) is the HMO Research Network (HMORN) approach for facilitating multisite research while protecting the privacy of members and proprietary corporate information. A valid and sustainable VDW is critical to the success of the HMORN, and is needed for HMORN's inclusion in many of the most important public health initiatives

planned for the next few years. **Methods:** In November 2007 the HMORN Governing Board approved the VDW 5-Year Strategic Plan, including creation of a VDW Operational Committee (VOC), reporting to the Assets Stewardship Committee (ASC) and providing coordinated oversight of the development, maintenance, and enhancement of the VDW. The seven members of the VOC are investigators and analysts representing HMORN's major consortia projects: CERT, CVRN and CRN. **Results:** In 2008, the VOC accomplished two major short term goals: 1) Creation of a comprehensive data quality checking system, implemented by seven content area expert Working Groups (WGs) consisting of 23 investigators and 23 programmer\analysts. The content areas of the WGs are enrollment and demographics, pharmacy, utilization, tumor, vital signs, laboratory, and census. The WGs assessed data availability and completeness for their content area and reported findings to the VOC and ASC, including recommendations for changes and enhancements. WG reports will form the basis for ongoing VDW documentation that will be used to standardize HMORN VDW descriptions for grants and proposals; 2) Development of a budget, staffing plan and priorities for 2009. The 2009 priorities include development of VOC standard operating procedures for creating new data content areas and changing current data areas/definitions, documenting policies for use of the VDW, promoting use of the VDW, and creation of additional WGs for death (new VDW content area), informatics, implementation, and data documentation. The documentation WG will oversee issues such as data dictionaries, data checking documentation, programming resources, a clinical concepts library, user guides, and incorporating updated VDW information in the HMORN Collaboration Toolkit. Looking forward, the VDW 5-year Strategic Plan includes streamlining IRB approval for multisite research and enhancing HMORN informatics capabilities. **Conclusions:** The newly created VOC has made substantial progress in helping make the HMORN VDW an even more valuable and useful resource for the network.

PS1-22:

The VDW Vital Signs File: Strengths, Issues, and Recommendations for the Future

Amy L Butani, BA, *HealthPartners Research Foundation*; Nancy Sherwood, PhD, *HealthPartners Research Foundation*; Kenneth Adams, PhD, *HealthPartners Research Foundation*; G Craig Wood, MS, *Geisinger Center for Health Research*; Yury Vilk, PhD, *Harvard Medical School*

Background/Aims: The Virtual Data Warehouse (VDW) Vital Signs file is an important data source for clinical information that is often used in VDW based research. Vital signs traditionally include pulse, diastolic blood pressure, systolic blood pressure, respiratory rate, and body temperature. This file contains multiple records of these data for each patient as well as related data such as measure date, height, weight, body mass index, and position for blood pressure reading. Despite this importance, it has not thus far been subjected to broad, systematic scrutiny for the extent and quality of the data at implementing sites. That is soon to be remedied by the subject effort of the proposed poster. We have devised an analysis plan and are writing code to generate copious amounts of descriptive data. These data and our group's cross-site analysis thereof will be documented in a report to the HMORN. The report will serve as a basis for establishing the current state of the Vital Signs files at implementing sites, and for making recommendations for future improvements. It should also prove quite useful as a reference for future grant writing efforts. **Methods:** Data set subject area committees were formed as part of the new HMORN governance of the VDW, composed of programmers and investigators from each site. Each committee has been charged with stewarding its particular dataset specification, and assuring the quality of the implemented files at the various HMORN sites. The Vital Signs subcommittee has prepared specifications for a set of descriptive tables, and a metadata survey inquiring about how the sites have interpreted the current Vitals file specification. Subcommittee members are in the process of writing a VDW program that will be run at each site to produce the desired descriptive tables. **Results:** Our report to the Operations Committee will focus on describing the extent and quality of the Vital Signs file data at the various sites, pointing out any inconsistencies in implementations and making recommendations for changes in the specifications. The proposed poster will highlight our findings. **Conclusions:** The report will evaluate the extent and quality of vital signs across HMORN sites and identify current ambiguities in the specification that will need to be remedied.

PS1-24:

Proof of Principle Demonstrations of a Distributed Research Network: Findings and Lessons Learned

Jeffrey S Brown, PhD, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; John H Holmes, PhD, *University of Pennsylvania School of Medicine*; Ross Lazarus, MBBS, MPH, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*; Robert Langer, MD, MPH, *Geisinger Center for Health Research*; David Magid, MD, MPH, *Institute for Health Research, Kaiser Permanente Colorado*; Andrew Nelson, MPH, *HealthPartners Research Foundation*; Joe Selby, MD, MPH, *Division of Research, Kaiser Permanente Northern California*; Edward Wagner, MD, MPH, *Group Health Center for Health Studies*; Richard Platt, MD, MS, *Department of Ambulatory Care and Prevention, Harvard Medical School and Harvard Pilgrim Health Care*

Researchers, policy makers and others commonly use electronic data routinely collected during the delivery of, or payment for, medical care to study the "real world" effectiveness, comparative effectiveness, safety, and costs of medical interventions. However, even very large individual healthcare data resources are often not big enough to adequately conduct post-marketing evidence studies. To improve the ability to use multiple distributed data resources, like the HMORN's Virtual Data Warehouse, the Developing Evidence to Inform Decisions about Effectiveness (DEcIDE) centers at the HMORN Center for Education and Research on Therapeutics (CERT) and the University of Pennsylvania are developing a design for a scalable distributed research network. Funded by AHRQ's Effective Health Care Program, the project intends to develop the framework for a distributed research network that will help close the knowledge gap regarding the "real world" effectiveness, comparative effectiveness, and safety of medical technologies. The network will have these important attributes: distributed architecture, strong local control of data uses, and federated querying. Constructing the network is a challenge, even among sites with fully operational local virtual data warehouse (VDW) installations, because of differences in computing environments and information systems, the need for responsible stewardship of clinical records, concerns related to data privacy, software development obstacles, the use of proprietary data, and the need to develop effective governance mechanisms. To investigate some of these issues, the project includes implementation of a proof of concept prototype involving these HMORN sites: Kaiser Permanente Northern California, Kaiser Permanente Colorado, Harvard Pilgrim Health Care, Group Health Cooperative, and Geisinger Health System. The goals of the proof of concept work are to distribute a query to separately stored data resources, execute the query remotely, and present aggregated results to an authorized system user. The proof of concept will be designed with a single network portal that manages the network software, including security, authorization, authentication, messaging, and query aggregation. We will present our findings from the proof of concept, including information on specific architecture and design used, the success of the proof of concept, and lessons learned from implementation.

PS1-26:

The VDW Demographic and Enrollment Files: Strengths, Issues, and Recommendations for the Future

Mark C Hornbrook, PhD, *Center for Health Research, Kaiser Permanente Northwest*; Roy E Pardee, JD, MA, *Center for Health Studies, Group Health*; Paul Hitz, BS, *Marshfield Clinic Research Foundation*; Mark Schmidt, BA, *Center for Health Research, Kaiser Permanente Hawaii*

Background/Aims: The VDW Demographic and Enrollment data files contain basic demographic data on all HMO members. These data include details of membership (start and end dates, whether drug coverage was included, type of insurance [Medicare, Medicaid, etc]). Demographic data include birthdate, gender, race/ethnicity. Demographic and enrollment data give the information needed to enumerate and begin describing a potential or actual study population. These data can be combined to give interesting and informative views into the different populations at the participating HMOs. This poster will describe the variations in data validity and completeness between the various HMOs, including age distributions, Medicare/Medicaid enrollment, variations in availability of race/ethnicity data, and recommendations for future improvements. **Methods:** The VDW Demographic/Enrollment QA committee was formed as part of the new HMORN governance of the VDW. This committee is charged with analyzing the quality of the demographic and enrollment VDW files at the various

HMORN health plans. The subcommittee has prepared a list of quality assurance tables, and is in the process of writing VDW programs to produce them. There is an ongoing interest in the ethnic diversity of our combined HMO population and a renewed interest in studying health care disparities. It is important that we can use the race/ethnicity data to describe our populations in appropriate terms. The Quality Assurance subcommittee is developing a set of programs to produce useful population descriptions using different methods to combine and report multiple ethnicities. These reports can provide the information needed in grant proposals, IRB progress reports and for study reports. **Results:** Our report to the Operations Committee will describe the extent and quality of the VDW Demographic and Enrollment data at the various sites, identifying inconsistencies and making recommendations for changes in the specifications. The proposed poster will highlight our findings. **Conclusions:** We anticipate that the data are of high quality, however, we do expect to find some limited inconsistencies among health plans. In addition, we anticipate that we will recommend some enhancements to the specifications.

PS1-27:
The HMORN VDW Utilization Files: Strengths, Issues, and Recommendations for the Future

Don Bachman, MS, *Center for Health Research, Kaiser Permanente Northwest*; Debra Ritzwoller, PhD, *Kaiser Permanente Colorado*; Terry Field, DSc, *Meyers Primary Care Institute*; Julia Kay, *Kaiser Permanente Northern California*; Mark Schmidt, *Center for Health Research, Kaiser Permanente Hawaii*; Jennifer Ellis, MSPH, *Kaiser Permanente Colorado*; Lauren Perkins, *Center for Health Research, Kaiser Permanente Georgia*

Background/Aims: The VDW utilization files contain encounter, diagnosis, and procedure information from outpatient, inpatient, and long-term care encounters. The utilization files are an incredible resource and can be used to determine study eligibility, build disease registries, track access and patterns of care, measure health status, calculate costs, and evaluate appropriateness of care. The utilization files are constructed from many local data sources that vary significantly across heath plans with respect to their content and structure, so building standardized VDW utilization files requires complex decisions and programming. Thus, it is vital that the utilization data be systematically scrutinized for quality and consistency within and across all HMORN health plans. Although the utilization files have been used for various projects and studies, these data have not been systematically reviewed across health plans. The purpose of this analysis is to identify data quality and consistency issues across the VDW utilization files. **Methods:** Dataset subject area committees were formed as part of the new HMORN governance of the VDW. Each committee is charged with analyzing the quality of the subject area VDW files at the various HMORN health plans. The Utilization QA subcommittee has prepared a list of quality assurance tables and implemented a metadata survey inquiring about how the sites have interpreted the utilization data specifications. From the utilization files, we have created tables that compare annual health plan utilization rates for many variables like type of encounter, diabetes diagnoses, ultrasounds, etc. Data values are also validated against the VDW specifications. **Results:** Preliminary analyses based on the VDW utilization data show that inpatient stay and hip fractures rates are consistent across health plans and remain stable over time. This poster describes the extent and quality of the utilization data at the various sites, identifying inconsistencies and making recommendations for changes in the specifications. **Conclusions:** While we anticipate that the data are of high quality, we do expect to find some limited inconsistencies among health plans. The report will serve as a basis for establishing the current state of the utilization files at the HMORN health plans, and for making recommendations for future improvements. It should also prove quite useful as a reference for future grant writing efforts.

PS1-38:
Catalyzing Innovation at the Front Lines of Health Care

Leah Tuzzio, MPH, *Group Health Center for Clinical Studies*; Judith Schaefer, MPH, *Group Health Center for Clinical Studies*; David McCulloch, MD, *Group Health Center for Clinical Studies*; Sarah M. Greene, MPH, *Group Health Center for Clinical Studies*; Susan Bennett, *Group Health Center for Clinical Studies*; Adele Clark, *Group Health Center for Clinical Studies*; Brian Austin, *Group Health Center for Clinical Studies*

Background/Aims: To find new ways for Group Health, its research center and its community foundation to work together, we pilot tested the Partnership for Innovation, a grant program to encourage and seed organization wide innovation. Innovation is defined as new ideas or approaches that have the potential to add value and change the way the organization works. The program gives staff funding to develop, implement, and evaluate innovations within the healthcare system. Evaluations assess the effect of the innovations in terms of costs, patient satisfaction, organizational readiness, and other aspects. These results inform decisions about adopting the innovation organization wide. **Methods:** We disseminated an initial call for proposals to medical center leaders, and developed a two-step selection process in which we first reviewed brief concept proposals for their innovativeness, likely effectiveness, impact, feasibility, congruence with strategic priorities, and overlap with other efforts. We next invited selected applicants to expand their proposals for review by the program's steering committee. In step three, the Partnership program itself was refined and improved through Plan-Do-Check-Act cycles after each of the two funding rounds in 2008. **Results:** We received 19 proposals in 2008 (12 in the first round). Funded proposal topics included nasal flu vaccine for children, an online chronic disease self-management program, infectious disease management for long-term care facilities, and enhancing medication safety for patients with complex medication regimens. The first round of four pilots are currently underway and the second round of two funded pilots will begin in 2009. Viable but unfunded proposals were rerouted to other departments to encourage discussion about whether the idea could be developed through other channels. **Conclusions:** Offering a pilot grant program to frontline staff may enhance engagement, empowerment, and creativity. Evaluating the pilot programs is an essential component of this initiative, both to improve the pilots themselves, and the innovation program as a whole. The partners found the collaboration promising and worth continued funding in 2009.

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