Selected Abstracts from the
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Cancer

A2-1:
Patterns of Colorectal Cancer Testing in Men and Women Newly Eligible for Screening
Karen Wernil1; Rebecca Hubbard1; Eric Johnson1; Jessica Chubak1; Aruna Kamineni1; Carolyn Rutter1

1Group Health

Background/Aims: Since 1993, the US Preventive Services Task Force has recommended screening to prevent colorectal cancer among average risk adults, beginning at age 50. Many studies over the past 20 years evaluated factors associated with screening uptake; however, few have focused on individuals who are newly eligible (i.e., those turning 50 years). We evaluated patient characteristics associated with uptake and time to initiation of colorectal cancer tests in a population newly-eligible for screening.

Methods: The study included 128,358 individuals who were members of an integrated care delivery system (Group Health) and enrolled on their 50th birthday from 1996-2011. We assessed receipt of colorectal cancer tests within 5 years of eligibility, and calculated the median time to first test. We examined patient characteristics associated with use of colorectal cancer tests overall using Cox proportional hazards models.

Results: Stool-based tests were most commonly used, with uptake ranging from 35-40% of the cohort across the study period. The proportion of individuals initiating colorectal cancer testing via colonoscopy increased from 3% in members becoming eligible in 1996-1998 to 21% in 2005-2007. Time to first test varied across test types. Median time to the first test was 3 months shorter in members who chose stool-based tests (25.2 months) compared to those who chose colonoscopy (28.2 months) among members newly eligible in 2005-2007. However, we observed no temporal changes in median time to first test, conditional on test type. Characteristics associated with increased uptake included more recent enrollment at age 50 (e.g., 2008-2010:HR = 2.16, 95% CI 2.09-2.23) and Asian background (HR = 1.08, 95% CI 1.05-1.11). Factors associated with reduced uptake included being a woman (HR = 0.93, 95% CI 0.91-0.94), African-American (HR = 0.95, 95% CI 0.91-0.99) or Pacific Islander (HR = 0.86, 95% CI 0.76-0.96), diagnosed with diabetes (HR = 0.88, 95% CI 0.85-0.91) and being moderately or severely obese (HR = 0.83, 95% CI 0.81-0.85 and HR = 0.75, 95% CI 0.73-0.77, respectively).

Conclusions: Patient characteristics associated with initiation of colorectal cancer testing in a newly eligible population are similar to previous findings among all-age eligible adults. Further, while the time to the first test remained stable, there was an increase in colorectal cancer testing during the study period.

Keywords: Screening; Colorectal Cancer; Prevention

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A2-2:
Systems of Support to Increase Colorectal Cancer Screening (SOS): A 2-Year Randomized Trial of an Automated Intervention with Stepped Increases of Support to Increase Uptake of Colorectal Cancer Screening
Beverly Green1; Ching-Yun Wang2; Melissa Anderson1; Sally Vernon1; Jessica Chubak1; Richard Meenan2; Sharon Fuller2

1Group Health; 2Fred Hutchinson Cancer Center; 1University of Texas School of Public Health; *Kaiser Permanente Northwest

Background/Aims: Screening decreases colorectal cancer (CRC) incidence and mortality, yet almost half of age-eligible patients are not screened at recommended intervals. Our objective was to determine whether interventions using electronic health records, automated mailings, and stepped increases in support increased being current for CRC testing over 2 years.

Methods: Setting and participants: SOS was a four-arm parallel design randomized controlled comparative effectiveness trial with concealed allocation and blinded outcome assessments (ClinicalTrials.gov registration number: NCT00697047). Patients aged 50-73 at baseline (n = 4674) not current for CRC screening and with no life-threatening illnesses from 21 primary care medical centers were randomized. Interventions: Usual care (UC), Automated mailed (Automated), Automated plus medical assistant telephone assistance (Assisted), or both Automated and Assisted interventions plus nurse navigation until testing was completed or declined (Navigated). Interventions were repeated in year 2. Measurements: Primary outcomes were the proportion current for screening in both years, defined as completion of a colonoscopy or sigmoidoscopy in year 1, or fecal occult blood test (FOBT) in year 1 and either FOBT, colonoscopy, or sigmoidoscopy in year 2.

Results: Compared to UC, intervention patients were more likely to be current for CRC screening for both years of the study, with incremental increases by intervention intensity (UC 26.5% vs. Automated 50.7%, Assisted 57.7%, or Navigated 64.4% P < .001). Automated interventions increased CRC screening in all patient subgroups compared to UC. The higher-intensity Assisted and Navigated interventions were less effective in patients age ≥65, and African American/Blacks and those reporting mixed race. Two-year intervention cost estimates were $57,000 for Automated, $67,000 for Assisted, and $79,000 for Navigated. Inclusion of CRC test costs produced total intervention costs of $314,000, $342,000, and $390,000 for three arms respectively, compared to $339,000 for UC costs for CRC tests alone. Conclusions: A low-cost stepped intervention that leveraged automated data and centralized processes led to twice as many people being current for CRC screening over 2 years. The rapid growth of electronic health records provides opportunities for spreading this model broadly.

Keywords: Colorectal Cancer; Screening; Electronic Health Records

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A2-3:
Pass this Message Along: Self-Edited Email Messages Promoting Colon Cancer Screening Among Friends and Family
Sarah Cutrona1; Douglas Roblin2; Joann Wagner3; Bridget Gaglio4; Andrew Williams5; Rosalie Torres Stone6; Kathleen Mazor7

1Fallon Community Health Plan / Reliant Medical Group; 3Kaiser Permanente Southeast; 5Kaiser Permanente Mid-Atlantic; 7Kaiser Permanente Hawaii; 6University of Massachusetts Medical School

Background/Aims: Encouraging communication within a social network may promote uptake of desired medical services or health behaviors. Little is known about the use of this approach to promote colorectal cancer (CRC) screening. We conducted in-person interviews with 438 insured adults ages 42-73 in Massachusetts, Hawaii, and Georgia.

Methods: Participants were shown a sample message in which the sender shares that he has completed a colonoscopy and urges the recipient to discuss CRC screening with a doctor. We asked participants to edit the message to create one they would be willing to send to friends and family via email or postcard. Changes to the message were recorded. Edited text was analyzed for content and concordance with original message.

Results: The majority of participants (61.6% [270/434])...
modified the message; 14.2% added to or reframed the existing personalizing words (e.g., adding “because I love you”), 10.3% (45/434) added urgency to the message (e.g., “please don’t delay”) and 8% (35/434) added reassurance (e.g., “It’s really not that bad”). Almost one in five (18.3%; 80/434) deleted a negatively framed sentence on colon cancer risks. In 46.5% (195/434) of cases, the meaning of at least one sentence was changed but only 2.7% (12/434) created messages with factual inaccuracies. **Conclusions:** Modifiable messages transmitted within a social network offer a way for screened individuals to promote CRC screening. Further study is needed to identify the optimal combination of user-generated content and pre-written text, allowing for creation of messages that are acceptable to senders, persuasive, and factually accurate.

**Keywords:** Communication; Cancer Screening; Social Network

**A2-4:** Preventive Health Service Use Among Colorectal Cancer Survivors Compared to Age- and Gender-Matched Controls

Jennifer Elston Lafata1; Ranzi Salloum1; Paul Fishman1; Maureen O’Keeffe-Rosett1; Debra Ritzwoller4; Mark Hornbrook6

1Henry Ford Health System; 2Group Health; 3Kaiser Permanente Northwest; 4Kaiser Permanente Colorado

**Background/Aims:** Because of advances in early detection and treatment, many colorectal cancer (CRC) survivors now live for decades. Among survivors, the mortality risk from co-morbid conditions—particularly cardiovascular disease—exceeds the risk from cancer, making the receipt of routine preventive health services important in the survivor population. To date, our knowledge of preventive service use among cancer survivors, especially survivors aged <65 years, remains in its infancy. Using a case/control design, we evaluate receipt of preventive health screenings among HMO-insured CRC survivors. **Methods:** Tumor registry data available within four geographically diverse HMOs were used to identify CRC cases aged ≥50 years diagnosed with non-metastatic disease and treated with curative intent between 1/1/2000 and 12/31/2008. Age and gender distribution-matched controls without a cancer diagnosis were also identified and assigned a pseudo-diagnosis date. HMO administrative and encounter data were used to identify insurance coverage and treatment dates, and socio-demographic and health care use information. Cases and controls, stratified by age (<65 vs. ≥65), were followed annually for up to five years post-treatment. Differences in annual service use between cases and controls were evaluated using chi-square tests. **Results:** We identified N = 561 cases and N = 5,114 controls aged <65, and N = 1,268 cases and N = 13,720 controls aged ≥65. Forty six percent of both cases and controls aged <65 and 52%/53% of cases/controls aged ≥65 were female. In the first year following treatment, cases aged <65 were significantly (P < 0.01) more likely to use colorectal and cervical cancer screening compared to controls (59 vs. 18%, and 87 vs. 76%, respectively), but significantly less likely to undergo cholesterol testing (30 vs. 48%). An identical pattern was observed among cases aged ≥65 (47 vs. 18%, 93 vs. 79%, and 39 vs. 50%, respectively). Regardless of age, no differences were detected in use of mammography or bone densitometry among female cases and controls. These same differences and similarities persisted through the third year of follow up. **Conclusions:** CRC survivors, regardless of age, receive recommended preventive health screenings, particularly cancer screening, at rates equal to or exceeding non-cancer controls. However, CRC survivors are less likely to receive cholesterol screening, potentially increasing their risk of cardiovascular-related morbidity.

**Keywords:** Cancer Survivors; Preventive Health Services

**A2-5:** Factors Independently Associated with Receiving First-Line Bevacizumab for Advanced Non-Small Cell Lung Cancer

Thomas Delate1; Kimberly Won1; Nikki Carroll1; Lawrence Kushi2; Mark Hornbrook4; Erin Bowles6; Debra Ritzwoller6

1Kaiser Permanente Colorado; 2Kaiser Permanente Northern California; 4Kaiser Permanente Northwest; 6Group Health

**Background/Aims:** Bevacizumab has FDA approval for advanced stage (IIIB/IV) non-small cell lung cancer (NSCLC) treatment; however, little is known about its uptake and use in HMOs. The aim of this study was to examine bevacizumab use over time in 4 Cancer Research Network (CRN) HMOs and identify factors associated with its use. **Methods:** Patients aged ≥21 years with stage IIIB and IV NSCLC diagnosed between 2005-2010 at 4 CRN sites who received first-line carboplatin-paclitaxel with (CPB) and without bevacizumab (CP) were included in this retrospective cohort study. Information on patients’ comorbidity burden, sociodemographic, tumor, and chemotheraphy treatment characteristics over time were obtained from the site’s Virtual Data Warehouse. Patient information was contrasted between CPB and CP patient groups using chi-square tests of association and t-tests/rank sum tests for nominal/ordinal and interval-level factors, respectively. Factors with a P < 0.2 in the bivariate analyses and patient sex were included in a multivariate logistic regression model to identify factors independently associated with receiving first-line CPB with adjustment for the clustering of study site. Interactions of age and stage with other factors were assessed. **Results:** A total of 1109 patients were included with 198 (18%) and 911 (82%) in the CPB and CP groups, respectively. Patients who received CPB were more likely than patients who received CP to be younger with lower comorbidity burdens, well/moderate differentiated tumors, non-small cell carcinoma morphology, and diagnosed in the later years of the study (all P < 0.05). Receiving CPB was associated with a non-small cell carcinoma morphology (OR = 1.84, 95% CI 1.21-2.80), well/moderate differentiated tumor (OR = 1.76, 95% CI 1.14-2.74), and diagnosis year (OR = 1.17, 95% CI 1.06-1.30) while inversely associated with age at diagnosis (OR = 0.96, 95% CI 0.95-0.98) (c-statistic = 0.738). No interactions were associated. **Conclusions:** Bevacizumab use in CRN patients with NSCLC was limited but uptake was associated with younger age and tumor factors, and increased over time. The patterns of CPB use in the CRN are consistent with published data that suggest little clinical advantage of bevacizumab in NSCLC patients ≥65 years and where approximately 2/3 of NSCLC patients are diagnosed at ≥65 years. **Keywords:** Lung Cancer; Chemotherapy; CRN

**PSI-3:** Perceptions of Cancer Screening Messages in the Media: How Do Patients Make Sense of Conflicting Messages in the Popular Media Around Cancer Screening?

Suepattra May2; Meghan Halley1; Katharine Rendle1; Caroline Tietbohl1; Dominick Frosch1

1Palo Alto Medical Foundation for Healthcare, Research and Education

**Background/Aims:** Americans are continually exposed to a message in the popular media that more healthcare services leads to better health. With respect to cancer screening, evidence-based guidelines on breast and prostate cancer screening run counter to a similar prevailing message in the popular media, which often encourages patients to “do their part” and screen for the disease. While considerable resources have been invested in the development of evidence-based decision aids (DAs) – patient education tools providing unbiased information about potential options and outcomes of a medical decision – patients may find these tools counter-intuitive because the evidence presented is often in direct contradiction to popular media depictions. Through focus groups and stimulus materials, this study investigated the influence and impact popular media has on medical decision-making for breast, colorectal and prostate cancer screening. **Methods:** Eighteen focus groups were conducted in the San Francisco Bay Area. Participants attended a group focused on screening for one of 3 cancers and completed a brief socio-demographic questionnaire. Using popular media stimulus materials and DAs, the researcher-facilitated discussions explored participants’ perceptions of and motivations to participate in cancer screening. Audiotapes of discussions were transcribed and analyzed to identify salient themes. **Results:** Ninety-two diverse participants recruited from the community participated in one of 18 focus groups (6 per condition). The average age of participants was 53, with slightly more women (55%) than men (45%). Most participants reported Caucasian ethnicity (62%) and had graduated from college (51%). Participants overwhelmingly trusted the DA over popular media stimulus materials. In deliberating the decision of whether to screen, participants drew upon their (a) personal experiences with
providers and the healthcare system, (b) personal experiences with cancer, (c) trust in a particular media source, and (d) ability to pay for screening tests.

Conclusions: Media messaging about cancer screening yielded very little influence on the decision to undergo screening. Rather, when presented with a DA, patients were more likely to place trust in that source, particularly if provided by a doctor. These data suggest a need for greater distribution of evidence-based decision support tools to aid patients in making decisions about cancer screening.

Keywords: Cancer Screening; Media; Cancer Education

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PS1-4: The Nature of Social Support on Breast Cancer Patients’ Treatment Decision-Making

Suepattra May1; Meghan Halley1; Katharine Rendle1; Nicole Ventre1; Dominick Frosch1; Harold Luft1

1Palo Alto Medical Foundation for Healthcare, Research and Education

Background/Aims: With the advent of patient-centered approaches to care, much attention has been directed towards engaging patients in their own care. Healthcare providers seek to achieve this through communication about and inclusion of their patients’ values and preferences under the rubric of shared decision-making (SDM). However, few studies have investigated the role a patient’s social support network (e.g., family members or friends) may play in medical decision-making or considered how discussions outside of the clinical consultation can affect a patient’s treatment decisions. Drawing on interviews with oncology care providers, breast cancer advocates, and women newly diagnosed with breast cancer in Northern California, this study investigated how members of a patient’s social support network can influence treatment decision-making for breast cancer. Methods: In-depth interviews were conducted with (1) oncology care providers and breast cancer advocates, and (2) breast cancer patients at four time points throughout their treatment journey, to explore the influence of others on treatment decision-making. At each interview, patients completed questionnaires assessing health-related quality of life (HRQOL), role preferences, and treatment satisfaction. EHR abstraction and observational field notes augmented patient interview data. Interview data were coded to identify recurrent themes across all interviews and frequency distributions for questionnaire data were calculated using IBM SPSS Statistics 20.

Results: We conducted 20 in-depth interviews with oncology care providers and breast cancer advocates, and over 150 interviews with 41 breast cancer patients. We report on providers’ observations of and experiences with members of their patients’ social networks in treatment decision-making. We also describe how patients themselves consider the involvement of others in their treatment decision-making, identifying several areas of decisional influence. Conclusions: Our interviews illustrate how the current healthcare delivery structure rarely acknowledges the circles of care that can influence decision-making. Lack of attention to the influence a patient’s social support network can have on treatment decision-making may lead to sub-optimal decision-making because these influences are not adequately understood by clinicians. Our findings suggest that patient-centered care and patient engagement must go beyond the dominant dyadic models of patient and provider and include an understanding of the influence of others in patients’ treatment decision-making.

Keywords: Breast Cancer; Decision Making; Social Support

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PS1-5: The HMO Cancer Research Network: Evolution and Current Organization and Activities

Lawrence Kushi1; Heather Claney1; V. Paul Doria-Rose2

1Kaiser Permanente Northern California; 2National Cancer Institute

Background/Aims: The HMO Cancer Research Network (CRN), continuously funded since 1999 through NCI cooperative agreements, provides support for cancer research in non-profit integrated health care delivery systems. Previously, the CRN included core research projects as a major activity. In its recent renewal, the CRN evolved into an infrastructure-only grant, with a major focus on promoting and facilitating collaborative cancer research in these settings. Methods: The CRN setting has characteristics that result collectively in a unique resource for epidemiologic and health services research. These include scientists with expertise in conducting public-domain cancer research in these settings; defined populations with a combined membership of ~8.5 million; clinical and administrative data systems that capture most aspects of care; archived biologic or biopsy specimens for many members; development and implementation of common data elements in the Virtual Data Warehouse (VDW) to support collaborative, multi-institutional research; and access to clinicians and administrators to facilitate translation of research findings to practice. Results: The CRN is led by a Steering Committee with scientists from each CRN institution with a smaller Executive Committee leadership team. With the latest renewal, CRN activities are being modified and enhanced in several areas: establishing an Informatics Core for continual improvement of the VDW’s data model and data elements for cancer research, and implementation of distributed query tools to facilitate preparatory-to-research inquiries and collaborative research studies; institutionalizing a CRN Scholars mentorship career development program; continuing a Developmental and Pilot Studies Program; and implementing an Outreach and External Collaborations Core to facilitate research collaborations among CRN scientists, investigators at other institutions, and clinical and operations partners. In this renewal, the CRN has also established Scientific Working Groups (SWGs) to promote collaborative research in key areas: Prevention and Screening; Prognosis and Outcomes; Health Care Quality and Cost; and Communications and Dissemination. These Cores, Programs, and SWGs are co-led by scientists at CRN and affiliated institutions. Conclusions: The CRN enables and facilitates researchers’ development of innovative multi-site, multi-disciplinary cancer research projects in the integrated delivery system setting, and motivates continued evolution of the CRN institutions as the nation’s premier learning healthcare system.

Keywords: Infrastructure; Multi-Institutional Research

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PS1-6: The Cancer Research Network: Creating New Possibilities for Cancer Prevention and Improved Cancer Outcomes

Virginia Quinn1; Douglas Corley2; Thomas Vaughan3; Lawrence Kushi2

1Kaiser Permanente Southern California; 2Kaiser Permanente Northern California; 3Fred Hutchinson Cancer Research Center

Background/Aims: Prevention and early detection can greatly reduce cancer-related morbidity and mortality, yet little is known about how well many interventions perform in large populations and the extent to which implementation failures might be remediable. Methods: The NCI-funded Cancer Research Network (CRN) (U24CA17154) continues to build infrastructure for multi-site collaborations. The CRN provides unparalleled opportunities for conducting innovative cancer prevention and cancer screening research. Results: Advantages of the CRN include: (1) A large, diverse, membership of approximately 8.5 million individuals for studying prevention and screening across population subgroups in community-based settings. (2) Close ties to CRN health plans whose systems and providers can be intervention targets critical to the success of prevention and screening efforts. (3) Access to the primary care setting enabling study of patient-provider decision making regarding prevention and screening behaviors. (4) Longitudinal data on screening contacts, interventions, and outcomes providing a unique opportunity to evaluate “real-world” screening and prevention, and a means of identifying potentially modifiable failures. (5) Biological samples of biopsies archived for many members. (6) Nationally-recognized leaders in cancer prevention and screening. The CRN investigator-led research portfolio includes expertise in tobacco control, dietary interventions, cancer screening and early detection. (7) Long-term relationships among CRN internal and external scientists to create efficient collaborations. CRN partnerships include the HMO Research Network, NCI-designated cancer centers, federal agencies, and numerous academic institutions. Conclusions: Achieving national goals for reducing the burden of cancer will require new knowledge about how to optimize existing strategies for prevention and screening; new research focused on biologic, behavioral, pharmacologic, and molecular risk factors; and evaluation of the
interactions between behavior change, personal factors, the built environment, and health care systems. For more information about the opportunities afforded by the CRN visit http://crn.cancer.gov.

Keywords: Cancer Research Network; Cancer Prevention; Cancer Screening

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PS1-7:

Health Plan Participants in a Study of Self-Screening for Melanoma

Virginia Quinn1; Nirupa Ghai2; Linda Wong3; David Peng3; Myles Cockburn1

1Kaiser Permanente Southern California; 2Stanford University, School of Medicine; 3University of Southern California

Background/Aims: In contrast to declines in the incidence of most common cancers, melanoma continues to rise with 76,250 new cases and over 9,000 deaths in the US in 2012. While melanoma detected at early stage has an excellent prognosis, most Americans do not know skin cancer signs. Population-based physician-initiated screening has proved impractical. Self-skin examination (SSE) has the potential to ameliorate the harm from melanoma in a feasible, cost-effective way. The limited studies of SSE to date were conducted mostly among patients receiving dermatology-specialty care. Methods: To test the acceptability and sensitivity/specificity of a SSE toolkit, we recruited subjects from the general membership of Kaiser Permanente Southern California, an integrated health plan serving a geographic area with one of the highest melanoma risks in the world. Potential non-Hispanic white subjects 22-50 years old without a history of cancer were offered the opportunity to compare their assessments of their nevi with clinical evidence from full body skin exams and digital imaging. Results: Forty percent of those reached by phone (493/1228) agreed to participate. Acceptors were more likely to be female (74% vs. 57%, P < .001), but no differences were found by age (mean age = 39 years), education (44% high school or less), or income (34% annual household less than $50,000). Few and only small differences in participation were found for diagnoses of overweight or obesity, hypertension, hyperlipidemia, or depression; and morbidity score or health care utilization including dermatology services. Participants were more likely to have had a flu shot (47% vs. 39%, P < .001) and to be a never smoker (71% vs. 65%, P = .05). As expected in this general patient population, fewer than 10% of those contacted had a clinical skin exam in the previous 3 years (8% of participants vs. 2% of non-participants P < .001). Conclusions: Self-skin examination appears to be of interest to a large proportion of adults contacted by the study, especially women. Few meaningful differences in participation were found. Modestly higher flu vaccination and lower never smoking may indicate a stronger health orientation among participants.

Keywords: Melanoma; Self-Screening; Study Participation

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PS1-8:

A Prospective Study of Breast Cancer Survivorship in Kaiser Permanente Northern California: The Pathways Study

Janise Roh1; Julie Munneke1; Marilyn Kwan1; Isaac Ergas1; Jun Song1; Song Yao2; Christine Ambrosone2; John Wiencze3; Marion Lee3; Scarlett Gomez3; Janice Barlow3

1Kaiser Permanente Northern California; 2Roswell Park Cancer Institute; 3UCSF Helen Diller Family Comprehensive Cancer Center; 4University of California, San Francisco; 5Cancer Prevention Institute of California; 6Zero Breast Cancer

Background/Aims: With over 2.5 million breast cancer survivors in the U.S. today, identification of modifiable factors associated with recurrence and survival is imperative. The Pathways Study, a prospective study of breast cancer survivors in Kaiser Permanente Northern California (KPNC) is examining the effects of lifestyle (e.g., diet, physical activity, complementary and alternative medicine [CAM]), contextual (e.g., social and built environment characteristics), medical care, and genetic and molecular factors on breast cancer prognosis. Methods: Women who are newly-diagnosed with invasive breast cancer are identified daily from KPNC electronic pathology records. Eligibility criteria include being at least 21 years old at diagnosis, no previous history of invasive cancer, and English, Spanish, or Chinese-speaking. Women are enrolled during an in-person baseline interview with collection of blood and saliva specimens, and followed periodically for lifestyle updates, treatment, and outcomes via mailed questionnaires, telephone interviews, and web surveys. Outcomes are also confirmed using KPNC electronic databases. Results: As of October 23, 2012, 4,340 women have been enrolled. The cohort is racially and ethnically diverse: 62% White, 12% Hispanic, 12% Asian, 8% Black, 3% Other. Blood and saliva have been obtained on 89% and 95% of enrollees, respectively. Recruitment is planned to end in March 2013, and follow-up will continue through June 2015 and beyond pending further funding. A total of 230 recurrences and 245 deaths have been confirmed. Conclusions: To date, 14 papers have been published on topics ranging from CAM use at diagnosis, quality of life at diagnosis, lymphedema risk factors, physical activity during treatment, employment status and quality of life, adherence to adjuvant hormonal therapy, breast cancer DNA methylation profiles, and correlates of breast cancer subtypes. The Pathways Study has provided a platform for several ancillary studies, investigating lymphedema, racial disparities in treatment, the physiology of aging, and bone health, and also has provided support for several career development awards. The research team has also included Zero Breast Cancer, a nonprofit organization dedicated to breast cancer research through community participation. The Pathways Study has become a rich resource of behavioral, genetic and molecular factors and breast cancer outcomes.

Keywords: Breast Cancer; Survivorship

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PS1-9:

Encouraging Patients to Report Concerns: Development and Pilot Testing of the We Want to Know Campaign

Kathleen Mazor1; Douglas Roblin2; Aruna Kamineni1; Sarah Greene1; Robert Reid3; Jane Anau1; Brandi Robinson1; Thomas Gallagher4

1Fallon Community Health Plan / Reliant Medical Group; 2Kaiser Permanente Southeast; 3Group Health; 4University of Washington

Background/Aims: In earlier work, we found that many cancer patients believed that something had gone wrong during their care but did not formally report their concerns, inhibiting clinicians’ ability to address patients’ concerns. In follow-up focus groups and surveys, clinicians expressed their desire to know about patients’ concerns. Therefore, we developed the “We Want to Know” campaign to encourage patients to speak up about perceived breakdowns in care. This abstract describes the planned intervention and evaluation. Methods: Key components of the We Want to Know campaign are: 1) message content is simple and direct, acknowledging the complexity of cancer care, and inviting patients to speak up about their concerns; 2) the message is delivered to patients via at least two channels – mailed brochure and an outreach telephone call; 3) participating organizations identify staff who can help to address patients’ concerns. The campaign will be implemented at two Cancer Research Network sites; assignment to the campaign intervention will be randomized. Cancer patients will be surveyed prior to the intervention; those who respond will be surveyed again approximately 12 weeks later. Analyses will evaluate pre/post changes in communication experiences and perceptions, within and between intervention groups. Patients’ reports of problems and their resolution will also be examined. Results: Site leadership acknowledged that unreported patient concerns are a problem that merits attention, but wondered whether the intervention itself could generate concerns and stress the clinical system’s capacity to respond. The participating CRN sites have differing organizational constraints which have led to minor differences in implementation. At one site, research staff will make outreach telephone calls to patients; at the other site, nursing staff will do so. One site will place campaign posters in clinics in addition to calls and the mailing. In an effort to be sensitive to the organizations’ leadership concerns, the campaign will seek to elicit reports of positive experiences as well as problematic ones. Conclusions: This pilot study will provide preliminary data on the effectiveness of the campaign in encouraging patients to express their concerns, and about the resources needed to respond to those concerns in real time.

Keywords: Cancer; Communication

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PS1-10: Patient-Centered Cancer Communication and Care Coordination Research in the Cancer Communication Research Center

Kathleen Mazor1

1Fallon Community Health Plan / Reliant Medical Group

Background/Aims: For over four years, CRN Cancer Communication Research Center (CCRC)-affiliated investigators have conducted research into patient-centered cancer communication and care coordination. One of 5 National Cancer Institute-funded Centers of Excellence in Cancer Communication Research, the CRN CCRC is the only center whose primary focus is studying and improving clinical care. This abstract describes CCRC research, lessons learned, and future directions. Methods: CCRC research studies include two RO1-type projects; one focuses on enhancing communication and coordination through innovative use of nurse navigators in oncology care; the other focuses on understanding and improving clinician-patient communication related to breakdowns in cancer care. CCRC pilot studies have explored diverse topics including improving communication to reduce home medication errors in pediatric oncology, clinician-patient communication around prostate cancer screening decisions, the relationship between “oral” health literacy and colorectal cancer screening, and direct-to-consumer communication about genetic testing. An NCI-funded supplement explored stakeholders’ views on collecting patient reports of cancer-related communication, while another examined the feasibility of cancer prognostic tools in clinical practice. Results: Setting: CCRC studies in CRN clinical systems has provided the distinct advantage of allowing researchers to examine feasibility as well as effectiveness of interventions. Patients, clinicians and clinical leaders have all expressed support for CCRC efforts to improve communication and care coordination, acknowledging the importance of communication in cancer care. At the same time, leaders and clinicians are conscious of increasing time constraints, competing priorities, and limited resources. Patients are willing to share their experiences and insights, as long as doing so does not jeopardize their care, or distract them from their battle with cancer. Conclusions: Patient-centered communication and care coordination are central to quality cancer care. CCRC research projects have engendered support and enthusiasm among the clinical systems, but have also faced significant challenges. Ultimately, the CCRC has provided CRN researchers with opportunities to develop and test multi-level interventions focusing on cancer communication and care coordination in clinical settings. Going forward, CCRC-affiliated researchers look forward to implementing systems for collecting patient reports of communication experiences across the cancer care continuum, and to expanding communication research capabilities within the CRN.

Keywords: Cancer; Communication; Care Coordination

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PS1-11: A Dissemination and Implementation Research Agenda for the Cancer Research Network: Looking Back and Looking Forward

James Dearing1

1Kaiser Permanente Colorado

Background/Aims: 2013 is the fifth year for the Cancer Research Network’s (CRN) only funded research center, the Cancer Communication Research Center (CCRC), an NCI-designated Center of Excellence in Cancer Communication Research (CECCR). This CRN center has sister centers at the University of Pennsylvania, University of Michigan, University of Wisconsin, and Washington University in St. Louis. An emphasis of the CRN center has been the application and study of dissemination and implementation (D&I) concepts in relation to external validity tests of interventions, spread of evidence-based interventions, and best practices for high-quality implementation. Now, with the funding of CRN4 (years 16-20), leadership for defining the future orientation to D&I research may be assumed by the CRN4 scientific working group charged with D&I research. Methods: I pose several questions about future D&I research within the Cancer Research Network. Which aspects of dissemination study most deserve attention, and why? What have we learned about implementation research and practice in the CCRC and in the CRN? What D&I study questions do we not need to ask? How is the larger scholarship of D&I most applicable to the CRN context as we go forward? Results: New types of data are suggested as objects for baseline measurement across CRN institutions; a recommendation that implementation research be clearly distinguished as consisting of two types is made; greater emphasis is called for to study the sustainability of effective practices and programs by identifying key outputs and outcomes that constitute sustainability. Lastly, a research agenda is proposed that lists key topics for study concerning dissemination, implementation, and sustainability for the CRN. Conclusions: Federal attention to issues of dissemination and implementation research in health is rapidly escalating. The new Cancer Research Network 4 has the opportunity to lead the nation in demonstrating innovative and effective approaches to the study of D&I. Expertise for this research expertise will be a primary legacy of the Cancer Communication Research Center.

Keywords: Dissemination; Implementation; CRN

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PS1-12: CRN4 Communication and Dissemination Scientific Working Group: Research Emphasizes and Planned Activities

James Dearing1; Kathy Mazor2; Brian Mittman3

1Kaiser Permanente Colorado; 2Fallon Community Health Plan / Reliant Medical Group; 3U.S. Veteran’s Administration

Background/Aims: The Communication & Dissemination (C&D) Scientific Working Group (SWG) is one of four research groups in the new CRN4. This SWG combines four distinct scientific areas of research: communication, decision-making, dissemination, and implementation. These four scientific areas represent some of the highest priorities of the National Cancer Institute for healthcare reform, improving patient-centered care, empowering patients, and spreading and scaling-up effective practices throughout the nation. Methods: Four scientific areas are targeted for the generation of new research proposals: (1) Communication (including patient-clinician communication, intra-team communication, organization interactions with patients, peer-to-peer communication, social media, health literacy, and the operation of health literate organizations); (2) Decision-making (including how patients make decisions, clinician decision-making, and how patient-clinician interactions shape decision-making); (3) Dissemination (including pre-production research to improve evidence-based practices, programs, and guidelines prior to dissemination, comparative studies of alternative modalities for communicating with potential adopting clinicians and patients, and diffusion outcomes that reflect behavioral responses of those targeted for adoption); and (4) Implementation (including fidelity-adaptation, core-periphery components of interventions that are implemented, practitioner contributions to evidence-based practices and programs, and the study of sustainability). Research proposals will be generated in each of these four scientific areas on the basis of targeted outreach to publishing researchers in each of these areas, personal networking by SWG co-chairs with researchers external to the CRN; and monthly meetings and messaging with CRN investigators. Co-chairs will participate in a variety of conferences to publicize the CRN and themselves be involved in leading, and in facilitating, research. Results: Metrics for success will include the number of research proposals submitted, research proposals funded, external collaborators on proposals, external collaborators on funded teams, number of participants in C&D SWG monthly calls, and in the longer term, the extent to which SWG members contribute to and are representatives to decision making bodies for national research agendas. Conclusions: Co-chairs are pairing short- and medium-term activities with a progressive long-term research agenda that will make contributions to healthcare reform and the testing of disruptive innovations in clinical practice.

Keywords: Cancer Research Network; Communication; Dissemination

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PS1-21:
Developing New Products to Support Patient-Centered Cancer Communication: A Case Example from the Cancer Communication Research Center

Borska Rabin1; Bridget Gagliò2; Tristan Sanders3; Michelle Henton3; Larissa Nekhlyudov5; Sheana Bull6; Alfred Marcus5; James Dearing1
1Kaiser Permanente Colorado; 2Kaiser Permanente Mid-Atlantic; 3Harvard Pilgrim Health Care; 5University of Colorado

Background/Aims: The Cancer Research Network Cancer Communication Research Center (CCRC), one of five National Cancer Institute-funded Centers of Excellence in Cancer Communication Research, had the unique opportunity to collaborate with colleagues from the National Cancer Institute (NCI) to conduct real world testing of an NCI-developed decision aid. This abstract describes the feasibility and small scale implementation testing of the NCI-developed cancer prognostic tool, the Cancer Survival Query System (CSQS). Methods: A web-based prognostic tool, the CSQS was developed by the Statistics Research and Applications Branch of the NCI in 2008. It was designed for physicians to use so they could better understand and communicate with cancer patients valid estimates of their cancer survival within the context of all causes of death. Our research team at the CCRC has completed stage one feasibility testing of the CSQS tool in four health care delivery systems and will soon begin a small-scale implementation study of this tool in three health care delivery systems in Colorado. We are also proposing a more structured process of product development and developed a comprehensive plan for the dissemination and implementation of CSQS. Results: A total of 57 providers from four health care delivery systems participated in formal usability testing and semi-structured interviews. Providers perceived CSQS as a well-designed tool that has the potential of increasing provider efficiency delivering prognostic information, and improving patient experience and understanding of this information. Feedback from these providers informed the revision of the CSQS content and format, and the development of a structured, large-scale dissemination and implementation plan. An ongoing small-scale follow-up study is testing strategies for the dissemination and implementation of this web-based decision aid. Findings available to date from both studies will be discussed in this presentation. Conclusions: Development of decision aids that support patient-centered communication requires a multi-step, iterative process and the early engagement of multiple stakeholders including potential users and organizational decision makers. This case study exemplifies different aspects of this process and illustrates lessons learned in this area from the work in the CCRC.

Keywords: Decision Aids; Cancer; Implementation
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PS1-22:
A Systematic Review of Web-Based Cancer Prognostic Calculators: Can They Support Patient-Centered Communication with Cancer Patients?

Borska Rabin1; Bridget Gagliò2; Tristan Sanders3; Larissa Nekhlyudov5; Sheana Bull6; Alfred Marcus5; James Dearing1
1Kaiser Permanente Colorado; 2Kaiser Permanente Mid-Atlantic; 3Harvard Pilgrim Health Care; 5University of Colorado Anschutz Medical Campus

Background/Aims: Information about cancer prognosis is a main topic of interest for cancer patients and clinicians alike. Prognostic information can help with decisions about treatment, lessen patients’ uncertainty and empower them to participate in the decision making process. Calculating and communicating cancer prognostic information can be challenging due to the high complexity and probabilistic nature of the information. Furthermore, prognostic information is further complicated by the potential interplay between cancer and other comorbid medical conditions. The purpose of this presentation is to present findings from a systematic review of web-based interactive prognostic calculators and assess how they might support patient-centered communication of prognostic information with cancer patients. Methods: A systematic review of web-based cancer prognostic calculators was conducted using web search engines, peer-reviewed manuscripts, and expert input. Calculators had to be interactive, focus on cancer, available in English, and provide information about probabilities of survival/mortality, recurrence, spread, or clinical response to treatment. Eligible calculators were reviewed and abstracted for content, format, and functions of patient-centered communication and findings were summarized in a tabular format for comparison. The abstraction guide was pilot tested by all abstractors and was refined using a consensus approach. Results: A total of 22 eligible web-based cancer prognostic tools including 95 individual calculators for 88 distinct cancer sites were identified and abstracted. Thirteen of the tools recommended patients as potential direct users; all other tools were designed for clinicians. Outcomes presented will include: 1) general description of calculators, including cancer type, designated users, types of data elements used in prognosis prediction, and validation; 2) calculator interface data entry features, and graphic output; 3) interpretation of prognosis and additional resources, 4) strengths and limitations in supporting patient-centered cancer communication about cancer prognosis. Examples from selected calculators will be demonstrated throughout the presentation. Conclusions: A large number of web-based cancer prognostic calculators have been developed and are available for use by cancer specialists and patients. The ability of most of these calculators to support patient-centered calculators around cancer prognosis is limited by their design and content and the degree to which they include and present information in an actionable way.

Keywords: Epidemiology; Rare Diseases; Lymphomas
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PS1-23:
Capitalizing on the HMO Cancer Research Network (CRN): The Optimal Setting to Conduct Studies of Rare Complex Diseases

Christine Cole Johnson3; Chun Chao4; Larry Engel3; Heather Feigelson3; Joan Fortuny3; Laurel Habel7; Jill Koskiol8; Douglas Roblin8; Leslie Spangler3; Karen Wells7; Marianne Ulcickas4
3Henry Ford Health System / Health Alliance Plan; 4Kaiser Permanente Southern California; 5University of North Carolina, Chapel Hill; 6Kaiser Permanente Colorado; 7Novartis Farmaceutica S.A; 8Kaiser Permanente Northern California; 9National Cancer Institute; 10Kaiser Permanente Southeast; 11Group Health; 12Boston University

Background/Aims: Rare cancers are challenging to study, both epidemiologically and clinically, as it is difficult to ascertain enough cases to achieve adequate statistical power or to be representative of a vast range of exposures. Further, as the complexity of unraveling the natural history of disease has increased, a large investigator team with diverse expertise is required to optimize the scientific contributions that can be mined from research projects. The HMOCRN provides a setting that can overcome these barriers. Although many studies evaluate all lymphomas combined, lymphoma consists of over 50 rare histological subtypes with varying incidence and survival rates and epidemiological features. Ideally, each histological subtype should be considered separately in etiologic studies, but even the most common, diffuse large B cell lymphoma, has a SEER incidence of only 7.5 per 100,000 in men and 5.0 per 100,000 in women. Other lymphoma types range in incidence from <0.1 cases per 100,000 for NKT cell lymphoma to 2.8 per 100,000 for Hodgkin’s Disease in all race-sex groups combined, to the highest rate found for a population subgroup, only 8.8 per 100,000 for multiple myeloma in African American men. Methods: We have assembled a multi-disciplinary team interested in lymphoma and pharmacoepidemiology that includes investigators with clinical, epidemiological and biostatistical expertise from six HMORN sites, two US universities, the NCI, and an international investigator who first initiated the project. Results: Combining data from these HMOCR sites from 1998-2008, we ascertained 1479 Hodgkin’s Disease cases, 3385 multiple myelomas, 771 T-cell lymphomas, (including 390 mycosis fungoides cases and 158 mature T-cell lymphomas), 3000 chronic lymphocytic leukemias, 1357 mature B cell lymphomas, 3883 diffuse large B cell lymphomas, 2188 follicular lymphomas, and 992 marginal zone B cell lymphomas. Conclusions: These numbers provide a unique opportunity to analyze many of the lymphoma subtypes as well as consider multiple confounders and effect modifiers, thus highlighting the strength of the HMOCR setting for the study of uncommon diseases. Further, such multi-site studies allow for variation in study population geography and patient and treatment diversity, as well as embrace intellectual capital from numerous HMOCR investigators and external collaborators.

Keywords: Epidemiology; Rare Diseases; Lymphomas
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PS1-25:
Incremental Costs of Cancer Care by Phase of Care for HMO Patients: Aged vs. Non-Aged

Maureen O’Keeffe-Rosetti1; Mark Hornbrook1; Debra Ritzwoller2; Paul Fishman1; Jennifer Elston Lafata4; Ramzi Salloum1; Jenny Staab1; Erin Keast1

1Kaiser Permanente Northwest; 2Kaiser Permanente Colorado; 3Group Health; 4Virginia Commonwealth University; 5University of North Carolina, Chapel Hill

Background/Aims: The majority of data on the medical costs of caring for cancer is based on aged Medicare beneficiaries treated in the indemnity/fee-for-service (FFS) system. Much fewer data are available on the costs of treating cancer in patients less than 65 years old. Using data from 4 CRN sites, we examined the cost of treating cancer by phase of care and stage of cancer for aged (65+) versus adult non-aged (greater than 18 and less than 65 years) HMO patients. Methods: We used a longitudinal case-control design to estimate cancer care costs for patients starting 12 months prior to diagnosis. Aged (N = 46,032) and non-aged (N = 46,423) HMO cancer patients were enrolled between 01/2000 and 12/2008. We sampled 171,448 aged and 203,312 non-aged controls from among all HMO members who had no tumor registry evidence of cancer prior to 2009. HMO controls were frequency matched to cancer cases on a 5-to-1 ratio by age group and gender. Health care utilization data were extracted for 2000-2008. Cost coefficients derived from modified national Medicare reimbursement systems were applied to utilization data and summed to total monthly costs per patient in 2008 dollars. Monthly costs were analyzed by four 12-month periods—Pre-diagnosis, Treatment, Survivorship, and End-of-life (EOL)—by case/control, aged/non-aged and stage I-III/IV. Only one year of Survivorship was included in this analysis. Results: Average monthly cost differences between aged and non-aged were reported. Pre-Diagnosis: Aged > Non-aged (difference of $261, P < 0.0001); both groups see sharp increases in quarter prior to diagnosis. Treatment: Non-aged > Aged costs ($201, P < 0.0001). Survivorship: Aged > Non-aged ($44, P < 0.0375). EOL: Non-aged > Aged costs ($2,173, P < 0.0001). All groups experienced accelerating EOL costs. Late-stage cancer costs were greater than costs of early-stage and, except for the Pre-diagnosis phase, non-aged late-stage costs were higher than aged late-stage. Late-stage cancer costs were more variable in the Survivorship phase. Aged and non-aged cases were significantly more expensive than their controls in all phases. Conclusions: Non-aged cases are more costly than controls in all phases. FFS treatment costs peaked at time of diagnosis for both aged and non-aged cases. Costs for FFS early-stage (ES) cases increased from -$70/mo. to $110/mo. HMO LS: -$60/mo. to $180/mo. HMO ES: $0/mo. to $120/mo. Treatment: FFS LS: $1,050/mo. to $550/mo. HMO ES: $1,070/mo. to $550/mo. Survivorship: FFS LS: $1,575/mo. to $940/mo. FFS ES: $270/mo. to $110/mo. HMO LS: $1,050/mo. to $550/mo. HMO ES decreased: $350/mo. to $200/mo. EOL: FFS LS: $1,700/mo. to $2,900/mo. FFS ES: $700/mo. to $1,200/mo. HMO LS: $4,200/mo. to $2,600/mo. HMO ES: $300/mo. to $1,000/mo. Conclusions: FFS costs controlled exceed HMO controls by $>120/mo. in all phases. FFS treatment costs peaked at time of diagnosis for both staging groups and were much higher than HMO costs. HMO treatment costs peaked at 1 month after diagnosis. FFS treatment costs dropped below HMO costs by end of treatment.

Keywords: Economics; Costs; Cancer

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PS1-26:
Treatment Costs of Advanced Cancer: Variation in Costs for Stage IV vs. Recurrent Breast, Colorectal, Lung, and Prostate Cancers

Debra Ritzwoller2; Maureen O'Keeffe-Rosetti2; Nikki Carroll1; Mark Hornbrook1; Paul Fishman1

1Kaiser Permanente Colorado; 2Kaiser Permanente Northwest; 3Group Health

Background/Aims: Previous studies have described the variation in utilization and costs associated with cancer patients diagnosed at late stage vs. early stage. Other studies have described the high cost of cancer care in the terminal phase. Little is known regarding variation of costs of advanced cancer care between patients diagnosed de novo with stage IV cancer versus those with recurrent metastatic cancer that develops after definitive therapy for early stage disease and a period of disease-free survival. Our aim is to compare total monthly medical care costs and resource use during the year after development of metastatic disease among patients presenting with stage IV disease and those with metastatic recurrence, using data from two CRN sites with tumor registries that capture recurrence, adjusting for age and non-cancer comorbidity. Methods: Patients aged 21 years and older with stage IV or metastatic recurrent breast, colorectal, lung, or prostate cancer diagnosed between 2006-2007 at two CRN sites were included in the analysis. Patients were followed for twelve months following diagnosis date (or through the end of 2008, or death, or disenrollment). Patient characteristics, comorbidities, and mortality were obtained from the Virtual Data Warehouse (VDW). Estimates of costs were derived from the 'HMO Costing Algorithm' by adapting these systems to assign real (deflated) costs to utilization data as represented in VDW encounter and procedure files. Descriptive statistics and regression analyses were used to compare costs and resource use between cohorts in each data set. Results: 383 breast, 752 colorectal, 1,463 lung, and 364 prostate cancer patients were identified with stage IV or metastatic recurrent disease. Forty percent of patients were age <65 years. Differences in age at diagnosis, and the modified Charlson-Deyo comorbidity index for patients with de novo vs. recurrent disease varied by cancer site. Average total monthly costs were significantly higher for stage IV cases relative to recurrent cases, except for prostate cancer cases. The cost differential (stage IV – recurrent) was the highest for breast cancer cases at $1,847. Conclusions: The findings from this analysis could have significant clinical and policy relevance related to the cost implications of treating advanced cancer.

Keywords: Health Economics; Costs; Cancer

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PS1-27:
Costs of Breast Cancer Care by Phase of Care: Medicare HMO vs. FFS Sectors

Mark Hornbrook1; Paul Fishman2; Maureen O’Keeffe-Rosetti1; Ramzi Salloum1; Jenny Staab1; Debra Ritzwoller2; Jennifer Elston Lafata3

1Kaiser Permanente Northwest; 2Group Health; 3“Henry Ford Health System / Health Alliance Plan; 4Kaiser Permanente Colorado

Background/Aims: Cancer-related costs for Medicare beneficiaries in the indemnity/fee-for-service (FFS) option are well-analyzed, but costs for aged HMO-enrolled cancer patients are less studied. We compared monthly costs for aged breast cancer patients by payment scheme. Methods: Longitudinal case-control design: mean incremental monthly costs starting 12 months prior to diagnosis were estimated using health care utilization data from 4 HMOs and SEER-Medicare. Cases: 7,822 aged Medicare HMO and 74,236 SEER-Medicare FFS female enrollees diagnosed with breast cancer between 01/00-12/08. Controls: 36,232 aged Medicare HMO enrollees with no tumor registry evidence of cancer and 34,754 FFS SEER-Medicare non-cancer beneficiaries for the same time period. HMO controls were frequency matched to cases 5-to-1 by age group and gender. 2008 national Medicare reimbursement rates were applied to monthly use vectors extracted for 2000-2008 and summed to total costs per month per enrollee for each case and control. Costs were analyzed by stage (early [I-III] vs. late [IV]) and four phases of care, each of 12-months duration: pre-diagnosis; treatment; survivorship (first 12 months only); and end-of-life (EOL). Incremental cancer-related costs were computed by subtracting average annual costs for controls from cases from the corresponding payment scheme for the same time period. Results: Pre-Diagnosis: Incremental costs for FFS late-stage (LS) cases started at -$140/mo. one year prior to diagnosis and finished the year at $350/mo. Costs for FFS early-stage (ES) cases increased from -$70/mo. to $110/mo. HMO LS: -$60/mo. to $180/mo. HMO ES: $0/mo. to $120/mo. Treatment: FFS LS: $10,100/mo. to $1,400/mo. FFS ES: $7,200/mo. to $400/mo. HMO LS: $5,000/mo. to $1,600/mo. HMO ES: $4,100/mo. to $600/mo. Survivorship: FFS LS: $1,575/mo. to $940/mo. FFS ES: $270/mo. to $110/mo. HMO LS: $1,050/mo. to $550/mo. HMO ES decreased: $350/mo. to $200/mo. EOL: FFS LS: $1,700/mo. to $2,900/mo. FFS ES: $700/mo. to $1,200/mo. HMO LS: $4,200/mo. to $2,600/mo. HMO ES: $300/mo. to $1,000/mo. Conclusions: FFS controls exceeded HMO controls by $>120/mo. in all phases. FFS treatment costs peaked at time of diagnosis for both staging groups and were much higher than HMO costs. HMO treatment costs peaked at 1 month after diagnosis. FFS treatment costs dropped below HMO costs by end of treatment.

Keywords: Health Economics; Costs; Cancer

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Rectal Cancer Survivors with Ostomies and Anastomoses: Effects of Cancer Surgery on Perceived Financial Burden and Employment

Mark Hornbrook1; Marcia Grant1; Christopher Wendel1; Joanna Bulley1; Carmit McMullen1; Andrea Altschuler1; Larissa Temple1; Lisa Herrinton2; Robert Krouse3

1Kaiser Permanente Northwest; 2Kaiser Permanente Northern California; 3Veterans Administration

Background/Aims: Rectal cancer surgery includes a colostomy (or ileostomy) or, more frequently, anastomosis of the rectum. Both surgery types may create long-term after-effects. We examined differences reported between survivors with ostomies versus anastomoses regarding levels of work, volunteering, and financial burdens, and how much they perceived their cancer operations affected these experiences. Methods: We mailed questionnaires to 1,063 rectal cancer survivors (5+ years post-diagnosis) in Kaiser Permanente (Northern California, Northwest) during 2010-2011. We asked about current employment status and the impact of their cancers on labor force participation, demotions, job discrimination, forced retirement, volunteering, social activities, and marital status. Our overall response rate was 60.5% (578/955). We analyzed usable responses from 390 survivors with anastomoses (69%) and 178 survivors with ostomies (31%) for differences in self-reported functional health status, work, volunteer, and perceived financial burden. Results: Survivorship ranged from 5 to 25 years. Mean ages for both groups were significantly beyond retirement age (anastomoses = 72 years, colostomies = 74 years) (NS). 56% of patients with anastomoses were male compared to 66% of ostomates (P <0.03). About 35% of all survivors were not married or partnered at time of survey. Survivors with anastomoses were more likely to be currently working (FT+PT=33%) than survivors with colostomies (FT+PT=20%) (35/178), while survivors with ostomies were more likely to be retired or homemakers (77% (137/178) vs. 64% (247/383)) or on Disability (ostomies = 3.4% (6/178), anastomoses = 2.1% (8/383)) (P <0.01). Stage at diagnosis was not associated with employment or volunteer activities among survivors, but employed survivors had significantly shorter survivorship periods than non-working survivors (P <0.05). Compared to survivors with anastomoses, survivors with ostomies reported significantly higher perceived financial burden from their cancer and its treatment (P <0.001). Permanent disabled survivors reported even higher perceived financial burden than non-disabled survivors, with no differences by ostomy and anastomosis status. Conclusions: Compared to survivors with ostomies, survivors with anastomoses were more likely to report being currently employed/working in the home and having lesser financial burdens from their illness. Interventions are needed to support survivors with ostomies to participate in work and volunteer activities, to manage their personal finances, and to maintain their social networks and personal relationships.

Keywords: Rectal Cancer; Survivorship; Colostomy

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Caregiving, Mutuality, and Long-Term Cancer Survivorship: The Case of Colorectal Cancer Patients with Ostomies

Andrea Altschuler1; Petra Liljestrand1; Marcia Grant2; Mark Hornbrook1; Robert Krouse3; Carmit McMullen1

1Kaiser Permanente Northern California; 2City of Hope; 3Kaiser Permanente Northwest; 4Veterans Administration

Background/Aims: The literature on informal caregiving for cancer survivors focuses on the first phases of cancer survivorship, with little evidence on long-term issues. For those whose cancer creates on-going disability, caregiving can continue for decades. Mutuality, the positive quality of the relationship between caregiver and care receiver, can affect acceptance and level of caregiving as well as patient and caregiver outcomes. Because many colorectal cancer (CRC) patients with ostomies have ongoing caregiving needs, understanding mutuality in caregiving relationships in this population is a high priority. Methods: We conducted an ethnographic study in two Kaiser Permanente regions with a population-based sample of 31 long-term (>5 years) CRC survivors with ostomies who received informal caregiving; survivors’ primary informal caregivers also participated. Eligible survivors received at least one hour of unpaid help a week to help complete tasks that were difficult because of their health. We used in-depth interviews and observations to collect data, and standard qualitative methods for data analysis. Results: Most survivors were >71 years old, female, had some college education, and required help with activities of daily living. Two-thirds lived with and received care from spouses. Survivors required help with ostomy care mainly due to stoma-related hernias, poor vision, obesity, poor dexterity, cognitive impairment, and weakness. Caregiving ranged from minimal support to assistance with daily ostomy care. Some survivors received caregiving far beyond what was needed, while others did not receive caregiving that was medically indicated. Low mutuality created challenges for ostomy caregiving. Levels of mutuality ranged from resentful performance of duty-bound aid to an extension of love and commitment. Conclusions: Our results support previous findings that cancer diagnoses can enhance high mutuality relationships and diminish low ones. Current findings extend research to include long-term colorectal cancer populations. We found that high mutuality allowed dyads to cooperate with ostomy care tasks that were objectionable to those dyads with low mutuality. For survivors with long-term caregiving needs, care planning should assess, identify, and support mutuality as a resource to enhance quality of life and adaptation over time.

Keywords: Cancer survivorship; Caregiving; Ostomy

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Colorectal Cancer Survivors’ Trust in Their Follow-Up Care Physician: The Role of Patient-Physician Communication by Stage of Cancer

Neetu Chawla1; NeeraJ Arora1; Ingrid Oakley-Girvan2; Steven Clauser3

1National Cancer Institute; 2Cancer Prevention Institute of California

Background/Aims: Trust in physicians plays an important role in facilitating cancer patients’ adjustment to their illness. However, patient trust has rarely been examined within the context of post-treatment follow-up care. We used data from the Assessment of Patient Experiences of Cancer Care (APECC) study to evaluate predictors of colorectal cancer survivors’ trust in their follow-up care physicians overall and by stage of cancer. Methods: Our analytic sample included colorectal cancer survivors who were 2-5 years post-diagnosis and saw a follow-up care physician in the past year (n = 371). Trust was assessed using a validated 11-item scale and responses were transformed to a 0-100 metric. Hierarchical linear regressions were conducted to examine predictors of trust with socio-demographic, clinical, and follow-up care variables entered in the first model and patient-physician communication variables (i.e., physician knowledge of the patient, information exchange, and physicians’ affective behavior) in the second. Using American Joint Committee on Cancer (AJCC) stage classification, stratified regressions were conducted to assess differences in predictors of trust by early (0, i, ii) vs. late stage (iii, iv) patients. Results: The mean trust score was 83.58 and did not significantly vary by cancer stage. In the main effects model, older age, increased length of patient-physician relationship, better health status, and male physician gender were associated with greater trust (P <0.05 for all). When communication variables were added, physician knowledge (P <0.001), information exchange (P <0.001), and affective behavior (P <0.05) were significantly associated with greater trust. In stratified analyses, physician knowledge (P <0.001) and information exchange (P <0.05) were associated with greater trust among early stage patients and information exchange (P <0.001) and physician affect (P <0.05) were significant predictors of trust among late stage patients. Conclusions: Patient-physician communication plays a central role in facilitating trust between colorectal cancer survivors and their follow-up care physicians. Information exchange was an important dimension of communication for all survivors, but early stage patients valued physician knowledge while late stage patients valued physician affect. Our findings suggest that to build and sustain patient trust, different aspects of communication may need to be emphasized during follow-up care interactions between physicians and survivors diagnosed with early vs. late stage colorectal cancer.

Keywords: Trust; Follow-Up Care; Patient-Provider Communication

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PS1-39:
Diagnosis Codes for Cancer Metastasis on Medicare Claims Have Limited Accuracy and Completeness
Neetu Chawla1; K. Robin Yabroff1; Angela Mariotto2; Timothy McNeel2; Deborah Schrag3; Joan Warren1
1National Cancer Institute; 2Information Management Services, Inc.; 3Dana-Farber Harvard Cancer Center

Background/Aims: Researchers are increasingly using diagnosis codes from administrative claims for cancer patients to identify metastatic disease at initial diagnosis or recurrence. The validity of metastasis codes on claims has not been established in population-based data. We used SEER cancer registry linked to Medicare claims to assess the completeness and validity of metastasis codes from Medicare claims for the four most common cancers in the U.S.

Methods: The study included 127,453 breast, lung, prostate, and colorectal cancer patients newly diagnosed with localized, regional, or distant disease in the SEER data between January 1, 2005 and December 31, 2007. From Medicare claims, patients were classified as having regional or distant disease at diagnosis if they had one hospital claim with a metastasis code or two physician claims with metastasis codes on separate days within 3 months of diagnosis. Patients without claims with metastasis codes were classified as having local disease. We calculated sensitivity, specificity, positive and negative predictive values, and conducted multivariate logistic regression analysis to evaluate patient factors associated with stage misclassification for each cancer site.

Results: For patients with distant disease per SEER data, the sensitivity and PPV of the claims was: breast (50.6%, 67.3%), colorectal (72.2%, 68.8%), and lung cancer (42.1%, 88.6%). None of the measures for stage simultaneously exceeded 80% for sensitivity, specificity, and positive predictive values for any of the cancer sites. In adjusted analysis, older, lower-income, and African American patients were more likely to have stage at diagnosis misclassified from Medicare claims.

Conclusions: Use of diagnosis codes alone in Medicare claims will misclassify stage at diagnosis for cancer patients, particularly for patients with metastatic disease. Since cancer patients are likely to be evaluated most comprehensively at the time of diagnosis, our findings suggest that using diagnosis codes in Medicare claims to define recurrence will also be limited.

Keywords: Metastasis Codes; Stage At Diagnosis; Medicare Claims

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PS1-41:
Geographical Access to Mammography Services and Stage of Breast Cancer at Initial Diagnosis in Wisconsin
Adedayo Onitilo1; Doug Miskowski2; Michael Broton1; Jessica Engel1; Hong Liang1; Rachel Stankowski1; Suhail Doi1
1Marshfield Clinic / Security Health Plan of Wisconsin; 2University of Wisconsin, Stevens Point; 3University of Queensland

Background/Aims: Early diagnosis of breast cancer is an important prognostic indicator and missed mammograms represent missed opportunities for earlier diagnosis. Geographical access to mammography services is an important factor in mammography screening. In rural regions, mammography access can be problematic and longer travel distance has been shown to adversely affect early breast cancer detection in rural populations, although results are mixed. Recent advances in geographic information systems (GIS) technology allows for more accurate determination of point distance and travel time via road networks. The goal of the present study was to utilize modern GIS technology to determine the association between geographic proximity to mammogram centers and stage of breast cancer at diagnosis.

Methods: Female patients with an initial diagnosis of primary breast cancer at the Marshfield Clinic between January 1, 2002 and December 30, 2008 were identified electronically through the Marshfield Clinic/St. Joseph’s Hospital cancer registry. Patients were classified by stage of breast cancer and analyzed to determine whether a correlation existed between stage and distance to closest facility, distance to visited facility, and rural or urban address location. ESRI ArcGIS Desktop version 10.0, ArcInfo license, Business Analyst extension, and StreetMap Premium using data from TeleAtlas 2010 were used to geocode point features and the ArcGIS Geocoding toolbar, Review/Rematch Addresses tool was used to substantiate the results.

Results: A total of 1,368 patients with breast cancer was analyzed. A trend of increased travel time to nearest facility with increasing stage at diagnosis was observed (P = 0.0643), where median travel time was 17.1 minutes for stage 0 breast cancer and 23.9 min for stage 4 breast cancer. Significantly fewer mammograms were performed in the winter months (November through February) and the difference was particularly striking for patients living 30 or more miles from a mammography center (P = 0.0448).

Conclusions: Using modern GIS technology, we showed that travel time affects mammogram utilization and thus stage at breast cancer diagnosis in the Marshfield Clinic service area. In rural areas, travel time and seasonal road conditions may impact on decisions to undergo mammography screening.

Keywords: Breast Cancer; Mammogram; Geographical Access

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PS1-42:
Beyond Risk Reduction: Decision-Making Factors Among Breast Cancer Patients Undergoing Contralateral Prophylactic Mastectomy
Katharine Rendle1; Meghan Halley1; Nicole Vrent1; Dominick Frosh1; Suepatra May1
1Palo Alto Medical Foundation for Healthcare, Research and Education

Background/Aims: Women diagnosed with unilateral breast cancer are electing to undergo contralateral prophylactic mastectomy (CPM)—or removal of the healthy breast—at rapidly increasing rates worldwide. CPM significantly reduces the risk of recurrence of contralateral breast cancer; however, it is also believed to be unnecessary for most patients due to the relatively low risk of contralateral breast cancer, and the effectiveness of less invasive treatment options. Additionally, since the risk of systemic metastases often exceeds the risk of contralateral breast cancer, most patients will not receive any survival benefit. As such, there is a growing need to understand why patients are electing to have CPM. Drawing from prospective, in-depth interviews with breast cancer patients, we explore how women are making this decision and investigate what factors beyond risk reduction may be impacting their decision.

Methods: Participants were recruited from a multispecialty clinic in Northern California. Participants were interviewed at four time points during their treatment journey. Medical records for each participant were reviewed to confirm therapies received. Analysis of interview transcripts used grounded theory to identify emergent decision-making factors across participants.

Results: Of the 41 patients enrolled in the study, 11 (27%) women elected to have CPM. The majority of these women underwent BCRA testing (9 or 82%), but only two women received a positive result. Influential factors identified across participants were: 1) desire to reduce or avoid breast cancer treatment; 2) having a close relationship with someone who died from breast cancer; 3) wanting to maintain (or improve) breast appearance; and 4) receiving imaging results that showed “suspicious” but ultimately benign changes in their healthy breast.

Conclusions: The decision to undergo CPM is impacted by a variety of factors including, but not limited to, risk reduction. Moreover, perceptions of risk are entangled with individual experiences prior to and during treatment, which may influence the ways patients understand risk as both a concept and a decision-making factor. Further investigation of the impact of both risk comprehension and perceived benefits of CPM—most notably reconstruction—on decision-making is needed to understand why women are electing to undergo this invasive and potentially medically unnecessary procedure.

Keywords: Breast Cancer; Contralateral Prophylactic Mastectomy; Decision-Making

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PS1-44: Reviewing Electronic Medical Records of Patients Assessed for Polycythemia Vera by a Multiphysician / Multicenter Group Practice Can Both Identify Physician Errors and Lead to Targeted Medical Education

Paul Roda, Porat Erlich; Ashley Ferrari; Xiaoqin (Amy) Tang

1Geisinger Health System

Background/Aims: In 2005, researchers described an acquired mutation in JAK-STAT signaling, the JAK2V617F mutation which is present in 95% of patients with P vera (PV). Within three years, testing for this mutation led to new World Health Organization (WHO) criteria for the diagnosis of PV, and other related myeloproliferative neoplasms. This project was initiated to assess the impact of molecular testing within a multiphysician, multicenter group practice and ultimately to use this knowledge to develop educational programs regarding how best to evaluate patients with polycythemia.

Methods: In 2001, Geisinger Health Systems implemented use of an electronic medical records system including most outpatient sites. This database was searched, identifying 268 patients who had at least one office visit between 2004 and 2009 with a primary (billing) code of PV. The clinician’s diagnosis, when available, was determined from progress notes. There were 204 cases with complete records, which were scanned for JAK2V617F mutation testing, serum erythropoietin level, splenomegaly, and bone marrow histology. Results of the diagnostic evaluation, and the clinician’s diagnosis, were compared with both the PV Study Group and subsequent 2008 WHO criteria. Results: Of the 204 fully evaluable patients, 56 never underwent JAK2V617F mutation testing, and only 11 met the 1971 PV study group criteria for that diagnosis. There were 87 patients who were positive for the JAK2V617F mutation, but only 48 met the 2008 WHO criteria for the diagnosis of PV. JAK2V617F mutation testing, when performed, led to a diagnosis change in 10% of patients originally diagnosed with PV prior to molecular testing. Serum erythropoietin levels were obtained in only 118 of the 204 fully evaluable patients, and were below 4 in only 52 of these patients. Conclusions: From this data, we created a cost-effective approach to the assessment of PV, and a continuing medical education lecture. This lecture has subsequently been delivered at numerous hospitals ranging from small community hospitals in the PV cluster region to several major university centers. This presentation will provide details of both the diagnostic paradigm and the subsequent lecture.

Keywords: Polycythemia Vera; Molecular Testing; Physician Education

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PS1-53: Effects of Transitioning from Conventional Methods to Liquid-Based Methods on Unsatisfactory Pap Tests: Results from a Multicenter US Study

Christopher Owens; Daniel Peterson; Tyler Ross; Diana S.M. Buist; Sheila Weinmann; Aruna Kamineni; Andrew Williams; Azadeh Stark; Kenneth Adams; Terry Field

1University of Massachusetts Medical School; 2Meyers Primary Care Institute; 3Group Health; 4Kaiser Permanente Northwest; 5Kaiser Permanente Hawaii; 6Geisinger Health System; 7HealthPartners

Background/Aims: Pap testing has transitioned from conventional preps (CP) to liquid-based preparations (LBP) due to perceived superiority of LBPs. Many studies conclude LBPs reduce unsatisfactory (UNSAT) tests, however some believe the evidence to substantiate this claim is weak. We studied the effect of the transition from CPs to LBPs on the proportion of UNSAT Pap tests (PT) in four health care systems in the United States. Methods: Our study cohort consisted of 548,174 women with 1,443,725 total PTs, ages 21-65 years, between 2000 and 2010. We used segmented regression analysis to estimate the effect of adopting LBPs on the proportion of UNSAT PTs. The effect of age on the rate of unsatisfactory PTs was also investigated. Results: Three sites implementing Surepath LBP experienced significant reductions in UNSAT PTs (Site 1 estimated effect: -2.46% [95% CI: -1.47%, -3.45%], Site 2: -1.78% [95% CI: -1.54%, -2.02%), Site 3: -8.25% [95% CI: -7.33%, -9.17%]. The fourth site implementing ThinPrep LBP did not experience a significant reduction in UNSAT studies. The relative risk of an UNSAT PT in women ≥ 50 increased after the transition to LBPs (Surepath: RR 2.1 [95% CI: 1.9, 2.2] and ThinPrep: RR 1.7 [95% CI: 1.5, 2.0]). Conclusions: We found that the strength of the effect of transitioning to LBPs on the proportion of UNSAT PTs varied with the proportion of unsatisfactory tests with CPs and the LBP platform used. The greatest reduction in UNSAT PTs is seen in women under 50.

Keywords: Pap Test; Unsatisfactory

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PS1-54: Clinical Perspectives on Under- and Overutilization of Cervical Cancer Screening Services

Gloria Coronado; Amanda Petrik; Mark Spofford; Jocelyn Talbot; Huyen Hoai Do; Vicky Taylor

1Kaiser Permanente Northwest; 2Fred Hutchinson Cancer Research Center

Background/Aims: The underutilization of cancer screening services is an on-going concern to program planners and policy makers; such underutilization is common among under-insured, ethnic- and language-minority populations and is associated with advanced stage of disease detection, limited treatment options, and diminished survival. At the same time, growing research interest has focused on the over-utilization of cancer screening services. We sought to gather the perceptions of clinic personnel at Latino-serving federally qualified health centers about patients’ utilization of screening services for cervical cancer. Methods: We conducted one-on-one interviews among 17 clinic personnel at four Latino-serving federally qualified health center networks in Oregon. Results: Estimated proportions of eligible patients who are under-screened ranged from 20% to 60%, with 30% most commonly cited. Under-screening for cervical cancer was thought to occur among low-income, under-insured and undocumented patients. External factors, such as limited funding to pay for screening and access barriers to follow-up testing in patients with positive screens were cited as contributing to under-screening. The most frequently cited proportion of eligible patients who are over-screened was 10%, and ranged from 10% to 50%. Notably, over-screening for cervical cancer was thought to occur among young women (those younger than 21) and women with a recent pregnancy. Inconsistent capture of history of screening in electronic medical records and unclear and changing screening guidelines were thought to contribute to over-screening in some patients. Conclusions: The health care providers we interviewed had widely varying perspectives of the under- and over-utilization of screening services for cervical cancer. Our findings may inform future efforts to promote guideline-appropriate cancer screening and coordinated follow-up care.

Keywords: Pap Test; Unsatisfactory

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PS1-55: Strategies and Opportunities to STOP Colon Cancer in Priority Populations: Pragmatic Study Design and Methods

Gloria Coronado; Amanda Petrik; Mark Spofford; Sally Retecki; Jennifer DeVoe; Beverly Green

1Kaiser Permanente Northwest; 2OCHIN, Inc.; 3Group Health

Background/Aims: Colorectal cancer (CRC) is the second leading cause of cancer death in the United States. One key factor thought to explain the relative high mortality is low utilization of screening services for CRC. Data from the National Health Interview Survey show that, in 2010, 41% of adults aged 50–75—nearly 35 million people—were not up-to-date with CRC screening. Almost 30% of eligible adults have never had any type of CRC screening. Screening rates are alarmingly low among certain population subgroups, including those with minimal education, low income, or having no health insurance. The subgroups least likely to be up-to-date with screening are those who receive preventive care services, including CRC screening, at Federally Qualified Health Centers (FQHCs). Strategies and Opportunities to STOP Colorectal Cancer in Priority Populations (STOP CRC) is a collaborative partnership between health research institutions and FQHCs to raise rates of CRC screening in FQHCs. STOP CRC uses a
PSI-56: Beyond Barriers: Systemic Constraints Limiting Sexual Health Care for Breast Cancer Survivors

Meghan Halley1; Suepatra May1; Katharine Rendle1; Dominick Frosch1; Allison Kurian2

1Palo Alto Medical Foundation for Healthcare, Research and Education; 2Stanford University

Background/Aims: Sexual health problems represent one of the most frequently experienced and longest-lasting effects of breast cancer treatment, but research suggests that providers rarely discuss sexual health with their patients. Existing research examining barriers to addressing the sexual health concerns of cancer patients has focused on discrete characteristics of the provider-patient interaction without considering the broader context in which these interactions occur. Drawing on focus group discussions with breast cancer survivors, we explore how foundational cultural and structural characteristics of the healthcare system may be preventing breast cancer survivors from addressing their sexual health concerns. Methods: Five focus groups were conducted with breast cancer survivors receiving support services at a breast cancer advocacy and resource organization in Northern California. Each group focused on a different aspect of treatment including: 1) diagnosis; 2) surgery and reconstruction; 3) chemotherapy; 4) radiation; and 5) survivorship. An interview guide for each topic area was used to elicit participants’ thoughts, opinions and experiences of breast cancer treatment. Analysis utilized inductive techniques incorporating elements of Grounded Theory to identify salient themes that emerged in the discussions. Results: An average of eight women participated in each focus group, and women were allowed to participate in more than one group, for a total of 21 participants. Participants’ discussions illustrated three core ways in which cultural and structural characteristics of the healthcare system prevented them from addressing their sexual health concerns, including: 1) the structure of cancer care led to participants being disconnected from the healthcare system at the time when sexual side effects most commonly emerged; 2) when their sexual side effects did emerge, the highly specialized structure of the biomedical system made it difficult for patients to identify the appropriate provider to address their complex sexual health concerns; and 3) when patients did discuss sexual health with their providers, their providers approached sexuality as primarily physical, while participants were experiencing biopsychosocial sexual concerns. Conclusions: These results suggest that addressing breast cancer survivors’ sexual health needs will require a comprehensive approach that includes educating physicians, coordinating existing resources, and developing new sources of information and support during the survivorship period.

Keywords: Breast Cancer; Sexuality; Communication

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Cardiovascular Disease

A3-1:
Outcomes of a Randomized Trial of Home Blood Pressure Telemonitoring with Pharmacist Case Management

Karen Margolis1; Stephen Asche1; Anna Bergdall1; Nicole Trower1; Jaime Sekenski1; Rachel Pritchard1; Patrick O’Connor1; JoAnn Sperl-Hillen1; Michael Maciosek1

1HealthPartners

Background/Aims: Patients with high blood pressure (BP) visit a physician on average 4 times per year though fewer than half achieve BP control. Practical, effective, and sustainable models are needed to improve BP management. Hyperlink is a clinic-randomized trial testing an intervention that combines home BP telemonitoring with pharmacist case management in patients with uncontrolled hypertension. Methods: We enrolled 450 patients with uncontrolled BP from 16 primary care clinics. Eight clinics (222 patients) were randomized to usual care and 8 clinics (228 patients) to intervention. Intervention patients received home telemonitors that transmit BP data to a secure database. Pharmacists consult with patients by phone and adjust antihypertensive therapy based on home BP data. The intervention lasts 12 months with follow-up to 18 months to observe durability. The primary outcome is BP control at 6 and 12 months, defined as BP ≤140/90 mm Hg (or ≤130/80 mm Hg in patients with chronic kidney disease or diabetes). Data on demographics, medication use, and adherence, and satisfaction with care were also gathered. Here we report 6-month BP outcomes. General and generalized linear mixed models are used to accommodate the cluster-randomization. Results: Enrollees were 45% female, 82% white, and 12% black, with mean age of 61 years. Mean BP at baseline was 148/85 mm Hg in both treatment groups. Of the 403 attending the 6-month visit (197 usual care, 206 intervention), 45.2% in usual care and 71.8% in intervention achieved BP control (P <0.001). In usual care, mean systolic BP decreased by 10.8 mm Hg and diastolic decreased by 3.4 mm Hg. In intervention, mean systolic BP decreased by 21.5 mm Hg and diastolic decreased by 9.4 mm Hg. The difference in change between groups was 10.7 mm Hg systolic (P <0.0001) and 6.0 mm Hg diastolic (P = 0.002). Secondary outcomes, including changes in self-reported satisfaction with care, treatment intensification, and medication adherence, will also be reported. Conclusions: Home telemonitoring with pharmacist case management was effective at reducing BP for hypertensive patients over 6 months. This intervention may be cost-effective for managing hypertensive patients with uncontrolled BP, especially if results are sustained during the maintenance and post-intervention phases of follow-up.

Keywords: Hypertension; Team-Based Care; Telemonitoring

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A3-2:
The Signs and Symptoms of Heart Failure are Frequently Documented to Wax and Wane in the Years Prior to a Clinical Diagnosis of Heart Failure: Data from 4,644 Patients Followed in Primary Care

Steven Steinhulb1; Jimmeng Sun1; Rajakrishnan Vijayakrishnan1; Roy Byrd1; Zahra Daar1; David Gotz2; Shahram Ebadollahi2; Walter Stewart1

1Geisinger Health System; 2IBM; 3Sutter Health

Background/Aims: The diagnosis of heart failure (HF) is frequently delayed until patients are symptomatic enough to require hospitalization. Earlier identification of these patients would allow for the aggressive initiation of preventive strategies, potentially resulting in a decrease in hospitalizations and improved outcomes. Methods: Patient Electronic Health Record (EHR) data from 39 community practice clinics within the Geisinger Clinic were used. Among primary care patients, 4,644 incident cases of HF were identified between 2001 and 2010 with their diagnosis date determined by specific operational criteria. A validated natural language processing application was applied to primary care encounter progress notes to identify affirmations and denials of Framingham signs and symptoms for heart failure. Results: During a mean duration of 3.4 years of observation preceding the HF diagnosis date, positive affirmations of HF signs/symptoms were frequently documented. The median duration of time between first
documentation of a positive sign/symptom and the date of clinical diagnosis was over 2 years for several, and greater than one year for most signs/symptoms. Surprisingly, the majority of signs/symptoms were documented to come and go (affirmation followed later by a negation) multiple times. In particular, ankle edema, rales, dyspnea on exertion and hepatomegaly were all documented to come and go a median of 5 or more separate times before clinical diagnosis. Conclusions: These results suggest that the waxing and waning course of HF signs and symptoms in the years prior to a clinical diagnosis of HF may pose challenges to the earlier diagnosis of HF in a primary care setting. The clinical application of automated tools to identify HF signs and symptoms within the EHR could substantially improve the early identification and treatment of these patients.

Keywords: Heart Failure; Natural Language Processing; Early Diagnosis

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EC1-2: Atrial Fibrillation and Outcomes in Heart Failure with Preserved Versus Reduced Left Ventricular Ejection Fraction

David McManus1; Grace Hsu2; Sue Hee Sung1; Jane Saczynski1; David Smith1; David Magid4; Jerry Gurwitz5; Robert Goldberg2; Alan Go3

1Fallon Community Health Plan / Reliant Medical Group; 2Kaiser Permanente Northern California; 3Kaiser Permanente Northwest; 4Kaiser Permanente Colorado; 5University of Massachusetts Medical School

Background/Aims: Atrial fibrillation (AF) and heart failure (HF) are two of the most common cardiovascular conditions nationally and AF frequently complicates HF. We examined how AF impacts adverse outcomes in HF with preserved left ventricular ejection fraction (HF-PEF) vs. reduced ejection fraction (HF-REF) within a large, contemporary cohort. Methods: We identified all adults diagnosed with HF-PEF or HF-REF based on hospital discharge and ambulatory visit diagnoses and relevant imaging results between 2005-2008 from four health plans in the Cardiovascular Research Network. Data on demographic features, diagnoses, procedures, outpatient pharmacy use, and laboratory results were ascertained from health plan databases. Hospitalizations for HF, stroke, and any other reason were identified from hospital discharge and billing claims databases. Deaths were ascertained from health plan and state death files. Results: Among 23,644 patients with HF, 11,429 (48.3%) had documented AF (9,081 pre-existing, 2,348 incident). Compared with patients who did not have AF, patients with AF had higher adjusted rates of ischemic stroke (hazard ratio [HR] 2.47 for incident AF; HR 1.57 for pre-existing AF), hospitalization for HF (HR 2.00 for incident AF; HR 1.22 for pre-existing AF), all-cause hospitalization (HR 1.45 for incident AF; HR 1.15 for pre-existing AF), and death (incident AF HR 1.67; pre-existing AF HR 1.13). The associations of AF with these outcomes were similar for HF-PEF and HF-REF, with the exception of ischemic stroke. Conclusions: AF is a potent risk factor for adverse outcomes in patients with HF-PEF or HF-REF. Effective interventions are needed to improve the prognosis of these high-risk patients.

Keywords: Atrial Fibrillation; Heart Failure; Systolic Function

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PSI-33: Clinical Factors Associated with Cognitive Function in Patients Hospitalized for Acute Coronary Syndromes: Preliminary Findings from TRACE-CORE

Jane Saczynski1; David McManus1; Jerry Gurwitz1; Robert Goldberg1; Catarina Kiefe1

1Fallon Community Health Plan / Reliant Medical Group

Background/Aims: Cognitive impairment (CI) among hospitalized patients is associated with lack of functional recovery, rehospitalization, and death, but limited data exist on cognitive function in patients hospitalized for acute coronary syndromes (ACS). We examine in-hospital clinical and treatment factors associated with cognitive function among patients with an ACS. Methods: Adults (n = 1730 to date) in central MA, Atlanta, GA, and Macon, GA, without dementia or delirium, were interviewed during hospitalization for an ACS as part of an ongoing study within the Transitions, Risk, and Actions in Coronary Events: Center for Outcomes Research and Education (TRACE-CORE). Cognitive function was assessed by the Telephone Interview of Cognitive Status (TICS; range = 0-41; impaired = 31 or less). Medical record review (n = 111 to date with full data expected in winter, 2013) was used to abstract baseline characteristics, in-hospital treatment, and in-hospital outcomes. Linear regression analysis examined patient demographics, medical history, key laboratory and treatment characteristics in relation to in-hospital cognitive status. Results: Participants were 63% (70 of 111) male, 90% (100 of 111) non-Hispanic white and aged 63.3±12.3 years. The average TICS score was 32.7 ±3 and 23% (26 of 111) were cognitively impaired. In general, patients with CI were only mildly impaired (mean TICS = 28.7). Older age, a history of coronary heart disease and higher maximum troponin I levels during hospitalization for an ACS were associated with significantly lower in-hospital cognitive function (all P’s <0.05). There was a trend for lower cognitive function among patients who had undergone CABG (P = 0.09). Discharge to a nursing facility was also associated with significantly poorer in-hospital cognitive function (P <0.001). Conclusions: Medical history and in-hospital clinical factors are associated with cognitive status during hospitalization for ACS. Screening for CI, which is common among patients hospitalized for ACS, would identify patients who may require tailored transitional care or closer post-discharge monitoring. Future work in this study will examine which clinical characteristics are associated with transient (in-hospital only) as compared with longer-term cognitive dysfunction.

Keywords: Acute Coronary Syndromes; Cognition; Epidemiology

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PS1-45: Prevention of Statin Intolerance in a High Risk Cohort and Management Strategies in Contemporary Cardiology
Bilal Saeed1; Eric Wright1; Michael Evans1; Meredith Lewis1; Steven Steinhubl1

1Geisinger Health System

Background/Aims: Statins are the mainstay of lipid-lowering therapy in contemporary medicine because of their well-established efficacy for reducing cardiovascular disease (CVD) morbidity and mortality in various at-risk populations. However, as many as 20% of individuals with a clinical indication for statin therapy are unable to take a daily statin due to some degree of intolerance. It is unknown what the most appropriate treatment is for these patients. We analyzed how this cohort of patients at high risk for cardiovascular morbidity and mortality is managed in contemporary cardiology.

Methods: Using our electronic health record (EHR) database, EPIC software, we identified patients who were older than 18 years with a high-risk indication for statin therapy; known coronary artery disease, known atherosclerotic disease, or diabetes. We identified those patients as statin intolerant if they had no recent history of statin use and were documented to have been prescribed at least one statin in the past. Results: A total of 63,624 high-risk patients met the eligibility criteria, with over 85% (54,536 patients) receiving a statin, although 5.1% (2,794 patients) were taking a ubiquinol supplement. Of the 9,088 (14.3%) statin intolerant patients, ~1/3 had tried 2 or more statins. Only 21% (1879 patients) were identified as having a statin allergy and 48 (0.5%) had a history of rhabdomyolysis with statin use. We found that 4448 patients (48.9%) were on alternative lipid-lowering medications with omega 3 supplements being most common (28.3%, 1257 patients) followed by ezetimibe (17.2%, 764 patients), fibrates (10.8%, 482 patients), and niacin (5.2%, 229 patients). Conclusions: Management of statin intolerance in a high-risk contemporary cohort of patients is challenging for modern-day health care providers. No strategies have been studied to assess long-term outcomes leading to marked variability in management. A clinical trial is warranted to assess the best treatment approach for this subset of the population who are at high risk for adverse cardiac events.

Keywords: Statin, Intolerance

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PS1-46: Variation in Hypertension Prevalence Among Asian American Subgroups: Results from PACS (Pan Asian Cohort Study)
Powell Jose1; Beinan Zhao2; Sukyung Chung3; Stephen Fortmann2; Latha Palaniappan2

1Palo Alto Medical Foundation for Healthcare, Research and Education; 2Kaiser Permanente Northwest

Background/Aims: Asian Americans are a rapidly growing minority population in the US. Higher rates of coronary heart disease (CHD) have been found for some Asian American subgroups, especially Asian Indians and Filipinos. Hypertension (HTN) is a major CHD risk factor, but rates of HTN among Asian American subgroups are unknown largely due to either underrepresentation or aggregation of Asian American subgroups in epidemiologic surveys. Methods: We examined prevalence rates of HTN across Asian American subgroups (Asian Indian, Chinese, Filipino, Japanese, Korean, and Vietnamese) compared to the Non-Hispanic White (NHW) population within a large, diverse, mixed payer ambulatory care setting in Northern California; all patients were insured. Electronic health records of 216,768 patients over 18 years of age who had at least two primary care visits from 2008-2010 were used for analysis (65% NHW, 13% Asian Indian, 14% Chinese, 3% Filipino, 2% Japanese, 1% Korean, and 2% Vietnamese). Prevalence rates were age- and sex-adjusted to the NHW population. The following criteria was used to define HTN: two separate non-emergent office visit blood pressure measurements ≥140/90mm Hg. IC9 coding for hypertension (401.X), or use of any anti-hypertensive medications. Prevalence rates of HTN for each group are presented with 99% confidence limits. Results: Age- and sex-adjusted hypertension rates were lower for aggregated Asian Americans (34.9%, 99% CI 34.5-35.3%) compared to NHW (38.9%, 38.6-39.2%). Filipinos, however, had much higher HTN rates (51.2%, 50.7-53.2%) compared to NHWs. Adjusted HTN rates were lower among the majority of Asian subgroups including Chinese (29.8%, 29.1-30.4%), Koreans (30.7%, 28.0-33.5%), Vietnamese (30.8%, 28.7-32.8%), and Asian Indians (36.9%, 35.9-37.8%), compared to NHWs. Japanese had similar HTN rates as NHWs (38.2%, 36.5-39.9%). Conclusions: There is substantial heterogeneity in HTN prevalence among Asian American subgroups, with Filipinos Americans exhibiting the highest rates of HTN. This analysis underscores the need to study Asian American subgroups separately to avoid masking the significant heterogeneity in cardiovascular risk factors. Keywords: Hypertension, Prevalence, Ethnicity

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PS1-47: Clinical Risk Factors for Cardiovascular Disease in Asian-Indian and Non-Hispanic White Men in the California Men’s Health Study
Nirupa Ghai1; Steven Jacobsen2; Stephen Van Den Eeden3; Ameena Ahmed3; Virginia Quinn4

1Kaiser Permanente Southern California; 2Kaiser Permanente Northern California; 3Kaiser Permanente San Francisco

Background/Aims: Asian-Indians (AIs) have disproportionately higher rates of cardiovascular disease (CVD) than most racial/ethnic groups. We evaluated clinical risk factors including diabetes mellitus (DM), hypertension (HTN), and dyslipidemia in AI men compared with non-Hispanic white (NHW) men enrolled in the California Men’s Health Study (CMHS). Methods: Analyses included 23,360 CMHS participants (AIs = 229, NHWs = 23,131) from Kaiser Permanente Southern California. ICD-9 diagnoses of DM, HTN or dyslipidemia were captured from the medical record. We defined pharmacotherapy with a prescription of ≥30+ days supply filled between 1/1/08 and 12/31/10. Risk factor control was measured with lab values and blood pressures obtained between 1/1/08 and 12/31/10. Results: No differences between AI and NHW men were found for age (mean = 58 years), however, AIs had higher educational attainment (83% (191/229) versus 51% (11093/23131) with a college degree). AIs were more often diagnosed with DM (39% (89/229) versus 19% (4352/23131), P <.001) and dyslipidemia (75% (171/229) versus 65% (14942/23131), P <.05). Similar percentages of HTN were found in both groups (62% (143/229) versus 58% (13486/23131). CVD clinical risk factors tended to cluster in the AIs, such that among men with HTN, AI men more often had all three diagnoses compared to NHW men (50% (72/143) versus 26% (3528/13486), P <.001). We observed similar findings among men with dyslipidemia (42% (72/171) versus 24% (3528/14942); P <.001). Overall, 95% of men with DM and 80% with HTN received pharmacotherapy. AI men with dyslipidemia were likely to be prescribed medication compared to NHW (148/229) versus 75% (13486/23131), <.05). Among men with DM, there were no differences in mean A1c levels, however, AIs more frequently had A1c levels of 7+ (uncontrolled) (45% (34/76) versus 36% (1,284/3592), P = .11). Among men with HTN, the mean systolic and diastolic values were similar. Mean LDL levels were lower among AIs (113 versus 120, P < .0001). No differences were found for HDL or triglyceride values. Conclusions: Compared with NHW men, AI men more often were diagnosed with diabetes and dyslipidemia, and clustering of CVD risk factors was more prevalent. Nevertheless, in this insured population, treatment and control of clinical CVD risk factors was similar in both groups. Keywords: Cardiovascular Disease; Diabetes; Hypertension

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PS1-50: Aspirin Decision Support Using Data-Driven Treatment Algorithms
Deepika Appana1; JoAnn Sperl-Hillen2; Heidi Ekstrom3; Gerald Amundson3; Patrick O’Connor4; Karen Margolis1; Thomas Kottke1

1HealthPartners

Background/Aims: The role of aspirin therapy for reducing risk of cardiovascular events among those with pre-existing cardiovascular disease is well-established. However, a more individualized approach is recommended for primary prevention based on estimated risks for cardiovascular disease and gastrointestinal bleeding. Methods: The United States Preventive Medicine Review: Prevention of Cardiovascular Disease in Patients With Atherosclerotic Disease: US Preventive Services Task Force Recommendation Statement. JAMA. 2019;321(9):947-954.
Services Task Force has published methods and tables to estimate the number of myocardial infarctions (MIs) and strokes prevented and estimated harms of using aspirin based on age categories in hypothetical cohorts of men and women. Translation of the guideline requires data and formulas to calculate risk which are not readily available to practicing clinicians. We took advantage of the opportunity to enhance the efficiency of provider and patient decision making regarding aspirin through the use of electronic health record data and computer program assistance to assess the risks and benefits.

**Results:** The decision support program for aspirin in HealthPartners Medical Group & Clinics was integrated with the electronic health record through a web-service called Cardiovascular (CV) Wizard. At the point of care, de-identified data including pertinent demographics, diagnosis codes, lab results, medications, and allergies are transmitted to the web service and run through a set of sophisticated algorithms to assess whether aspirin is indicated and to provide individualized treatment suggestions and safety alerts based on known allergies and intolerance, contraindications, and identification of previous bleeding risks. **Conclusions:** Using electronic decision support algorithms, it is possible to provide patients and providers with printable information to engage them in more evidence-based decisions about aspirin use for primary prevention.

**Keywords:** Aspirin; Decision Support; Treatment

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**PS1-51:**

**Testing a Clinical Decision Support Process to Lower Cardiovascular Risk of Patients**

Heidi Ekstrom; Gerald Amundson; Deepika Appana; JoAnn Spern-Hillen; Karen Margolis; Patrick O’Connor; William Rush; Lauren Crain

1HealthPartners

**Background/Aims:** More than 30% of adults in the U.S. have a 10% risk or greater of having a heart attack in the next 10 years. The proportion of adults with moderate and high cardiovascular risk (CVR) accounts for nearly half of the first major cardiovascular (CV) events in the United States. Shared decision support tools may reduce CVR by facilitating and prioritizing provider-patient communication about CV risk. **Methods:** CV Wizard was developed to identify and prioritize uncontrolled CVR factors and offer treatment suggestions. It was integrated into the electronic health record through a web-service and pilot tested with 14 providers at 6 HealthPartners Medical Group (HPMG) clinics. CV Wizard was triggered during patient visits for adults age 18-75 with known CV risk factors such as diabetes, heart disease, tobacco use, hypertension, and hyperlipidemia. Staff printed the patient and provider versions of the decision making support. Providers completed a satisfaction survey 6 weeks postimplementation. **Results:** Eleven providers completed the survey. Ten said CV Wizard fit well in their workflow. All found the information on the form useful and would recommend it to others. Providers also reported that patients were receptive, all or most of the time, to using the tool. Several (n = 3) were encouraged that patients paid more attention to smoking risks. **Conclusions:** Preliminary results show that the CV Wizard is promising for engaging patients in decisions to lower CV risk and providers had high satisfaction rates. The patient tool provides an easy to comprehend visual for communicating and prioritizing CV risk reduction, particularly around smoking.

**Keywords:** Decision Support; Risk; Cardiovascular Disease

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**PS1-52:**

**Diagnosis of Pediatric Hypertension Depends on Clinical Practice Guideline Definitions**

Kenneth Adams; Alan Sinaiko; Joan Lo; David Magid; Elyse Kharbanda; Matthew Daley; Emily Parker; Louise Greenspan; Karen Margolis; Nancy Sherwood; Nicole Trower

1HealthPartners; 2University of Minnesota; 3Kaiser Permanente Northern California; 4Kaiser Permanente Colorado

**Background/Aims:** The National High Blood Pressure Education Program (NHBPEP) guidelines define hypertension (HT) in children and adolescents as blood pressure (BP) measures above the 95th percentile on three consecutive clinic visits. In contrast, the Expert Panel of Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents (Expert Panel) clinical practice guidelines define HT as the average of three consecutive BP measures above the 95th percentile. Here we quantify the impact of these two different case definitions of HT on occurrence of HT in a defined population of children and adolescents. **Methods:** Study subjects were a cohort of 117,329 pediatric primary care patients, drawn from three large, geographically dispersed health systems. Subjects were 3-17 years old at entry between January 1, 2007 and December 31, 2010. Subjects having an elevated initial BP were not excluded, nor were subjects having BP diagnosis codes at baseline or follow-up. We estimated the period prevalence rate of HT using NHBPEP and Expert Panel definitions, applying a rolling window to the longitudinal BP measurements to consider each successive block of three BP measures. Analyses were performed separately for children (3-11 years) and adolescents (12-17 years). Data were analyzed by Poisson regression to estimate annual rates of HT. **Results:** Subjects were followed for an average of 2.1 years. HT defined by elevated BP ≥95th percentile on 3 consecutive clinic visits occurred at a rate of 0.25%/year in children, and 0.42%/year in adolescents. HT defined as the average BP ≥95th percentile from 3 successive clinic visits occurred at higher rates: 0.49%/year in children (P ≤0.00005) and 0.75%/year in adolescents (P ≤0.00005). For subjects with HT defined by elevated BP ≥95th percentile on 3 consecutive clinic visits, the average time between elevated measurements was 19 weeks (s.d. 25 weeks). **Conclusions:** HT rates in children and adolescents were twice as high when using an average of 3 consecutive measures (Expert Panel method) as when using 3 consecutive hypertensive levels (NHBPEP definition). The impact of these differences in HT rates on downstream risk of persistent HT and CV events later in life requires further investigation.

**Keywords:** Hypertension; Pediatric; Blood Pressure

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**Chronic Conditions**

**B2-2:**

**Impact of Automated Alerts to Primary Care Providers and Staff When Patients are Discharged from the Hospital: A Randomized Trial**

Jerry Gurwitz; Terry Field; Jessica Ogarek; Jennifer Tija; Sarah Cutton; Leslie Harrold; Jennifer Donovan; Abir Kanan; Shawn Gagne; Peggy Preusse; Lawrence Garber

1University of Massachusetts Medical School; 2Meyers Primary Care Institute; 3Massachusetts College of Pharmacy and Health Sciences

**Background/Aims:** Inadequate continuity of care puts patients at high risk during transitions from the inpatient to ambulatory setting. Several approaches for improving patient transitions from hospitals to home have been developed, but most require substantial commitments of personnel time. With the adoption of electronic medical records by medical group practices, there may be opportunities to improve the quality of care for patients discharged from hospitals. **Methods:** We conducted a randomized controlled trial of an HIT-based transitional care intervention in a particularly vulnerable patient population, patients aged 65 and older discharged from hospital to home. In addition to notifying providers about the patient’s recent transition, the system provided information about new drugs added during the inpatient stay, warnings about drug-drug interactions, recommendations of dose changes and laboratory monitoring of high-risk medications, and reminded the primary care provider’s support staff to schedule a post-hospitalization office visit. Randomization occurred at the time of hospital discharge during a one-year intervention period beginning in August 2010. Alerts were automatically delivered to the provider and staff in-basket within the Epic electronic medical record. The primary outcomes were: 1) having an outpatient office visit with the primary care provider within 30 days following discharge, and 2) having a rehospitalization within 30 days following discharge. **Results:** The study included 3667 discharges of which 1877 discharges were randomly assigned to the intervention arm. Forty-nine percent of discharges in the intervention arm were followed by office visits with the primary care provider within 30 days, compared to 51% in the comparison arm (RR 0.96, 95% CI 0.90, 1.03). Eighteen percent of discharges in the intervention arm were followed by a rehospitalization.
within 30 days compared to 20% in the comparison arm (RR 0.92, 95% CI 0.80, 1.05). **Conclusions:** The intervention was not effective in increasing the proportion of discharges followed by timely office visits to primary care providers or reducing the proportion with rehospitalization.

**Keywords:** Hospital Discharges; Re-Hospitalization; Office Visits

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B2-3:
**Predicting the Risk of End-Stage Renal Disease in Patients with Stage 3 Chronic Kidney Disease: A Pragmatic Risk Score**

Micah Thorp1; Eric Johnson1; David Smith1; Xiuhai Yang2; Amanda Petrik3; Robert Platt2

1Kaiser Permanente Northwest; 2McGill University

**Background/Aims:** Chronic kidney disease (CKD) is common, but only progresses to end-stage renal disease (ESRD) in a minority of patients. Developing a tool for early identification of patients likely to progress to ESRD would enable clinicians and medical systems to target resources to patients likely to benefit from interventions. **Methods:** We conducted a cohort study by linking data among 38,483 patients with stage 3 CKD. We measured patient characteristics during the year before patients became eligible because of their poor kidney function. The patient characteristics were known from previous studies to predict ESRD. We followed patients for up to one year. Seven routinely measured patient characteristics accurately predicted the risk of ESRD. By combining those characteristics with numeric weights for their importance, the risk score identified the subgroup (top decile or tenth) of patients at the highest risk. **Results:** We observed 461 patients who developed ESRD, a one-year risk of 1.6 per 100 patients. We judged the risk score’s effectiveness by dividing the cohort into ten equal groups or deciles, which included approximately 3,849 patients. Patients at or above the 90th percentile of predicted risk (top decile) were 60 times more likely to suffer a deep infection when compared with patients below the 10th percentile (bottom decile): 11.0 per 100 patients (top decile) versus 0.2 per 100 (bottom decile). The c-statistic was 0.89. **Conclusions:** This pragmatic risk score appears to be the first of its kind for predicting ESRD in patients with stage 3 CKD. Previous risk scores in the KPNW population and other populations have predicted ESRD in both earlier and later stages of CKD and may not be sufficiently accurate for KPNW’s intended application. Our risk score can predict a patient’s absolute risk (e.g., 11 per 100 patients). The risk score can also reveal where a patient’s absolute risk ranks as a percentile. The same seven characteristics are more useful to decision-makers when the hazard ratios (numeric weights) can be combined in a risk score to predict the absolute risk.

**Keywords:** Risk Scores; Chronic Kidney Disease; ESRD

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B2-4:
**A Vertebral Fracture Assessment (VFA) Performance Algorithm Improves Appropriate Utilization Among Those Referred for Bone Density Tests (DXA)**

John Schousboe1; Fergus McKiernan2; Neil Binkley3

1Park Nicollet Health Services; 2Marshfield Clinic / Security Health Plan of Wisconsin; 3University of Wisconsin

**Background/Aims:** Densitometric lateral spine imaging (vertebral fracture assessment, or VFA) identifies prevalent vertebral fracture and improves fracture risk estimation, but is under-utilized in clinical practice. We created an algorithm to be used by bone density (DXA) technologists to identify those with moderate or higher pre-test probability of prevalent vertebral fracture who should have VFA at the time of a DXA test. Our objectives were to: a) assess changes of VFA utilization after implementation of the algorithm at a large rural multispecialty community health care organization and an academic health center; and b) assess the association of VFA results with prescription of fracture prevention medication. **Methods:** We devised a physician DXA order option that VFA also be performed for those patients whose worst T-score (spine, femoral neck, or total hip) is between -1.5 and -2.5 PLUS age 65 years or more OR height loss 1.5 inches or more OR current glucocorticoid use. The proportion for those with an indication for VFA who had one done before and after introduction of the performance algorithm was compared with chi2 statistic. Manual medical record review was done to assess results of VFA, and logistic regression was used to estimate the multivariable-adjusted association of VFA results (positive for vertebral fracture vs. negative) with subsequent physician prescribing of fracture prevention therapy. **Results:** After introduction of the DXA/VFA order option, 36% (331 of 969) and 87% (438 of 452) of those with a VFA indication at the two institutions had VFA performed (P-value <0.001 compared to before introduction). Those with a VFA positive for prevalent vertebral fracture had an odds ratio of 3.2 (95% CI: 2.1 - 3.1) of starting fracture prevention medication compared to those with a VFA negative for vertebral fracture, adjusted for age, sex, prior clinical fracture, and current glucocorticoid use. **Conclusions:** DXA technologists can successfully use an algorithm to identify those for whom VFA is indicated, provided the appropriate conditional order for VFA is part of the DXA order. Documentation of prevalent vertebral fracture appropriately increases utilization of fracture prevention therapy in a substantial subset of those who do not otherwise have an indication for therapy.

**Keywords:** Vertebral Fracture Assessment; Fracture Risk

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B2-5:
**Spectrum of Obesity and Extreme Obesity in a Diverse Population of Children and Adolescents**

Louise Greenspan1; Malini Chandra1; Stephen Daniels2; Benjamin Maring1; Alan Sinaiko3; Emily Parker4; Nancy Sherwood5; Matthew Daley6; Elyse Kharbanda7; Kenneth Adams8; Ronald Prineas9

1Kaiser Permanente Northern California; 2Children’s Hospital Colorado; 3University of Minnesota Medical School; 4HealthPartners; 5Kaiser Permanente Colorado; 6Wake Forest University School of Medicine

**Background/Aims:** The aim of the study was to examine the prevalence of obesity and extreme obesity in school-aged children using three classifications based on body mass index (BMI): BMI percentile, percentage above the 95th percentile and Z score, and the association of BMI stratification with elevated blood pressure. **Methods:** This was a retrospective study of 117,618 children aged 6-17 years receiving well-child care in Kaiser Permanente Northern California between July 2007 and December 2010. Blood pressure, BMI and other data were extracted from electronic records. **Results:** The prevalence of BMI ≥95th percentile ranged from 14.5% (4,395 of 30,235) in whites and 14.3% (2,287 of 16,033) in Asians to 22.3% (1,809 of 8,124) in blacks and 25.8% (5,734 of 22,187) in Hispanics. For boys, the highest prevalence was in Hispanics (29.2%, 3,346 of 11,452), followed by blacks (21.0%, 879 of 4,193); for girls, the highest prevalence was in blacks (23.7%, 930 of 3,931) and then Hispanics (22.2%, 2,388 of 10,735). For extreme obesity, a threshold of BMI ≥120% of the 95th BMI percentile identified the largest proportion of children (5.6%, 6,532 of 117,618) compared to BMI ≥99th percentile (3.8%, 4,488 of 117,618) and BMI Z score ≥3.0 (0.1%, 83 of 117,618). Stratification of BMI by percentage above the 95th percentile demonstrated a graded relationship between obesity severity and risk of elevated blood pressure. **Conclusions:** The prevalence of obesity and extreme obesity in children varied by age, gender and race/ethnicity, with the highest prevalence among Hispanics followed by black children. Compared to BMI thresholds based on the 99th BMI percentile or BMI Z score of 3, classification by BMI ≥120% of the 95th BMI percentile identified a greater percentage of severely obese children in whom additional health risk stratification was achieved by further categorizing based on percentage above the 95th BMI percentile. This classification approach may be useful for obesity management in clinical practice, public health surveillance, and research.

**Keywords:** Obesity; Children; Classification

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PS3-19:
Association of Racial Discrimination and Overweight Status Among Adolescents
Dayna Johnson1; Christine Joseph1; Andrea Cassidy-Bushrow1
1Henry Ford Health System / Health Alliance Plan

Background/Aims: The percent of overweight adolescents has tripled in the last 30 years, with increasing the risk for obesity and chronic diseases. Evidence suggests racial discrimination has implications for academic performance and health; however, research examining its contribution to obesity among adolescents is limited. We examined the association between discrimination and overweight status in a racially-diverse sample of healthy adolescents. Methods: Adolescents age 14-17 years completed a single research visit between November 2009 and June 2011. Height and weight were measured by trained staff. Discrimination was measured using 8 items from the school discrimination scale (SDS) which assesses the frequency with which adolescents perceive personal racial discrimination at school by their teachers and peers. Overweight was defined as a body mass index ≥85th percentile for sex and age. Logistic regression was used to estimate the association of discrimination with overweight status. Results: The sample consisted of 333 adolescents (mean age 16.4±1.0 years; 152 (44.6%) male; 174 (55.2%) African-American (AA); 127 (38.1%) overweight). Males had higher scores on the peer and teacher SDS than females, 1.26±0.47, 1.27±0.59 vs. 1.14±0.33, 1.18±0.48, P < .01 and P = 0.01 respectively. In crude analyses, adolescents with higher peer and teacher SDS scores were more likely to be overweight, OR = 1.5 P = 0.09 and OR = 1.3 P = 0.02, respectively. In race- and gender-specific models, white males with a higher teacher SDS score had a 5.1 higher odds of being overweight, P = .04. The association persisted with adjusting for age. There was no association among white females, AA males or AA females for teacher SDS score and overweight status, P = 0.68, P = 0.27, and P = 0.58 respectively. Additionally, we found no association by race or gender for peer SDS and overweight status. Conclusions: Our results suggest that adolescents, particularly males that report being discriminated against by their teachers, are more likely to be overweight. We likely did not observe an association between peer SDS and overweight status, because our population was recruited from a highly segregated area, where students attend schools with peers of the same race. Given adolescent health is predictive of adult health, additional research examining the role of discrimination in producing poor health outcomes among adolescents is warranted.

Keywords: Overweight; Discrimination; Racial Discrimination

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PS3-20:
Prevalence of Obesity and Extreme Obesity in Children Aged Three to Five Years
Joan Lo1; Benjamin Maring1; Malini Chandra1; Stephen Daniels2; Alan Sinaiko3; Matthew Daley4; Nancy Sherwood4; Emily Parker5; Kenneth Adams5; Ronald Prineas6
1Kaiser Permanente Northern California; 2Children’s Hospital Colorado; 3University of Minnesota Medical School; 4Kaiser Permanente Colorado; 5Kaiser Permanente San Francisco; 6Kaiser Permanente Colorado

Background/Aims: Early childhood adiposity may have significant later health effects, highlighting the importance of early recognition in young children. This study examines the prevalence and recognition of obesity and severe obesity in preschool-aged children. Methods: The electronic medical record was used to examine body mass index (BMI), height, sex, and race/ethnicity in 42,559 children aged 3-5 years 2007-2010 within Kaiser Permanente Northern California. Normal BMI (BMI <85th percentile); overweight (BMI 85th-94th percentile); obesity (BMI ≥95th percentile); and extreme obesity (BMI ≥99th percentile or BMI ≥1.2x95th BMI percentile) were classified using the 2000 Center for Disease Control and Prevention growth charts. Provider recognition of elevated BMI was examined for obese children aged 5 years. Results: Among 42,559 children, 12.4% (2,698 of 21,717) of boys and 10.0% (2,077 of 20,839) of girls had BMI ≥95th percentile. The prevalence was highest among Hispanics (18.2%, 982 of 5,397 boys and 15.2%, 760 of 4,988 girls), followed by blacks (12.4%, 161 of 1,138 boys and 12.7%, 154 of 1,216 girls). A positive trend existed between BMI category and median height percentile, with obesity rates highest in the highest height quintile. The proportion with BMI ≥99th percentile was 3.9% (1,670 of 42,559), nearly two-fold higher for boys (66.8%, 1,116 of 1,670) versus girls (33.2%, 554 of 1,670), and identified a larger proportion of children compared to BMI ≥1.2x95th BMI percentile (1.6%, P <.001). Among those aged 5 years, 77.9% of obese children (1082 of 1389) had provider diagnosis of obesity or elevated BMI, increasing to 84.5% (424 of 502) among the subset with severe obesity. Conclusions: Obesity and severe obesity are evident as early as age 3-5 years, with race/ethnic trends similar to older children. This study underscores the need for continued recognition and contextualization of early childhood obesity in order to develop effective strategies for early weight management.

Keywords: Obesity; Pediatrics; Body Mass Index

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PS3-29:
Impact of BMI and Change in BMI from Normotension to Prehypertension or Hypertension in Patients Ages 3-17
Emily Parker1; Patrick O’Connor2; Elyse Kharbanda3; Kenneth Adams1; Alan Sinaiko3; Karen Margolis4; Louise Greenspan5; David Magid6; Matthew Daley5; Nancy Sherwood1
1HealthPartners; 2University of Minnesota Medical School; 3Kaiser Permanente San Francisco; 4Kaiser Permanente Colorado

Background/Aims: Overweight and obesity among US children and adolescents is an important public health problem. Conditions associated with obesity, such as type 2 diabetes, hypertension, and hypercholesterolemia, are becoming more common in children. This study examined the relationship between changes in BMI percentile and incident prehypertension and hypertension in a cohort of children and adolescents. Methods: Study subjects were 23,578 patients, ages 3-17, with three or more outpatient primary care visits between 2007 and 2010 at HealthPartners Medical Group, Kaiser Permanente Colorado, or Kaiser Permanente Northern California. Data were extracted from electronic health records (EHR). Change in BMI was defined as: increase, decrease, stayed obese, stayed overweight, and stayed healthy weight using established BMI percentile cut-points. Incident prehypertension and hypertension were defined using blood pressures and diagnosis codes from the EHR. We used time-dependent Cox proportional hazards models to estimate the hazard of change in BMI percentile with incident prehypertension and hypertension. Results: Over a median 2.6 years follow-up, there were 7,232 cases of incident prehypertension, 148 diagnoses of incident hypertension, and 107 additional cases of incident hypertension based on blood pressure data from the EHR. Seventy-one prehypertensives went on to develop hypertension. Those who stayed obese, stayed overweight, and increased BMI had increased hazard of incident prehypertension (1.96, 1.39, and 1.49, respectively) and increased hazard of incident hypertension (3.6, 3.21, and 1.83, respectively) compared with those who stayed healthy weight. Conclusions: Persistently high BMI or increasing BMI over time was associated with pronounced increase in risk of both incident prehypertension and hypertension. Future research should examine factors associated with the development and recognition of hypertension.

Keywords: Obesity; Hypertension; Pediatrics

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PS3-30:
Recidivism to Uncontrolled BP Levels in Previously Controlled Hypertension Patients
Patrick O’Connor1; Steven Asche1; David Magid2; JoAnn Sperl-Hillen1; David Price2; Heidi Ekstrom1; Karen Margolis4
1HealthPartners; 2Kaiser Permanente Colorado

Background/Aims: We posit that as rates of hypertension (HT) control improve nationally, recidivism from controlled to uncontrolled HT will emerge as a major obstacle to ongoing improvement in overall population rates of HT control. To probe this hypothesis, we examined rates and predictors of HT recidivism in adults with baseline adequate HT control who are receiving care at medical groups that have overall high rates of HT control.
control. Methods: Study subjects were adults with controlled hypertension at baseline based on two consecutive visits with normal BP readings (<140/90 mmHg or <130/80 mmHg for those with diabetes) at Medical Group A (MG-A; N = 12,766) and Medical Group B (MG-B; N = 9,768). We classified HT recidivism after follow-up for 4-16 months after the initial BP measures using the mean of the last two BP readings for each patient.

Results: At baseline, the proportion of adults with HT who were at BP goals was 55% at MG-A, and 66% at MG-B. HT recidivism occurred in 19% of subjects with baseline controlled HT (based on two consecutive baseline visits) at MG-A and 13% of subjects at MG-B. At MG-A, men (P = .008) and those with higher BMI (P < .001) were more likely to have HT recidivism. At MG-B, those who were younger (P < .001) and with higher BMI (P < .001) were more likely to have BP recidivism. At both MGs, DBP was more likely to rise to uncontrolled levels in those age 50 or under compared to older age groups, while SBP was more likely to rise to uncontrolled levels in those age 65 or older compared to younger age groups. Conclusions: HT recidivism occurred in 13% to 19% of patients with previously controlled HT over a mean of 14 months of follow-up time. In medical groups with relatively high levels of baseline HT control, HT recidivism represents a brake on efforts to improve overall BP control. Effective strategies to minimize HT recidivism have great potential to improve overall levels of HT control on a population basis, and could improve HT-related quality measures at the medical group and individual provider level.

Keywords: Hypertension; Blood Pressure; Recidivism

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PS3-32:
Patients with Co-Occurring Hypertension, Obesity, and Depression: Diagnosis vs. Treatment, and Is Treatment of One Condition Associated with Changes in Other Conditions?

Ming Tai-Seale1; Caroline Wilson1; Jun Ma1; Harold Luft1

1Palo Alto Medical Foundation for Healthcare, Research and Education

Background/Aims: Hypertension (HTN), overweight and/or obesity (OVRWT), and depression (DEP) frequently co-occur. Research on co-occurring chronic conditions often relies on Medicare claims data, and is subject to biases from age limits and reliance on claims-based diagnoses. We use electronic health record (EHR) data from a multispecialty practice to study the occurrence of these conditions among all adults. We assess the probability that previously untreated patients with high blood pressure (BP) receive a diagnosis and subsequently are treated with drugs, and the impact of such treatment on both the BP and body mass index (BMI) of people who also have OVRWT and/or DEP. Methods: EHR data for 2002-2010 were used to examine BP and BMI trajectories among adults with HTN, OVRWT, or DEP and to examine the impact of prescriptions for HTN and DEP on trends in BP and BMI, controlling for patient characteristics. We used propensity score stratification to address treatment selection bias. Results: Most (71%; 23,386/32,326) people with any of these 3 conditions were aged <65. About 32% (21,166/65,522) of those with high BP were neither diagnosed nor treated for HTN. Only 53% (14,254/27,016) of obese patients had a weight-related diagnosis. Recorded depression was associated with increases over time in BP (coef = .09, P < .01) and BMI (coef = .06, P < .01). We found that hypertension was associated with slower increases in BMI (coef = -.08, P < .01). With propensity score stratification, growth curve modeling revealed antihypertensive treatment to be associated with declines in both BP and BMI. Depression medications were not significantly associated with BP or BMI changes. Conclusions: Less than two-thirds of the patients with elevated BPs were diagnosed as having HTN. The favorable impact of HTN treatment on BMI, as well as on BP, suggests addressing missed opportunities for treatment can potentially lead to better outcomes for patients with both problems.

Keywords: Multiple Chronic Conditions; Hypertension; Obesity

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PS3-34:
Does Reporting of Estimated Glomerular Filtration Rates Affect Clinician Behavior?

Micah Thorp1; David Smith1; Eric Johnson1; Nancy Perrin1; Jessica Weiss2; Suma Vupputuri1; Amanda Petrik1; Xiuhai Yang1

1Kaiser Permanente Northwest; 2Oregon Health and Sciences University; 3Kaiser Permanente Colorado

Background/Aims: The National Kidney Disease Education Project and other groups have recommended automated calculation and reporting of estimated glomerular filtration (eGFR) rates among all patients who have a serum creatinine measured. Few studies have assessed whether clinical practice patterns have changed in response to this new initiative. We conducted a time series analysis assessing the rate of nephrology referrals, visits and follow up laboratory testing before and after automated reporting was implemented. Methods: We conducted a retrospective cohort study of patients who had incident eGFR levels <60 measured before and after implementation of eGFR reporting at Kaiser Permanente Northwest (KPNW). We compared rates of subsequent evidence of clinical recognition including nephrology referral, repeat serum creatinine and proteinuria testing before and after implementation of eGFR reporting. Logistic models were used to compare change in clinical recognition rates controlling for baseline trends, and determine if the change in rates is related to clinician characteristics. Results: We found 21,612 patients who had an eGFR <60, had been members for 2 years, were 18 years or older, and did not have a diagnosis of CKD. The number of referrals increased after the eGFR by 1.3 referrals per month (P = .05). However, the trend in monthly referral slowed after eGFR by .59 per month in comparison to the baseline trend (P = .02). Differences in the change in likelihood of referral after eGFR were found for age (P = .01), amount of FTE (P = .04), and type of practice (P = .01). Slope changes

Keywords: Urate Lowering Therapy; Renal Outcomes

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in subsequent orders for other testing (i.e., proteinuria) were not significant. **Conclusions:** Following implementation of eGFR reporting, the likelihood of referral to nephrologists increased though the number of nephrology clinic visits did not. Clinicians who were younger, family medicine, and worked full time were more likely to increase referrals after eGFR.

**Keywords:** Chronic Kidney Disease; Laboratory Reporting; eGFR

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**PS3-35:**

**MRI Detection of Substantia Nigra Degeneration in Parkinson’s Disease: Developing a Candidate Biomarker**

Daniel Huddleston1; Xiangchuan Chen2; Jason Langley2; Xiaoping Hu2

1Kaiser Permanente Southeast; 2Emory University

**Background/Aims:** The substantia nigra (SN) selectively degenerates in Parkinson’s disease (PD). Prior MRI studies of SN have used manual segmentation to make quantitative measurements, an approach with inherently limited accuracy. Here we used an in-house optimized neuramelin MRI (NM-MRI) protocol, and a novel semi-automated segmentation method to investigate changes in SN associated with PD. The relationship between MRI measures and orthostatic hypotension, a phenotypic feature of PD, was also examined. **Methods:** Eight controls and 10 PD patients were scanned on a 3.0 Tesla Siemens MRI scanner using our optimized NM-MRI sequence (2D gradient echo sequence with magnetization transfer contrast preparation pulse) and processing protocol. A contrast to noise ratio (CNR) binary map was generated, identifying voxels with intensity >3 SD above the mean intensity. SN ROIs were defined on the binary map based on the location of the high intensity voxels, which defined its borders discretely. Mean CNR and number of voxels (volume) were then obtained for the SN. Statistical analysis was performed with SPSS. **Results:** Comparison of means revealed that both CNR and volume of the SN were significantly lower in the PD group than in controls (CNR: $P = 0.044$; volume: $P = 0.028$). Each of the two MRI measures were significantly correlated with the orthostatic blood pressure drop (Pearson’s correlation, CNR: $r = -0.725$, $P = 0.001$; volume: $r = -0.661$, $P = 0.003$). **Conclusions:** As hypothesized, both CNR and volume of SN were significantly lower in the PD group than in controls. SN degenerates in PD, this NM-MRI approach appears to detect PD-associated degeneration of SN in vivo. Also, as hypothesized, the MRI measures had a significant negative association with orthostatic blood pressure drop, a phenotypic characteristic of PD. These results indicate that the MRI measures presented here represent promising candidate PD biomarkers. Longitudinal studies are warranted to test this approach as part of an early diagnosis strategy and as a potential clinical trial outcome measure.

**Keywords:** Parkinson’s Disease; Biomarkers

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**PS3-36:**

**Testosterone Replacement Therapy Patterns for Aging Males in a Managed Care Setting**

JaeJin An1; T. Craig Cheetham1; Stephen Van Den Eeden2

1Kaiser Permanente Southern California; 2Kaiser Permanente Northern California

**Background/Aims:** Testosterone replacement therapy is a widespread and growing practice for treating androgen deficiency. Characteristics of males receiving testosterone and treatment patterns in a managed care setting are relatively unexplored. The purpose of this study was to describe the characteristics and treatment patterns of males receiving testosterone therapy. **Methods:** We identified patients who received a testosterone prescription from January 1999 to December 2010 in Kaiser Permanente Southern California (KPSC). We excluded patients receiving testosterone therapy for indications other than androgen deficiency, including: 1) age <30, 2) genetic indications, 3) hypothalamic or pituitary dysfunction, and 4) testosterone deficiency. Twelve months continuous membership prior to the index date was required for inclusion in the cohort. We investigated demographics, testosterone prescriptions, baseline diagnoses, total serum testosterone laboratory results, and physician specialty. Descriptive statistics and paired t-test were used. **Results:** Among testosterone users (N = 10,159) the mean (SD) age was 56.8 (11.6) and 67.7% were white. On an annual basis, from 1999 to 2010, the treatment rate increased by 183% and number of prescriptions per patient increased by 22%. The most frequently prescribed testosterone products were transdermal gels (55.7%), patches (26.2%), and intramuscular injections (14.4%). The average duration of exposure was close to one year [mean (SD) days supply = 320.0 (504.2) days]. Baseline testosterone levels were obtained in 91.0% of patients and the mean (SD) serum testosterone level was 259.7 (179.5) ng/dL. Follow-up testosterone levels were drawn in 59.8% of patients within one year of the index date and the mean (SD) serum testosterone level was 395.0 (275.3) ng/dL. The mean increase from the baseline was 151.9 (95% CI = 160.5, 143.3) for transdermal gels, 118.0 (129.5, 106.5) for patches, and 200.7 (237.0, 164.3) for intramuscular injections. The most frequent diagnoses at baseline were hypertension (43.7%), hyperlipidemia (43.1%), erectile dysfunction (33.5%), testicular dysfunction (26.7), and diabetes (20.3%). Testosterone prescriptions were most frequently written by primary care providers (family practice [36.0%] or internal medicine [20.1%]) followed by specialists (endocrinology [13.5%] and urology [6.6%]). **Conclusions:** Testosterone therapy is rapidly increasing treatment among aging males in KPSC, and most frequently prescribed by primary care physicians.

**Keywords:** Testosterone; Androgen Deficiency

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**PS3-45:**

**A Randomized Controlled Trial to Improve Bone Health: A Multi-Modal Approach to Patient Recruitment**

Brandi Robinson1; Douglas Robin1; Kenneth Saag2; Fredrick Wolinsky3; Peter Cram4

1Kaiser Permanente Southeast; 2University of Alabama at Birmingham; 3University of Iowa College of Public Health; 4University of Iowa Carver College of Medicine

**Background/Aims:** Kaiser Permanente Georgia (KPGA) is one of three sites participating in a randomized controlled trial to evaluate the effect that a direct mailing of Dual-Energy X-ray Absorptiometry (DXA) results will have on patients’ bone health. This abstract describes KPGA’s multi-modal approach to patient recruitment. **Methods:** Over a 24-month period, KPGA will enroll approximately 2,900 English-speaking men and women age 50 years and older who present to 1 of 5 locations to complete a bone density scan. Patients with significant mental, visual or hearing impairments will be excluded. As part of the study, participants will be asked to complete a 30-minute baseline interview in the clinic immediately following his/her DXA scan. In order to reach our enrollment goal, we have taken a multi-modal approach to patient recruitment which includes (1) proactive outreach prior to the DXA appointment, and (2) clinic-based outreach on the day of the DXA appointment. Proactive outreach includes daily review of the DXA appointment database to identify potentially eligible patients. Patients identified by this method receive an invitation letter to participate in the study as well as a follow-up phone call to determine if the patient would like to participate. Clinic-based outreach consists of flyers and posters strategically placed in high impact areas of patient waiting rooms and in-person recruitment that is initiated by the DXA technologist. **Results:** During the first 8 months of recruitment, we assessed 3,164 patients for eligibility and enrolled 1,001 patients into the study. 344 (16%) did not meet the inclusion criteria, 1,571 (50%) declined to participate, 243 (8%) were missed, and 5 (0.2%) started the baseline interview but could not complete it. Clinic workflow has not been adversely affected by the implementation of our study, and the DXA technologists have provided positive feedback on our clinic-based recruitment measures. **Conclusions:** Taking a multi-modal approach to patient recruitment may be effective in enrolling large numbers of patients in a randomized controlled trial. Our recruitment approach has been well received by both patients and clinic staff.

**Keywords:** Patient Recruitment; Osteoporosis; Musculoskeletal Health

doi:10.3121/cmr.2013.1176.ps3-45
**Comparative Effectiveness Research**

**A1-1:**  
*Exercise as a Vital Sign*: Impact of Documenting Self-Reported Exercise in Primary Care  
Richard Grant1; Connie Uratsu1; Julie Schmittdiel1; Barbara Sternfeld2  
1Kaiser Permanente Northern California

**Background/Aims:** Physical inactivity is highly prevalent in US adults and significantly increases mortality risk. We examined the impact of implementing a new primary care visit process to record patient exercise frequency and intensity (“Exercise as a Vital Sign” [EVS]) at the beginning of each visit. **Methods:** We conducted an observational, quasi-experimental cohort study of 696,267 patients and 1,188 primary care providers to examine the impact of EVS implemented between April 2010 to October 2011 in 4 of 15 regional medical centers. Patients without primary care physicians (PCPs) or with co-morbid conditions that precluded exercise were excluded. We assessed documentation of exercise in PCP progress notes; healthy lifestyle-related referrals (e.g., exercise programs, nutrition and weight loss consultation); and changes in weight or glycemic control in patients with overweight or type 2 diabetes. **Results:** EVS implementation was associated with greater exercise-related PCP progress note documentation (26.2% vs. 23.7% of visits, odds of visit documentation increased 1.12 [95% CI:1.11-1.13] adjusting for demographic differences and repeated measures); and a small but significant increase in lifestyle-related referrals (2.1% vs. 1.7%); aOR 1.14 [1.11-1.18]), particularly in obese patients (BMI ≥30 kg/m2, 4.0% vs. 3.2% visits, P <0.001) and patients with type 2 diabetes (3.5% vs. 2.6% visits, P <0.001) compared to visits without EVS. Among patients with at least two BMI measures (n = 633,864), patients in EVS medical centers had slight weight loss (-0.02 kg/m2) whereas control site patients had weight gain (+0.02 kg/m2). Difference in weight change between facilities favored EVS in linear models controlling for baseline differences (<0.03 kg/m2 [95% CI: -0.04 to -0.02 kg/m2]). Differences in A1c (n = 70,083) were similarly small but favored EVS facilities (change in A1c: -0.06% [95% CI: -0.08 to -0.05%]). **Conclusions:** Exercise data collection during initial patient intake resulted in increased PCP progress note documentation and lifestyle-related referrals. The population-level impact on weight and glycemic control was favorable but slight. We conclude that EVS is a necessary but insufficient first step towards improving the identification and treatment of physical inactivity in primary care.

**Keywords:** Exercise; Primary Care  
doi:10.3121/cmr.2013.1176.a1-1

**A1-2:**  
Cost-Effectiveness of Interleukin 28B Genotype-Guided Protease Inhibitor Therapy in Treatment-Naïve Patients with Hepatitis C Virus Genotype 2 or 3  
Jonathan Bock1; Kimberly Fairley1; Robert Smith1; Daniel Maeng1; James Pitcavage1; Nicholas Inverso1; Marc Williams1  
1Geisinger Health System

**Background/Aims:** The addition of protease inhibitors to standard of care (SOC) dramatically increases treatment response in Hepatitis C Virus (HCV) genotype 1 patients. Moreover, Interleukin 28B (IL28B) genotyping helps predict responsiveness for these patients. However, the economic implications of incorporating IL28B genotyping in HCV genotype 2 or 3 infected patients are unknown. This study used a treatment algorithm that included IL28B genotype-guided therapy to examine the short and long-term cost-effectiveness of utilizing these single-nucleotide polymorphisms in treatment-naïve HCV genotype 2 or 3 infected patients. **Methods:** A treatment algorithm was constructed to reflect a therapy regimen for treatment-naïve patients with HCV genotype 2 or 3 infection using pegylated-interferon, ribavirin, and telaprevir. To examine the role of the IL28B gene in affecting costs and health outcomes, a decision tree was derived from the treatment algorithm in order to populate a predictive cost model for therapy using our treatment algorithm. **Results:** Expected short-term costs of therapy following our algorithm were $21,648.92 and $47,972.84 for the CC and TT genotypes at rs12979860, respectively, and $47,972.84 and $21,648.92 for patients with the CT genotype at rs12979860 and the TG/GG and TT genotypes at rs8099917, respectively. Predicted costs among patients undergoing SOC therapy were $20,758.92. Sustained virologic response (SVR) rates for genotypes 2/3 were predicted to occur in 82.2% (8,220 of 10,000) of patients overall—88.83% (8,883 of 10,000) and 65.91% (6,591 of 10,000) for the CC and TT genotypes at rs12979860 and 81.01% (8,101 of 10,000) overall for patients with the CT genotype at rs12979860 [72.08% (7,208 of 10,000) and 86.78% (8,678 of 10,000) for the TG/GG and TT genotypes at rs8099917]. Markov modeling predicted a 27.29 quality-adjusted life-expectancy (QALE) after following our treatment algorithm while adding $7,766.51 in long-term costs. The model predicted only a 26.65 QALE after SOC therapy (while adding $9,599.05 in long-term costs). **Conclusions:** Although short-term treatment costs of an IL28B genotype-guided approach exceed those of SOC for treatment-naïve HCV genotype 2/3 infected patients, Markov modeling suggests that lower long-term costs and improved health outcomes may be achieved by the proposed algorithm and provides a dominant cost-effective strategy for treating this population of HCV infected patients.

**Keywords:** Economics; Cost Modeling; Pharmacogenomics  
doi:10.3121/cmr.2013.1176.a1-2
A1-3:
The Performance of Propensity Score Methods for Estimating Hazard Ratio in Time-to-Event Data

Xiaowei (Sherry) Yan1; Lester Kirchner1

1Geisinger Health System

Background/Aims: Propensity Score (PS) methods have been used increasingly in observational studies to reduce bias due to confounding. The performance of PS for estimating hazard ratios (HR) has not been systematically studied. Monte Carlo simulations were performed to evaluate four methods of utilizing PS: 1:1 matching, stratification, PS adjustment, and inverse probability weighting (IPW). Methods: Twelve variables (6 binary, 6 continuous), varying in their association with treatment and outcome, were generated. Five of each were related to both treatment and outcome, and the remaining were associated with outcome. Two scenarios were considered. Scenario #1: 20% of the sample was treated and variable distributions differed between groups. Scenario #2: treatment assignment was associated with the variables. One thousand data sets with 5000 samples each were generated. Time-to-event data were generated from an exponential distribution. Each method was evaluated by controlling treatment only, treatment+confounders, treatment+outcome-related variables, and all potential covariates. Results: Controlling treatment only, matching methods yielded the least biased estimate (~40%) in both scenarios if the condition HR >1.0 was true, while PS adjustment performed best if the condition HR <1.0 was true. In both scenarios, an unbiased estimate was attained if, and only if, all potential covariates were controlled, regardless of method. Conclusions: All PS methods resulted in a biased estimation of the true HR if the treatment estimate is not conditioned on all confounders and outcome-related covariates. The least biased estimation occurs when treatment and confounders are controlled in the PS covariate adjustment method and IPW method. Comparing the four methods, stratification on PS performs better than other methods, followed by matching. The bias was reduced by controlling for confounders if treatment and confounders were strongly associated, or by controlling for outcome-related covariates if outcome was strongly associated with covariates. In addition, unbiased estimates are attained without applying any PS methods as long as all potential covariates are controlled in the model.

Keywords: Propensity Score Methods; Time-to-Event Data; Bias doi:10.3121/cmr.2013.1176.a1-3

A1-4:
Pragmatic and Adaptive Methods of Electronic Medical Record (EMR) Cohort Identification for Comparative Effectiveness Research

Mei Lu1; Jia Li1; Lora Rupp1; Lois Lamaro1; Vinutha Vijayadeva2; Joseph Boscaino3; Mark Schmidt1; David Nerenz2; Stuart Gordon1

1Henry Ford Health System / Health Alliance Plan; 2Kaiser Permanente Hawaii; 3Geisinger Health System; 4Kaiser Permanente Northwest

Background/Aims: Accurate EMR-based cohort identification is crucial in the conduct of comparative effectiveness research. CheCS is a longitudinal study of chronic hepatitis B (CHB) and C (CHC) infection being conducted at 4 HMORN sites. Subjects are identified using automated EMR-based ICD-9 diagnosis and laboratory inclusion criteria, and about 12,000 patients were identified in the initial cohort selection. After confirmation of CHB/CHC status through chart abstraction, we found false discovery rates (FDR) were 13.6% for CHB and 11.3% for CHC. An adaptive approach was proposed to optimize the EMR-based cohort selection. Methods: Classification and Regression Tree (CART) was performed to identify a set of electronic variables (or variable combinations) for CHB and CHC. The variables/classifiers that were considered included not only all the initial cohort identification criteria, but also HIV status, any outpatient order or pharmacy claim for CHB/CHC antiviral medication, and 41 other liver disease-related procedures/diagnoses. The analysis began with CART model building using one set of data (learning), followed by model validation using the other set of data (testing). Results: Of the 12,144 patients identified for the initial CheCS cohort, 2,518 met initial CHB criteria and 9,844 met initial CHC criteria, including 218 who met criteria for both. Of these, 10,825 (2,176 CHB and 8,724 CHC, including 75 co-infected) patients’ diagnoses were confirmed through chart abstraction and the remaining were excluded. CART model FDRs were 8.5% on learning data and 7.1% on testing data for CHB, and 4.9% and 5.7% for CHC, yielding sensitivities and specificities >91% for CHB and >84% for CHC. Overall, FDRs were significantly lower (7.8% for CHB, 5.3% for CHC) than those yielded from the initial inclusion criteria alone (P <0.001). Conclusions: Our adaptive approach to using electronic data for prediction of CHB/CHC status is feasible, can be used for sequential CheCS cohort identification, and may be useful in other studies to identify patients diagnosed with CHB/CHC.

Keywords: Cohort; Identification; Adaptive doi:10.3121/cmr.2013.1176.a1-4

PS1-1a:
Use of the CER Hub to Identify Out-of-Control Asthma and Compare Therapeutic Classes of Step-Up Asthma Medications in Clinical Practice

Richard Mularski1; MaryAnn McBurnie1; Michael Schatz1; Jerry Krishnan1; Jon Puro1; Andrew Williams1; David Au2; Brian Hazlehurst1

1Kaiser Permanente Northwest; 2Kaiser Permanente Southern California; 3University of Illinois Hospital & Health Sciences System; 4OCHIN, Inc.; 5Kaiser Permanente Hawaii; 6VA Puget Sound Health Care System

Background/Aims: Asthma is a chronic inflammatory condition that imposes a substantial burden on patients and society. A major target in asthma care is guideline adherence to disease control assessment and therapy. Our aim was to develop an electronic medical record (EMR) based measure of provider determination of asthma control and use it to assess different treatment modalities employed in out-of-control asthma to allow observational comparative effectiveness research (CER) on different types of step-up therapy. Methods: We developed EMR-based abstraction rules to allow automated determination of asthma control during clinical encounters, a construct that indicates need for treatment intensification. The EMR-based measure operationalizes components in the Expert Panel Report-3 recommendations for assessing a patient’s level of asthma control across the domains of risk and impairment. We used manual chart abstraction on samples of encounter records provided by six diverse health systems participating in the CER Hub project, to develop and validate the EMR-based measure of asthma control. Results: We identified over 185,000 patients diagnosed with asthma across CER-Hub during 2006-2010. Provider documentation (predominantly text clinical notes) was rich in data related to asthma control including aspects of impairment (patient-reported symptom frequency, nighttime awakenings, interference with activity, frequency of rescue inhaler use, and lung function) and risk to patient well-being such as asthma exacerbations and use of systemic corticosteroids. Using the automated medical record classifier MediClass, which enables access to both coded and free-text components of the record, we will assess patients on low-dose inhaled corticosteroid therapy whose asthma is not well controlled. We are using the EMR-based measure to investigate the comparative effectiveness of the following step-up therapies (1) addition of a leukotriene modifier, (2) addition of a long-acting beta-agonist, and (3) increase to higher dose inhaled corticosteroids. Conclusions: Traditional large database studies have been unable to assess elements of asthma control, such as symptom frequencies or activity limitations, because these clinical data are typically only available within free-text progress notes documenting the patient visit. The CER Hub asthma control measure provides new capacity to evaluate the comparative effectiveness of asthma interventions across diverse healthcare settings and in large real-world populations.

Keywords: Assessing Provider Behavior; Asthma; Asthma Control Assessment doi:10.3121/cmr.2013.1176.ps1-1a
Use of the CER Hub to Evaluate Exercise Counseling in Primary Care

Stephen Fortmann1; Victor Stevens1; Jon Puro2; Stephen Kurtz2; Brian Hazlehurst3

1Kaiser Permanente Northwest; 2OCHIN, Inc.

Background/Aims: Regular physical activity (PA) markedly improves health, physical function, independence, mood, and quality of life while reducing the risk of obesity, diabetes, cardiovascular disease, and some cancers. However, most people in the US do not meet recommended PA levels. The primary care setting is well-suited to long-term follow-up with repeated assessment and modification of treatment plans (e.g., for controlling hypertension). This approach is adaptable to exercise assessment and counseling—“exercise as medicine”. Kaiser Permanente (KP) recently introduced a PA promotion initiative that includes a new electronic medical record (EMR) feature to document current PA level (called “Exercise as a Vital Sign” or EVS). Provider counseling and referral for exercise items do not appear in structural fields in the EMR. We therefore plan to use natural language processing to assess the efficacy of EVS.

Methods: We developed a method to measure the prevalence of leisure-time PA assessment, counseling, and referral in electronic medical records (EMRs) in primary care. The protocol was adapted from the “5As” of smoking cessation counseling, a motivational interviewing strategy designed to effect behavioral change, and operationalizes how clinicians document PA status and counseling for PA, including key concepts, phrases, words, numbers, orders, and procedures. Three chart reviewers used tools provided by the CER Hub to identify these measures in 400 charts each from two healthcare organizations. We assessed the internal validity of the measures through analysis of the manual chart review data.

Results: Abstractors as a group (n = 3) reliably identified components of PA counseling, including non-specific advice, personalized advice, and referral for PA, in approximately 25% of encounters from a health plan that had implemented EVS. Significantly fewer instances of PA counseling were found in encounters from a second health system without EVS.

Conclusions: This preliminary work supports the development of strategies to create a Mediclass program to automatically search the ambulatory component of EMR for these measures. We plan to assess PA counseling before and after the implementation of EVS, which has occurred at different times in different regions of KP, allowing a lagged baseline design for evaluation of relationships between EVS, PA counseling, and health outcomes.

Keywords: Physical Activity; Behavioral Counseling; Primary Care

doi:10.3121/cmr.2013.1176.ps1-1b

The CER Hub: A Platform for Conducting Comparative Effectiveness Research

Brian Hazlehurst1; David Au2; Elissa Brannon3; Andrew Masica4; Richard Mularski1; MaryAnn McBurnie1; Jon Puro2; Andrew Williams6; Victor Stevens1

1Kaiser Permanente Northwest; 2VA Puget Sound Health Care System; 3Kaiser Permanente Southeast; 4Baylor Health Care System; 5OCHIN, Inc.; 6Kaiser Permanente Hawaii

Background/Aims: Comparative effectiveness research (CER) is to generate new evidence on the effectiveness, benefits, and harms of different treatments, diagnostics, and disease prevention methods under “real world” conditions. To accomplish this goal using data generated in the course of providing care, CER requires the identification, capture, aggregation, integration, and analysis of disparate data sources held by different institutions with diverse care practices and data systems. Methods: To address the goals of CER, we built the CER Hub; a web-based platform for collaborative development and conduct of healthcare research studies using multi-institutional, comprehensive electronic medical record (EMR) data. The Hub provides informatics tools and methods for developing and applying study-specific processors of EMR data, enabling access to the entire clinical record (including text clinical notes) to answer study questions. These processors are developed on the Hub and then distributed out to participating study sites to enable efficient and accurate aggregation of study data, allowing pooling of standardized limited datasets for analysis of multi-institutional clinical data. As an Internet-based platform, the Hub provides support for collaborative design, development, and conduct of research studies that use electronic clinical data. The Hub provides investigator-initiated studies with capacity to address questions of interest to independent researchers and their organizations, while providing a mechanism for the knowledge gained to be built into subsequent, related research efforts.

Results: To demonstrate the CER Hub, we established multiple research studies that involve six diverse health systems dispersed throughout the U.S. (including 3 HMORN sites), which utilize 3 distinct EMR systems. Each study developed, validated, and deployed a study-specific data processor to identify aspects of patient health and care services delivered to study patients, locally within their health system’s data processing environment. Aggregate data resulting from this process were then assembled at a central site for descriptive and outcomes analyses.

Conclusions: The CER Hub provides a scalable method to generate evidence on fundamental questions in health and care delivery (including comparative effectiveness, epidemiology, health services, public health, quality and patient safety questions) with capacity to analyze large populations from multiple and diverse healthcare systems.

Keywords: Natural Language Processing; CER Informatics Infrastructure; Multi-Institutional Research

doi:10.3121/cmr.2013.1176.ps1-1c

Use of CER Hub to Evaluate Outcomes of Smoking Cessation Services, a Behavioral Treatment

Victor Stevens1; Steffani Bailey2; Brian Hazlehurst1; Stephen Kurtz1; Andrew Masica3; MaryAnn McBurnie1; Elisa Priest3; Jon Puro2; Nancy Rigotti4; Leif Solberg5; Andrew Williams6

1Kaiser Permanente Northwest; 2OCHIN, Inc.; 3Baylor Health Care System; 4Massachusetts General Hospital; 5HealthPartners; 6Kaiser Permanente Hawaii

Background/Aims: The US Public Health Service task force on tobacco use and dependence developed an evidence-based treatment guideline for primary care (the “Five As” - Ask, Advise, Assess, Assist, Arrange). The Five As guidelines have been implemented by most primary care treatment organizations, including the six health systems in this project. Use of this guideline has been shown to substantially increase smoking-cessation rates in carefully managed research projects, however only a few assessments of implementation and effectiveness have been conducted in real-world clinical settings.

Methods: Using the CER Hub, we specified operational definitions for each of the 5As enabling their identification in the EMR, including definitions unique to specific care settings (e.g., the names of local cessation programs). We refined an automated system, MediClass, with these definitions and used software tools on CER Hub to manually code samples of 500 test records at each site for comparison to performance by MediClass. We are using this automated data processor to assess smoking cessation care delivered to over 400,000 smokers across the six health systems during a 6-year study period.

Results: Each site deployed the automated processor in their secure data environment and are generating and sharing a standardized limited dataset for analyses. The pooled dataset contains the relevant clinical events (including updates to tobacco use status as well as the Five A’s) to identify patients who smoke, those who stop smoking, and the smokers who received various types of treatment. Patients are classified as smokers if they are using tobacco at a visit, or if they were identified as a smoker at a previous visit with no change in tobacco use status noted since that visit. Smoking cessation services are being assessed for each primary care visit during the study period. Delivery of smoking cessation services will be summarized with respect to patient and provider characteristics and populations of interest, and quitting outcomes assessed.

Conclusions: The CER Hub provides a common format for organizing data from multiple data systems and provides a practical and scalable method for identifying smoking counseling in the free text and coded data of electronic medical records.

Keywords: Smoking Cessation; Behavior Change; Health Services Research

doi:10.3121/cmr.2013.1176.ps1-1d
Diabetes

A3-3:
Pre-Pregnancy Adiponectin Levels and Subsequent Risk of Gestational Diabetes Mellitus (GDM)

Monique Hedderson1; Jeanne Darbinian1; Assimara Ferrara1
1Kaiser Permanente Northern California

Background/Aims: Adiponectin is an adipocyte-derived polypeptide with insulin-sensitizing properties that has been prospectively linked to the development of type 2 diabetes. Adiponectin levels decrease during the course of normal pregnancy. It is unknown whether pre-pregnancy adiponectin levels are related to risk of gestational diabetes mellitus (GDM), a common pregnancy complication and strong predictor of type 2 diabetes. Our study assessed prospectively whether serum total and high molecular weight (HMW) adiponectin concentrations measured before pregnancy are associated with subsequent risk of GDM. Methods: We conducted a case-control study among normoglycemic women who took part in a multiphasic health checkup (MHC) exam at Kaiser Permanente Northern California between 1984-1996 and had a subsequent pregnancy before 2009 (255 GDM cases and 507 controls, matched on: year of exam, age at exam and age at pregnancy and number of intervening pregnancies). The MHC exam occurred on average 7 years before pregnancy. Results: Pre-pregnancy total adiponectin and HMW concentrations were lower in women who developed GDM than controls (7.7 vs. 10.6 and 2.8 vs. 3.9 μg/mL, respectively, P-values <0.001). Compared with women in the highest quartile of total adiponectin, women in the lowest quartile had an almost 4-fold increased risk of GDM after adjusting for insulin, hours since last food, race/ethnicity, family history of diabetes, education, BMI and parity (OR (95% CI): 3.83 (2.05-7.16)). Similar results were observed comparing the highest versus lowest quartile of HMW adiponectin (OR: 4.15 (2.20-7.83)). Conclusions: The risk of GDM is increased among women with lower pre-pregnancy levels of adiponectin, suggesting decreased insulin sensitivity is present years before pregnancy. Measuring adiponectin may help identify women at high risk for GDM.

Keywords: Gestational Diabetes; Biomarkers; Adiponectin
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PS2-2:
Frequency and Results of Glucose Screening in Children and Adolescents 2007-2011

Patrick O’Connor1; Kenneth Adams1; Elyse Kharbanda1; Alan Sinaiko1; David Magid1; Matthew Daley1; Joan Lo1; Nancy Sherwood1; Louise Greenspan1
1HealthPartners; 2University of Minnesota Medical School; 3Kaiser Permanente Colorado; 4Kaiser Permanente Northern California; 5Kaiser Permanente San Francisco

Background/Aims: The aim of the study was to ascertain frequency of glucose screening in children and adolescents, in predefined age, gender, BMI, and race strata. Methods: Study subjects included 68,322 individuals age 3-17 years at cohort entry and followed for a median of 37 months. Subjects had at least one office visit at HealthPartners Medical Group (HPMG). Subjects had their laboratory data examined for date and results of any fasting or random glucose, glycated hemoglobin (A1c), or oral glucose tolerance tests done in an outpatient setting. We report descriptive statistics on rate of glucose testing and rate of tests indicating pre-diabetes by age, gender, BMI, race/ethnicity group, and calendar year. Results: Overall rate of glucose screening was 10.7% (7278/63822). Rates increased in recent years compared to earlier years, were similar in males and females, and were greater in older subjects, those with obesity, and those of minority race or Hispanic ethnicity. The test rate was 4.4% (1145/26245) per year in 2007 compared to 19.7% (1687/8563) in 2010. Glucose screening was most often done with fasting or random glucose, but 7.7% (560/7278) of tests were glycated hemoglobin (A1c). About 13.9% (1013/7278) of tests showed results indicating pre-diabetes. Of the 1013 with a test result indicating pre-diabetes, 79.1% (801/1013) were age 12 and older, 60% (608/1013) were of minority race or Hispanic ethnicity, and 30.9% (313/1013) were obese.

Diabetes diagnosis (250.xx) was present in 2.2% (161/7278) of the subjects with one or more glucose/A1c tests. Conclusions: Rates of glucose testing are highest in demographic subgroups with the highest risk, and have increased markedly in recent years. As the rate of screening increases further, it is likely that the proportion that screen positive for pre-diabetes or diabetes will decline. A substantial number of adolescents have recently been identified as having pre-diabetes, and further work is needed to characterize care subsequently provided to these subjects, and to characterize other CV risk factors.

Keywords: Glucose; Screening; Pediatrics
doi:10.3121/cmr.2013.1176.ps2-2

PS2-3:
Virtual Diabetes Education Improves Resident Physician Knowledge and Performance: A Cluster Randomized Trial

JoAnn Sperl-Hillen1; Patrick O’Connor1; Heidi Ekstrom1; Stephen Asche2; Paul Johnson1; Deepika Appana1
1HealthPartners; 2University of Minnesota Medical School

Background/Aims: The aim of the study was to evaluate an online virtual educational experience on resident physician knowledge and ability to manage patients with diabetes mellitus (DM). Methods: 341 consented residents in 19 residency programs were randomized to receive (n = 177) or not receive (n = 164) the 18 virtual learning cases. Each unique case required about 15 minutes to complete using a web-based interactive electronic health record-like interface that challenged providers to take clinical actions to bring patients to all care goals within 6 months of simulated time. Physiologic modeling simulated realistic outcomes of provider actions, and providers received feedback designed to critique and guide them between longitudinal encounters. After the intervention period, all residents were assigned a 10-question knowledge test and 4 virtual performance assessment cases. Generalized linear mixed models were used to test for study arm differences in knowledge scores and the proportion of residents bringing each virtual case to composite goals for diabetes, blood pressure, and lipids. Results: 232 residents (97 intervention, 135 control) completed at least one assessment case. Residents were 52% female; 52% white; mean age 31; 44% family medicine, 53% internal medicine; and in post-graduate years (PGY) 1 (34%), 2 (35%), 3 and 4 (28.5%). The proportion of residents bringing patients to composite goal using case-specific pre-determined appropriate and safe treatment criteria was significantly higher in the intervention group than control: case 1 - 21.2%, vs. 1.8%, P = .002; case 2 – 15.7% vs. 4.7%, P = .02; case 3 – 48.0% vs. 10.4%, P < .001; case 4 - 42.1% vs. 18.7%, P = .002. Mean knowledge scores (intervention vs. control) for all residents was 5.3 vs. 4.1 (P = .0005), and by PGY were PGY 1 - 5.2 vs. 3.8 (P = .0008), PGY 2 - 5.2 vs. 4.1 (P = .0009), PGY 3 and 4 – 5.2 vs. 4.5 (P = .14). Conclusions: The simulation-based training was successful at improving resident knowledge scores and resident ability to achieve care goals using virtual patients. Differences on assessment case performance by intervention/control group were fairly consistent across PGY 1-4. However, study group effects on the knowledge test appeared stronger for first-year residents compared to those in later years.

Keywords: Diabetes Education; Simulated Technology
doi:10.3121/cmr.2013.1176.ps2-3

PS2-4:
Diabetes Screening and Detection in an Ambulatory Clinical Population

Sukyung Chung1; Kristen Azar1; Beinan Zhao1; Diane Lauderdale2; Latha Palaniappan1
1Palo Alto Medical Foundation for Healthcare, Research and Education; 2University of Chicago

Background/Aims: Type 2 diabetes mellitus is associated with significant morbidity and mortality in the U.S. It is unknown whether racial/ethnic disparities in diabetes prevalence are being adequately addressed in clinical practice with respect to screening. Our aim was to determine diabetes screening and detection rates by race/ethnicity and whether they vary depending on screening criteria used. Racial/ethnic minority groups are generally found to have higher prevalence of diabetes, but little is known
about whether screening and detection rates vary by race/ethnicity. **Methods:** Data from electronic health records (EHR) in a large ambulatory group practice were used to construct a cohort of persons aged 35 and older without prevalent diabetes (N = 116,355). They were followed for diabetes screening (average follow up 17 months in 2007-2011). We computed standardized screening and detection rates in each racial/ethnic group and examined predictors of screening. We compared positive detection rates for those who met the U.S. Preventive Services Task Force (USPSTF) or American Diabetes Association (ADA) screening criteria and those who did not. **Results:** Most patients (82%), including 75% of those meeting neither criteria, were screened during follow-up. Racial/ethnic minority groups had higher screening rates – Latino (82%), Asian subgroups (83% [Japanese] to 90% [Filipino]), non-Hispanic Black (92%) – than non-Hispanic White (80%) (P <0.001). Detection rates were also significantly higher for some minority groups (Latinos (2.1%), Asian Indians (2.4%), and Filipinos (3.8%) than non-Hispanic White (1.3%) (P <0.05). Among screened, 1.6% had positive test results (number needed to screen [NNS] = 64). The NNS was 46 for those meeting ADA criteria, 36 for USPSTF criteria and 132 for those meeting neither. **Conclusions:** Nearly all patients in our study population received screening, and racial/ethnic minority groups were not less likely to be screened. Current clinical practice screens a high proportion of individuals meeting neither ADA nor USPSTF guidelines. Given low screening costs that may be appropriate because many new cases were detected among those without risk factors. Given the substantial benefit of early detection of diabetes our study suggests that universal, preventive screening for diabetes for asymptomatic individuals may have utility. **Keywords:** Diabetes; Screening; Prevention

**Genetics**

**B4-1:** An Overview of Kaiser Permanente’s Research Program on Genes, Environment, and Health

Cathy Schaefer1; Sarah Rowell1; Mary Henderson1; Lawrence Walter1; Marianne Sadler1; Sunita Miles1; Donna Schaffer1; Lisa Croen1; Eric Jorgenson1; Lawrence Kush1; Charles Quesenberry1

1Kaiser Permanente Northern California

**Background/Aims:** The Research Program on Genes, Environment, and Health (RPGEH) is a large, population-based resource for genetic epidemiology developed by scientists at the Kaiser Permanente (KP) Northern California Division of Research. The goal of this program is to link research data for 500,000 broadly consented health plan members, including longitudinal electronic medical records (EMR), genomic data from biospecimens, and environmental exposure data from surveys and geographic information system (GIS) databases in order to support research on many different health conditions. **Methods:** In 2011, the RPGEH established a state-of-the-art biorepository. The KP clinical lab infrastructure is used to collect and transfer blood samples to the biorepository where saliva, serum, plasma, buffy coat and extracted DNA samples are processed and archived. The biorepository includes a facility for separating blood into components for storage, as well as DNA extraction and normalization. Storage capabilities include -80 C and -20 C freezers, an ambient storage unit and LN2 freezers. The biorepository was designed to store blood components for up to 500,000 health plan members. Although initially participant recruitment was by postal mail, electronic methods of recruitment have now been developed. The goal of this effort was to decrease the per person cost of contact and to recruit younger members. By leveraging the KP EMR, blood draw orders are now automatically entered by RPGEH staff for consenting participants. These samples are then stored in the RPGEH biorepository and tracked in a Laboratory Information Management System. **Results:** A survey of demographic and behavioral factors was conducted 2 years prior to saliva collection. With these data, we examined demographic relationships with TL, behavioral influences, and relationship of TL with all-cause mortality following sample collection. **Results:** As expected, TL is inversely correlated with age, and women have longer telomeres than men except as young adults. All analyses controlled for age and gender. As seen in other studies, we find significantly longer TL among African Americans than other groups. TL is positively correlated with education and body mass index (BMI), and negatively correlated with cigarette smoking and alcohol consumption. We found no relationship with major depression or stress-related disorders, even when limited to recent episodes. We found that short TL was prospectively associated with mortality, although only those with the shortest TL were at increased risk; the association suggested a critical threshold of short TL determines effects on mortality. The association persisted even after adjustment of the demographic and behavioral factors such as age, sex, race, education, BMI, smoking, and alcohol consumption. **Conclusions:** While this could indicate a direct effect of TL on health, it will also be important to examine the extent of pre-existing morbidities in these individuals to understand their possible role in the pathway between TL and longevity. **Keywords:** Genes; Mortality; Epidemiology

**B4-4:** Genome-Wide Association Study of Macular Degeneration: Early Results from the Kaiser Permanente Research Program on Genes, Environment, and Health (RPGEH)

Eric Jorgenson1; Stan Sciotino1; Ling Shen1; Dilrini Ranatunga1; Thomas Hoffmann1; Mark Kvale2; Yamhzi Banda2; Pui-Yan Kwok2; Lawrence Walter2; Neil Risch2; Cathy Schaefer1

1Kaiser Permanente Northern California; 2University of California, San Francisco

**Background/Aims:** Age-related macular degeneration (AMD) is the most common cause of vision loss in individuals over the age of 50 in the United States. Genetic factors explain a large portion of the risk of developing AMD, and genetic variants at the CFH, HTRA1/ARMS2, C2/CFB, and C3 gene loci have previously been associated with the disease. **Methods:** We conducted a genome-wide association study (GWAS) of AMD in the Kaiser Permanente Genetic Epidemiology Research on Adult Health and Aging (GERA) cohort. The GERA cohort includes 110,266 subjects with extensive electronic medical record information on eye examinations, diagnoses and treatment of...
vision disorders, and dense genome-wide genotype information on more than 675,000 genetic markers generated using Affymetrix Axiom arrays. The cohort is ethnically diverse, with 7.5% Asian, 7% Latino, 3.5% African American, and 81% non-Hispanic white subjects. We identified a total of 2,147 AMD cases (46 Asian, 125 Latino, 11 African American, and 1,965 non-Hispanic whites) and 37,521 controls (2,013 Asian, 3,201 Latino, 1,168 African American, and 31,139 non-Hispanic whites) for analysis. Analyses were conducted separately for each race/ethnicity group. Results: In the largest group, non-Hispanic whites, we identified highly significant associations with variants in the CFH and HTRA1/ARMS2 gene regions, and genome-wide significant associations in the C2/CFB and C3 gene regions. Conclusions: These results confirm those of previous studies and demonstrate the power of the GERA cohort for combining information from electronic medical records with extensive genotype data. This approach can be applied to additional vision disorder phenotypes, including response to treatment and disease progression.

Keywords: Genetics; Vision Disorders; Age-Related Macular Degeneration

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B4-5: Neighborhood Deprivation and Telomere Length: Preliminary Findings from the Kaiser Permanente Research Program on Genes, Environment, and Health (RPGEH)

Stephen Van Den Eeden1; Mark Kvale2; Jun Shan1; Kyle Latham2; Dilrini Ranatunga1; Sarah Rowell1; Marianne Sadler1; Dana Ludwig1; Lawrence Walter1; Rachel Whitmer1; Charles Quesenberry1

1Kaiser Permanente Northern California; 2University of California, San Francisco

Background/Aims: Shortened telomeres have been associated with numerous adverse health outcomes. In addition, a number of environmental or external exposures, including smoking, air pollution and stress, have been reported to be associated with short telomeres. We sought to examine how neighborhood quality of participants in the RPGEH Genetic Epidemiology Research Study on Adult Health and Aging (GERA) cohort affected telomere length. Methods: The GERA cohort is a multi-ethnic cohort (average age = 63 years) of over 100,000 individuals with linked electronic medical records and questionnaire data. Telomere length was determined from saliva samples in the Blackburn Laboratory using the novel Automated Telomere Length Analysis System (ATLAS) to handle the required high throughput processing of samples. Each sample was assessed six times using qPCR. Relative telomere length (T/S) was obtained from the initial concentrations of the sample telomere (T) with the corresponding sample reference gene (S). The distribution of (T/S) was found to be positively skewed and a log transformation was used to normalize the distribution. The final telomere length end point was the difference in adjusted means of telomere length per standard deviation unit by accounting for age and gender. The NDIs is a standardized composite score of neighborhood quality derived from eight US Census data variables related to poverty/income, occupation, family structure, education and unemployment and normalized to a 100-point scale at the block-group level. Results: A higher NDI indicates greater neighborhood deprivation. The NDI was linked with residential address at time of sample collection. We observed a pattern of shorter telomere length with increasing level of neighborhood deprivation. The pattern persisted even after accounting for age, gender, race/ethnicity, smoking, BMI, and the presence of cardiovascular disease, diabetes and other comorbidity. Conclusions: Our results suggest that neighborhood can adversely impact telomere length. Future plans will be discussed.

Keywords: Telomere; Neighborhood Deprivation; Environment

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PS3-1: Marshalling Site-Specific Data in Multi-Site Studies: Lessons from the eMERGE Network

Jane Grafton1; Eric Baldwin1; David Carroll1

1Group Health

Background/Aims: The Electronic Medical Records and Genomics (eMERGE) Network is a national consortium of nine institutions supported by the National Human Genome Research Institute (NHGRI) to study genetic correlates of disease by pooling data from local biorepositories and electronic data ecosystems. Three HMORN sites participate. Twenty-one of >40 planned genome-wide association studies (GWAS) have been completed, including GWAS for chronic, cognitive, cardiovascular, gastro-intestinal, hematologic, infectious and other phenotypes, without patient contact. Transportable algorithms rely entirely on structured data from the EMR and, optionally, clinical text using natural language processing (NLP). Salient themes include bioinformatics, genomic medicine, privacy, and community engagement. Methods: Algorithms defining phenotype cases and controls are developed iteratively at a primary site in conjunction with one or two secondary sites. SAS, KNIME, Python, and random manual review at multiple sites establish an algorithm’s positive predictive value (PPV) and portability. Validated algorithms, published as site-agnostic pseudo code documents on a secure Web site are implemented with local tailoring at remaining sites; data are pooled for analysis. Results: Pseudo code documents are an efficient way for communicating the logic and content of phenotype algorithms across sites when data not available in multi-site standardized formats (such as the Virtual Data Warehouse) are required or must be obtained using NLP. Iterative, random-sample chart validation is an important method for developing robust transportable algorithms. Business intelligence rules systems such as KNIME simplify implementation of complex algorithms and NLP. A Web site for sharing pseudo code and validation results aids communication. Conclusions: Experiences from the eMERGE network offer valuable lessons for conducting multi-site studies in the HMORN when non-VDW and/or NLP-derived data are required.

Keywords: Genomic; Phenotype; Bioinformatics

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PS3-2: Informatics Challenges to Implement Pharmacogenetics to Clinical Practice

Zhiyi Zhou1; Max He1; Murray Brilliant1; Ariel Brautbar1; Aaron Miller1; Bryan Weichelt1; Simon Lin1

1Marshfield Clinic / Security Health Plan of Wisconsin

Background/Aims: A widely-held vision arising from genomics research is to be able to use information on genomic variation to guide clinical prescriptions. This translational project is designed to test the concept that sequence information from a patient can be coupled with electronic medical records for use in personalized medicine. Methods: Marshfield Clinic is a health care system in Wisconsin with 2 hospitals and 52 community care centers, a member of the HMORN, and partner of the Institute for Clinical and Translational Research, University of Wisconsin – Madison. Cattails, Marshfield Clinic’s internally developed outpatient EHR, has been in existence since the late 1980s. The full-feature EHR is deployed on laptop, tablet and PDA technology and supports a variety of clinical decision support (CDS) applications surrounding care management, prevention, radiology orders and medication prescribing. Much of the underlying infrastructure that supports these CDS applications will be used when integrating genomic information into clinical practice. The underlying development principles for this initiative emphasize the importance of clinical workflow, genetic result significance, and the ability to reconfigure the system as knowledge improves. Results: A strategy of implementing an informatics system to satisfy the needs of pharmacogenetics from both research and clinical practice was tested. One in three of the 411,851 Marshfield Clinic patients in 2011 could benefit from a pharmacogenomic test. Implementing pharmacogenetics tests of three drugs (Warfarin, Clopidogrel, and warfarin) at Marshfield Clinic could prevent potential adverse events that cost $11.3 million annually. Conclusions: Such an informatics system will further
enable comparative effectiveness research in pharmacogenetics and pharmacogenomics.

Keywords: Pharmacogenetics; Clinical Implementation; Clinical Decision Support

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PS3-3:
Biobanking for Research: A Survey of Member Attitudes and Understanding

Alanna Rahm1; Michelle Wrenn1; Heather Feigelson

1Kaiser Permanente Colorado

Background/Aims: Population-based biobanks are an important resource for genetic research. To optimize recruitment of healthy individuals into a research biobank, it is important to know what potential participants understand about this type of research, and the use, risks, and benefits of providing samples to a biobank. Methods: We drafted informational recruitment and consent documents and then surveyed approximately 200 adult members in Kaiser Permanente Colorado clinic waiting rooms to evaluate: their understanding of biobanking and the materials we provided; their willingness to provide a blood sample to a biobank; and facilitators and barriers to their participation. Our materials stated that our proposed method of collecting biospecimens would be to collect an extra tube of blood at their next routine or clinical blood draw. Participants were also instructed that we were only gathering information, not actively recruiting for a biobank. Results: Our survey population was 65% female, mean age was 55, and 78% non-Hispanic white. Of 190 respondents, 79% understood that they would not need a separate blood draw to contribute to the biobank. Nearly all participants understood that they would not be paid for any products resulting from the use of their blood and would not receive results from their samples (91% and 84%). 81% understood that results from their sample would not be entered into their medical record. 67% of participants indicated they would be willing to contribute to a biobank, and 59% would still participate if providing information to US Government databases was required. 68% would donate a sample because "it is important to contribute to research," and over half the participants (55%) said they had no concerns about contributing to the biobank. Of those with concerns, 36% said information security was a reason. Conclusions: The data from this survey will help identify possible barriers to member participation in a research biobank and help identify ways to improve participation.

Keywords: Biobank; Genetic Research

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PS3-4:
Genetic Risk Factors for Major Bleeding in Warfarin Patients in a Community Setting

Joshua Roth1; Denise Boudreau1; Monica Fujii2; Federico Farin2; Allan Rettie2; Kenneth Thummel2; David Veenstra2

1Group Health; 2University of Washington

Background/Aims: Studies evaluating newly initiated warfarin patients in anticoagulation clinics show that polymorphisms in CYP2C9, VKORC1, and CYP4F2 influence dose requirements, and CYP2C9 variants have increased risk of major bleeding side effects. However, these findings may not be applicable to long-term warfarin users or non-specialist care settings. Within this context, our objective was to evaluate the association between CYP2C9*2 and *3, VKORC1 1173, and CYP4F2*3 variants and major bleeding in long-term warfarin users in a community setting. Methods: We used a case-control design and recruited patients from Group Health (GH). Cases experienced a major bleeding event while receiving warfarin. Controls received warfarin on a randomly assigned index date, and had no major bleeding in the prior year. We identified major bleeding with an ICD-9 algorithm, and validated events with chart review. We obtained covariates from GH automated databases and a self-report survey. Our primary analysis used logistic regression to estimate the major bleeding odds ratio (OR) for variants vs. wild type patients. We also conducted an exploratory analysis to estimate the major bleeding OR for patients with variable vs. constant dietary vitamin K intake, stratified by genetic status. Results: We enrolled 265 cases and 305 controls with an average of 3.4 and 3.7 years of warfarin use at the index date, respectively. In our primary analysis, the CYP4F2*3 variant was independently associated with decreased major bleeding risk (OR: 0.62, 0.43-0.91), and CYP2C9 and VKORC1 had null associations. In our exploratory analysis, CYP4F2 wild type patients demonstrated a trend toward increased major bleeding risk with variable vs. constant vitamin K intake (OR = 1.18, 0.64-2.16), while there was a null association in CYP4F2 variants Conclusions: In the largest study of warfarin pharmacogenomics and major bleeding to date, we found that a common CYP4F2 variant is associated with a 38% reduction in risk of major bleeding. In contrast, CYP2C9 and VKORC1 variants demonstrated null associations. Our findings may reflect a gene-drug-environment interaction between CYP4F2*3, warfarin, and dietary vitamin K intake. Collectively, our findings expand understanding of genetic risk factors for major bleeding in warfarin therapy, and can potentially inform dosing and monitoring practices pending validation in independent cohorts.

Keywords: Warfarin; CYP4F2; Major Bleeding

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PS3-13:
Re-Identification Risk Associated with Sharing Linked Genomic and Phenotypic Data from the Kaiser Permanente Research Program on Genes, Environment and Health (RPGEH)

Lawrence Walter1; Stan Sciortino1; Dilrini Ranatunga1; Julia Kay1; Dana Ludwig2; Carol Somkin1; Mary Henderson1; Cathy Schafer1

1Kaiser Permanente Northern California

Background/Aims: It is now understood that conventional de-identification methods such as the HIPAA Safe Harbor standard do not guarantee anonymity of patient records, which may be vulnerable to a variety of attacks aimed at re-identifying confidential information. We present an analytic framework for evaluating these risks quantitatively in order to be able to explicitly balance privacy and scientific utility. As a concrete example, we examine implications for patient privacy of plans to deposit over 70,000 full-genome genotypes and associated clinical data in the dbGaP federal-managed data repository, as a component of a NIH-funded study conducted by the Research Program on Genes, Environment, and Health (RPGEH) at the Kaiser Permanente Northern California Division of Research (KPNCDOR). Risks are examined from multiple perspectives and risk reduction strategies discussed. Methods: Two analytic approaches are described: (1) “k-anonymization”, which computes risk based only on the distribution of cell sizes in the disclosed dataset; and (2) “k-map” which takes account of the characteristics of potential reference datasets – e.g., voter rolls, disease registries - which may be available to the attacker. Probabilities of re-identification were computed using a random sample of records from actual study participants, and assumed disclosure of the following phenotypic attributes: 5-year age group, sex, race (5 categories) and a set of 22 ICD9-defined common diseases. For method 2, the KPNC EMR was used as a proxy for a highly informative reference dataset. Results: The first method tended to yield very conservative estimates of risk: 9.5% of subjects in the disclosed dataset had unique phenotypic attributes, while 18% were in cells of size <5 and 24% were in cells of size <10. Factoring in characteristics of potential reference datasets, method 2, yielded substantially lower levels of risk: 2% of subjects were distinct, 4% in cells size <5, and 6% in cells of size <10. Conclusions: Assessment of re-identification risk of disclosed genomic-phenotypic data is complex, involving differing stakeholders' perspectives, attack types, and characteristics of both the disclosed data and the surrounding information environment. However, reasonable assumptions can be made which allow quantitative estimates of risk, and suggest strategies for risk reduction.

Keywords: Confidentiality; Data Sharing; RPGEH

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CREX: Utility of a Computerized Methodology to Identify Health Conditions Using the EMR for GWAS, in the Kaiser Permanente Research Program on Genes, Environment, and Health

Stan Sciortino1; Lawrence Walter1; Dilrini Ranatunga1; Dana Ludwig1; Cathy Schaefer1; Julia Kay1; Eric Jorgenson1

1Kaiser Permanente Northern California

Background/Aims: The Genetic Epidemiology Research on Adult Health and Aging (GERA) Cohort has genotyped data on over 100,000 participants. In order to characterize many health conditions of interest found among respondents for sample-size estimation and GWAS, we sought to extend methodologies that utilized the Electronic Medical Record (EMR) in an automated way to characterize many diseases without the expense and limitation of numerous, complex algorithms specific to individual diseases and conditions. Methods: We tested a probabilistic approach that scored clinical decisions recorded in the EMR to capture specific diagnostic and treatment domains. We first considered physician diagnosis alone. We assessed sensitivity and specificity against internal registries at the Kaiser Permanente Northern California Division of Research. We also used the methodology to characterize phenotypes for Types 1 and 2 diabetes for GWAS. We tested a single diagnostic domain in a logistic model based on an ICD-9-CM taxonomy and found high sensitivity and specificity when compared with internal registries for breast, lung, colon and prostate cancers; Barrett’s esophagus; HIV; Crohn’s disease; ulcerative colitis, and diabetes. We then assessed a logistic regression model to distinguish among members with Types 1 and 2 diabetes in the genotyped cohort, utilizing the ICD-9 taxonomy, the earliest age at diagnosis available in the EMR or by self-report, and pharmacy prescription utilization of anti-diabetic drugs. Results: The model exhibited a sensitivity of 96.3% and specificity of 99.6% for Type 1 diabetes and a sensitivity of 94.0% and specificity of 98.4% for Type 2 diabetes when compared with the gold standard internal diabetes registry. We identified an additional 60 cases of Type 1 diabetes and conducted comparative GWAS. Conclusions: Utilizing diagnostic information in the EMR as independent domains in probabilistic models to accomplish phenotype creation appears to be a reliable approach to facilitate robust characterization for evaluation, analysis and mapping of numerous disease phenotypes. The method is agnostic to input taxonomies as long as the EMR record contains sufficient and reliable atomic detail. It can also be adapted for machine learning given expert user feedback when gold standard databases are not available.

Keywords: Disease Classification; GWAS; Statistics

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PS3-15:

Genome-Wide Association Study of Anxiety Disorders: Early Results from Kaiser Permanente’s Research Program on Genes, Environment, and Health (RPGEH)

Ling Shen1; Thomas Hoffmann2; Mark Kvale3; Lori Sakoda4; Yamhazi Banda5; Pui-Yan Kwok6; Neil Risch7; Eric Jorgenson1; Cathy Schaefer1

1Kaiser Permanente Northern California; 2UC Berkely School of Public Health

Background/Aims: The Kaiser Permanente/UCSF Genetic Epidemiology Research Study on Adult Health and Aging (GERA) cohort includes 110,266 individuals with comprehensive longitudinal medical records along with genome-wide genotype data. As such, it provides an unprecedented opportunity to conduct a number of genome-wide association studies (GWAS) of psychiatric disorders. Post-traumatic stress disorder (PTSD) and panic disorder (PD) are prevalent, persistent, disabling and heritable anxiety disorders. Numerous candidate gene studies have been published with inconsistent findings. We conducted the GWAS of PTSD and the GWAS of panic disorder among non-Hispanic white GERA cohorts to detect the underlying heterogeneous genetic architecture. Methods: We identified a total of 6177 combined ASD and PTSD cases in the GERA cohort, in which cases had two or more psychiatric diagnoses of ASD and/or PTSD; the GERA cohort supplied 63,613 controls. A total of 1483 subjects with two or more diagnoses of panic disorder and 75,379 controls were included in the GWAS of panic disorder. All the cases and controls were genotyped on the custom Affymetrix Axiom EUR arrays with 674,518 SNPs. Results: In the GWAS of combined ASD and PTSD or the GWAS of PD, a suggestive association with ASD/PTSD was found with a SNP in an intergenic region on chromosome 10 near the ANKRD20A gene (OR = 1.11, P = 1.42x10^-7), as well as neighboring SNPs. In the GWAS of PD, we replicated a SNP association (rs1873727) in intron 3 of TME132D which was reported in a recent GWAS of PD. Conclusions: Our analysis did not yield conclusive associations with PTSD or PD. We replicated a candidate gene in TME132D in the PD analysis. This suggests that we can observe true association signals for these disorders, but additional cases are needed to detect modest effects.

Keywords: GWAS; Post Traumatic Stress Disorder; Panic Disorder

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Health Informatics

C3-1: Creation of Deidentified Test Datasets from the VDW for Code Development Prior to IRB Approval

Jenny Staab1; Donald Bachman1; Alan Bauck1; Maria Faer2; David Gary2; Pierre-André La Chance1

1Kaiser Permanente Northwest; 2Kaiser Foundation Research Institute

Background/Aims: The turn-around time of data-only studies could be shortened by about a month if programmers were to start developing extraction and analytic code before official IRB approval has been granted. However, while code development is likely more successful and efficient if the programs can be checked against data, fully identified datasets like the VDW cannot be accessed without the proper authorizations. A solution to this dilemma is the creation of deidentified test datasets. These test datasets are based on the VDW and preserve its structure and much of the richness of the data. Yet, due to sufficient deidentification, their use for code development falls outside of the purview of the Privacy Rule’s research provisions and does not qualify as Human Subjects research, so IRB approval is not required. Methods: We created VDW based test datasets for 25,000 randomly selected individuals. Only patients up to the age of 90 and within the mid 90% of the age-specific height and weight distribution were eligible. All identifiers, such as MRN, encounter ID, provider ID, and facility code, were replaced with randomly assigned study identifiers, and crosswalks from VDW to study identifier were destroyed immediately after test dataset creation. The same study identifier was used for a given VDW identifier across all tables. Every date was shifted by a specific number of days that varied randomly across individuals, but was consistent for all dates associated with one person. Additional deidentification measures such as random sorts and grouping into larger categories were also applied. Conclusions: A combination of methods serves to sufficiently deidentify a group of test datasets that can be used for code development while awaiting IRB approval for the project. The employment of consistent study identifiers across datasets and date shifting by a person-specific constant preserves important relationships across content areas and time. Use of these deidentified test datasets allows for programming to begin as soon as the study population and protocol are sufficiently defined. This, in turn, enhances research efficiencies as data analysis can begin sooner, data-driven decisions can happen earlier, and studies can be completed more quickly.

Keywords: Deidentification; VDW; Compliance

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C3-3: Using the Electronic Health Record and the National Cancer Institute’s Breast Cancer Risk Assessment (SAS) Macro to Identify Women at Increased Risk for Breast Cancer

Joseph Leader1; Amanda Bengier1; Jonathan Darer1; Azadeh Stark1; Victor Vogel1

1Geisinger Health System

Background/Aims: Women at increased risk for breast cancer (BC) are eligible to take selective estrogen receptor modulators (SERMs) to reduce their risk; Food and Drug Administration (FDA) approval of tamoxifen or raloxifene for BC risk reduction and American Society of Clinical Oncology guidelines for the use of SERMs recommend the two drugs for any woman over the age of 35 years with a 5-year risk of 1.67% or greater, but identifying those women can be both challenging and costly. Fortunately, the National Cancer Institute (NCI) has developed an open source Breast Cancer Risk Assessment Macro (BrCa RAM) that can be run using SAS software. By leveraging the Geisinger Health System (GHS) Electronic Health Record (EHR - EpicCare), the Department of Radiology’s software (Centricity RIS-IC), and Department of Pathology’s software (CoPath), we were able to calculate 5-year and lifetime risk of developing invasive BC. Methods: BrCa RAM calculates risk based on patient age, number of biopsies, if a biopsy ever displayed atypical hyperplasia (Yes/No), age at menarche, age at first live birth, number of first degree relatives with breast cancer, and patient race. We were able to extract and format these elements from EpicCare, RIS-IC, and CoPath. Demographic information (age, race, sex) was obtained from EpicCare, pathology information (number of biopsies, atypical hyperplasia) was obtained from CoPath, and personal history (number of first degree relatives with breast cancer, age at menarche, and age at first live birth) was obtained from RIS-IC. Results: We found 91,692 women between the ages of 35-90 in the RIS-IC database who had ever received a screening mammogram. We identified 9,021 patients with a calculated 5-year breast cancer risk 2% or greater and the mean age was 59.7 years. The numbers of patients by 5-year risk score category were: 2.25% (n = 3,551); 2.5-3% (n = 1,946); 3%- (n = 3,524). Conclusions: The BrCa RAM is a powerful tool that enabled GHS to calculate breast cancer risk for our entire population. Using this macro, we were able to identify patients for prophylactic SERM treatment which can potentially prevent or delay a woman’s risk of developing BC.

Keywords: Electronic Health Record; Breast Cancer Risk; SAS

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C3-4: Primary Care Physician Efficiency in Handling Patient Secure Email and the Impact on Patient Communication and Access

Di Meng1; Terhilda Garrido1

1Kaiser Permanente Program Offices

Background/Aims: All Kaiser Permanente regions have implemented secure email functionality. Regional policies, workflows, and provider best practices have been established regarding secure email encounters with patients. This Phase I study explores effective practices of primary care physicians (PCPs) handling email traffic with patients, provides evidence regarding current secure email workflow and volumes, and estimates physician workloads related to daily secure email encounters with patients. Methods: A combination of methods was used: 1. Structured interviews with 27 PCPs with a high volume of secure email encounters with patients; 2. Descriptive and correlation analysis of daily secure email volume and provider response time; 3. Estimation of actual physician workloads related to secure email with patients, based on observed volume and time spent per email; and 4. Approximate randomization to estimate expected workload adjusted by PCP panel size, kp.org registration rate, and number of clinical work days. Results: Preliminary results of this Phase I study indicate that, before adjusting for panel size, regional averages for physicians’ daily volume of secure email encounters with patients ranged from 1 to 9. Few physicians have high volumes (10-20 per day) of email encounters with patients. Interviews with 27 high-volume physicians revealed two models for managing email traffic: direct physician response and team triage (74%). Some doctors respond quickly to minimize repeat emails/phone follow-ups from patient; others fear that rapid responses will generate higher email volume. First-response times are correlated with email volume in some regions, but average physician response times are not correlated with the volume of email encounters. Preliminary results from approximate randomization provided insight into associations between physician email encounter practices and patient satisfaction with access and communication. Conclusions: Practices for handling secure emails with patients varied across physicians and regions. The data did not confirm all high-volume physician perceptions regarding relationships between volume and turnaround times. The majority of physicians was not overwhelmed by the workload related to secure email with patients, and patient satisfaction was associated with higher email volumes.

Keywords: Secure Email; Efficiency; Primary Care Physician

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C3-5: Patient Use of a Secure Web Portal and LDL in Patients with Diabetes

Jie Huang1; Ilana Graetz1; Richard Brand2; John Hsu3; Mary Reed1

1Kaiser Permanente Northern California; 2University of California, San Francisco; 3Massachusetts General Hospital

Background/Aims: Patient use of web portals to interact with their healthcare delivery system and healthcare providers could improve the quality and safety of care. Among patients with diabetes in a large integrated delivery system (IDS), we examined the association between patient use of
the web portals and cholesterol test results. Methods: The health system implemented a web-based tool for all patients who registered to use the website in November 2005, allowing members to securely access a personal health record, as well as e-mail their physicians, and view their lab results. In this study, we defined patients as web-portals users when patients emailed their physicians or viewed lab results at the first time. We examined the association of patient web-portal use and low-density lipoprotein cholesterol (LDL) level using linear regression with fixed effect at patient level, adjusting for medical center electronic health record (EHR) implementation, quarter for seasonality, and year for temporal trend. Results: The 169,711 patients in the IDS diabetes registry at the start of 2004 were followed through 2009. The number of patients who had used patient web-portal increased dramatically from 16% in 2006 to 35% in 2009. During 2004-2009, a total number of 1,070,856 LDL tests were performed among the study subjects and 18% of the tests were done after patients used the web portal. Overall patient web-portal use was associated with reduction of LDL value by 0.81 mg/dL (95% CI: 0.64-0.97). Further examination among patients stratified by their baseline LDL (last value in 2003) showed that the largest reduction in LDL was found among those with worst control: on average, LDL level dropped by 0.36 mg/dL (95% CI: 0.14-0.57) among those with baseline LDL <100 mg/dL, 0.90mg/dL (95% CI: 0.63-1.18) among those with baseline LDL 100-<130mg/dL, and 2.04 mg/dL (95% CI: 1.59-2.50) among those with baseline LDL >130 mg/dL. Conclusions: Patient use of a web-based portal to review laboratory results or email their clinicians increased substantially between 2006 and 2009. Patient use of web portals was associated with improvement of LDL level, with greater improvement among patients in worse control.

Keywords: Patient Portal; Diabetes; LDL

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PS2-5: Prevalence of Migraine in a Diverse Community – Electronic Methods for Migraine Ascertainment in a Large Integrated Health Plan

Alice Pressman1; Alice Jacobson1; Andy Avis1

1Kaiser Permanente Northern California

Background/Aims: Migraine, a common neurological disorder, is among the top 20 causes of disability worldwide. One-year prevalence of migraine in the US is estimated to range from 8-15%, with women affected at approximately three times the rate of men. Current methods for migraine ascertainment from headache clinics and surveys are costly, affected by clinic-ascertainment bias, and do not work in situations where patient contact is not feasible. With the growing use of electronic medical records (EMR), new methods must be developed for identifying and tracking migraine prevalence over time. We sought to develop an EMR algorithm, to identify migraine, and to characterize its prevalence in Kaiser Permanente Northern California (KPNC). Methods: From EMRs of all KPNC members, we collected all outpatient migraine diagnoses (ICD9 code 346.xx) and migraine-specific prescriptions (ergots, triptans, and acetaminophen with caffeine) for 2006-2010. We chart-reviewed a random sample to develop an electronic Migraine Probability Algorithm (score 0-100). We tested the algorithm in a second independent chart review. Using membership data, we calculated prevalences by age, race, and gender. Results: We identified 313,174 KPNC members with evidence of migraine - 253,620 women and 79,554 men. The 5-year period-prevalence of migraine among KPNC adults was 17.1% for women and 5.9% for men. Among children, rates did not differ by gender (<2%) until the age of 10, when prevalences were higher - 5.8% for girls and 3.5% for boys. For women, prevalence peaked at ages 25-29. In contrast, males experienced flat prevalence with age (range 5%-6%). Overall, Whites had higher prevalence than Asians, but Blacks did not differ appreciably. Conclusions: We used EMR data to capture migraine diagnoses and show prevalence patterns similar to those reported in the literature. Prevalence of diagnosed migraine in KPNC was 2.5-3 times higher in women than men; migraine peaked with age in women, but remained flat for men; and prevalence of migraine among Asian adults was roughly 2/3 that of Whites. These methods for ascertainment of migraine are inexpensive and easy to implement and have applications and implications that extend well to other institutions and debilitating pain conditions.

Keywords: Electronic Medical Records; Migraine; Epidemiology
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PS2-6: Who Opens Alerts to Physicians? (And Who Doesn’t?)

Terry Field1; Hassan Fouayzi2; Shawn Gagne2; Sarah Cutrona1; Jessica Ogarek2; Devi Sundaresan2; Lawrence Garber2

1University of Massachusetts Medical School; 2Meyers Primary Care Institute

Background/Aims: With the increasing adoption of electronic medical records (EMR), there are many opportunities to implement systems of information flow, like alerts to providers. Tests of such systems have varied results. Methods: Within a multispecialty group practice that uses Epic EMR, we conducted a trial of automated alerts to primary care physicians and their staff when older patients were discharged from hospital to home. We generated alerts for new medications, drug interactions, dose problems, or monitoring needs. Provider staff received alerts to schedule an office visit. Alerts appeared in the recipient’s Epic in-basket. Using EMR “digital crumbs”, we tracked the length of time before alerts were viewed. We analyzed the impact of physician age, gender, department, and employment status (full-time, part-time). We also analyzed the impact of patient conditions, including age, gender, comorbidity, and number of office visits in the previous year. Results: Of 763 alerts to physicians, 616 (81%) were opened within one day. Characteristics associated with timely opening were age <50 (OR 1.7, 95% CI 1.1, 2.6) and full-time employment (OR 2.9, 95% CI 1.6, 5.2). Of 1928 alerts to staff, 1173 (61%) were opened within one day. Physician characteristics associated with staff opening of alerts were gender (staff of male physicians were more likely to open the alerts within one day [OR 1.8, 95% CI 1.4, 2.4]), and being a member of the Family Medicine department (OR 1.9, 95% CI 1.3, 2.6) or sub-specialty department (OR 16.6, 95% CI 2.3, 122.3). Staff of full-time physicians were less likely to open alerts within one day (OR 0.64, 95% CI 0.47, 0.87). Controlling for patient characteristics had no impact on results. Conclusions: Special efforts may be required to reach physicians working part-time and older physicians. The characteristics related to staff opening of alerts are specific to this group practice, but the high level of variability across physician types and departments is likely to be an issue in many settings. Design of a system directed at reaching staff quickly may require in-depth assessment of work flow and communication patterns in clinical departments.

Keywords: Health Information Technology; Electronic Medical Record; Alerts
doi:10.3121/cmr.2013.1176.ps2-6

PS2-7: Automated Ordering and Sample Collection to Leverage Electronic Medical Record Based Genetic Research – The Geisinger MyCode Project

Samantha Avelino1; Ryan Colonie1; David Carey1

1Geisinger Health System

Background/Aims: The Geisinger MyCode project is a system-wide biobanking project with DNA and serum samples from over 35,000 Geisinger patients. We summarize an automated process for ordering and collection of samples linkable to EMR data for research studies. Methods: Eligibility lists for enrolling patients of interest are automatically generated using inclusion criteria and daily clinic schedules. Research staff use eligibility lists to consent patients to participate in MyCode during a regularly scheduled clinic visit. An opt-in consent process is used. After consent, an automatic blood order is placed in the patient’s EMR. Electronic orders are executed by a clinical phlebotomist at the time of a clinical blood draw. Samples are stored using a unique study ID, but remain linkable to the patient’s EMR data through a data broker process. De-identified clinical data is obtained from Geisinger’s enterprise data warehouse to create phenotypes for genetic research. Results: The MyCode biobank includes over 35,000 participants and more than 104,000 samples. 85% of patients approached give consent to participate. 90% also agree to be recontacted to participate in future research studies. The standing research blood order allows for collection of serial samples. The retention rate for participation is >99%. More than 24,000 MyCode samples have been used in over 20 research projects. In the past 2 years, externally funded research projects that utilize the MyCode
ePhenotyping for Abdominal Aortic Aneurysm

PS2-8:

**Background/Aims:** A large volume of clinical data is captured in electronic medical records (EMRs), and feasibly extracting the data to define clinical phenotypes is valuable to health care research. We designed an algorithm to define abdominal aortic aneurysm (AAA) cases and controls. We implemented the algorithm using our institutional warehouse and propose using the HMORN Virtual Data Warehouse (VDW) to replicate our findings. **Methods:** The cohort consisted of individuals enrolled in the Geisinger MyCode biobank or consented for research in other studies (such as the Vascular Department). The Structured Query Language (SQL) algorithm utilized CPT codes and ICD9 codes and vital signs data to define individuals as cases, controls or excludes. AAA cases were defined as having an AAA repair procedure, or at least one vascular clinic encounter with a ruptured AAA, or at least two vascular clinic encounters with an unruptured AAA. AAA controls were neither excludes nor cases, but had an encounter within the past 5 years, and never had an ICD9 code 441.3, 441.4, or 441.9. Individuals were excluded based on certain medical conditions, age younger than 40 or older than 89, not having an encounter within 5 years, or having an ICD9 diagnosis of 441. **Results:** We screened the records of 29,770 individuals, identifying 1,155 AAA cases and 17,523 controls. We excluded 337 individuals based on predisposing genetic conditions, 109 individuals without a visit within the past 5 years and 10,398 individuals based on age. To assure that we had true AAA cases, 248 individuals with ICD-9 codes of 441.x (which includes thoracic and unspecified site of aneurysm) were excluded. The algorithm was validated on a subset of individuals by manual chart review and demonstrated a Positive Predictive Value (PPV) of 94% and sensitivity of 100%. **Conclusions:** We designed an ePhenotyping algorithm to identify AAA cases and controls from the EMR with high PPV and sensitivity necessary for research purposes. The VDW provides an excellent opportunity to broaden the study population characteristics and replicate the findings.

**Keywords:** Electronic Medical Records; Abdominal Aortic Aneurysm

**doi:** 10.3121/cmrr.2013.1176.ps2-8

PS2-10:

**Economic Impact of Electronic Health Information Exchange**

Christine Bredfeldt

**Background/Aims:** More than 40% of outpatient visits involve a transition in care. Effectively coordinating care across providers is critical to reducing healthcare costs and improving patient safety and quality of care. Electronic health information exchange (eHIE) facilitates coordination of care by enabling information transfer across providers and medical clinics. By increasing care coordination, eHIE is expected to reduce healthcare costs resulting from redundant lab tests and radiology studies. In this study, we examine the economic consequences of eHIE in the context of x-ray imaging for bone fractures. **Methods:** We have previously demonstrated that eHIE is associated with a significant reduction in follow-up x-ray imaging for patients with bone fractures of the extremities. This retrospective cohort study of Kaiser Permanente Mid-Atlantic States (KPMAS) members compared the rate of duplicate x-rays in patients with a diagnosis of bone fractures from the Emergency Department (ED) or from outpatient care between 2006 and 2010. Here, we use the Medicare fee schedule to estimate costs for all imaging events, including x-rays, CT scans and MRIs, during the two month period following the initial fracture diagnosis. We estimate total cost by identifying all relevant radiology procedures during the two months following the index event and assigning costs based on published estimates for each procedure. **Results:** The study included 5680 patients from KPMAS with bone fractures diagnoses. 38% of patients were initially seen in the ED, while 62% of patients were seen in outpatient care. The median cost of imaging procedures in the month after diagnosis was $30.60. Patients who received diagnosis and follow-up care at facilities that did not have active eHIE cost the healthcare system 1.7 times as much as patients who received diagnosis and follow-up care at institutions that electronically shared radiology data between facilities and providers. **Conclusions:** eHIE reduces healthcare costs related to duplication of diagnostic tests, specifically imaging studies. Next steps will be to evaluate the impact of different eHIE access methods on its effectiveness.

**Keywords:** Health Information Exchange; Health Information Technology; Radiology

**doi:** 10.3121/cmrr.2013.1176.ps2-10
PS2-11: Impact of a Health Information Technology (HIT) Based Intervention to Improve Adherence to Cardiovascular Disease Medications: Early Results from the PATIENT Trial

William Vollmer1; Cynthia Rand1; Jeffrey Tom1; Ashli Owen-Smith1; David Smith1; Suma Vuppaturi1; Andrew Williams1; Diane Ditmer1; Reesa Laws1; Jennifer Schneider1; Amy Waterbury1

1Kaiser Permanente Northwest; 2Johns Hopkins University; 3Kaiser Permanente (SPAN).

Background/Aims: Adherence to certain effective and widely prescribed cardiovascular (CVD) medications is poor. The purpose of this analysis is to demonstrate the effective implementation of a cost-effective and easily disseminable population-level HIT adherence intervention. Methods: PATIENT is a pragmatic trial designed to improve adherence to antihypertensives and statins in high-risk patients in three Kaiser Permanente (KP) regions. The 1-year intervention (Dec. 2011-2012) enrolled 21,752 adults, aged 40-80, with diabetes or CVD and at least 1 dispensing of a target medication in the past year (based on pharmacy dispensing data). Participants were randomized to one of 3 arms: usual care (UC), automated telephone reminders (IVR), or an enhanced IVR arm (IVR+) that added mailed educational materials, reminder mailings and live outreach calls to IVR calls. Results: Through the first 10 months of intervention we attempted 42,010 automated reminder calls (~2.9 per participant intervention). Of these, 56% (23,596) of calls successfully reached the target participant and an additional 29% (12,271) resulted in messages left. These figures were higher for calls made to those nearly due for a refill (65% and 26% of 20,182) than for calls made to those overdue (48% and 32% of 21,828). Of calls where we reached the participant, 30% resulted in a transfer to the regional pharmacy automated refill line and an additional 2.5% resulted in transfers to a live pharmacist. Among the 7,258 IVR+ patients, 3,748 medication reminder letters were mailed, 2,146 live reminder calls were made, and we have sent 36,823 educational mailings (~4.9 per participant). Key implementation challenges that emerged related to 1) complexities in coding the intervention call flag algorithm from the EMR and 2) customization of the intervention to fit regional work-flow and support program sustainability. Close partnering with pharmacy staff was crucial in overcoming early hurdles. Outcome data (not yet available) will be presented at the meeting. Conclusions: We successfully implemented a large, multi-modal, HIT, medication adherence intervention at 3 KP regions. A high proportion of members were reached and actively participated in the intervention. Key challenges/solutions are detailed in a manual of operations to facilitate the implementation of similar interventions in other settings. Keywords: Medication Adherence; Comparative Effectiveness Research; Automated Phone Calls

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PS2-21: Extracting Signs and Symptoms from Colonoscopy Reports Using NLP

Scott Halgrim1; Edward Pham2; Aruna Kamineni2; Gabrielle Gunderson2; David Carrell2; Carolyn Rutter2

1Group Health; 2University of Washington.

Background/Aims: The overarching goal of the Studying Colorectal Cancer: Effectiveness of Screening Strategies (SuCCESS) project at Group Health (GH) is to develop evidence to inform personalized colorectal cancer (CRC) screening recommendations. Specifically, we aim to study the comparative effectiveness of screening as practiced, evaluate the potential for personalizing screening and surveillance recommendations, and model the long-term comparative effectiveness of screening in a cohort of GH members enrolled between 1993 and 2015. To accomplish these goals, we used Natural Language Processing (NLP) to collect detailed information from colonoscopy reports in GH’s electronic medical record (EMR). Specifically, we extended an existing NLP system to identify whether signs or symptoms related to CRC were reported at the time of colonoscopy. Methods: To prepare the NLP system to process all colonoscopy reports available in the EMR during the study period, we used a development set of 248 documents. The reports were randomly selected from colonoscopies performed in 2011 for which there was a corresponding pathology report on the same day. Trained medical record reviewers created the development set gold standard. The NLP system, developed in GATE (an open source text processing architecture), was an extension of a system created by Harkema et al. that used MetaMap as a resource to process all documents before sending the appropriate reports through a set of colonoscopy extraction rules. Colonoscopy results were consolidated by a post-processing and evaluation tool written in Python by the authors. Results: The system performed admirably on CRC signs and symptoms. Aggregate sensitivity and specificity were 0.885 and 0.980, respectively, and positive predictive value (PPV), or precision, was 0.826, resulting in an F-score of 0.855. Conclusions: In order to execute the SuCCESS project’s ambitious research aims we need high-quality data from tens of thousands of colonoscopy procedures. This information is not captured in a structured way in GH’s EMR, and manual abstraction of this information is not feasible, but our results show that NLP can reliably extract detailed information from the text reports. Future work includes improving the system’s precision, extracting patient and family history, and extracting results from the associated pathology reports. Keywords: Colorectal Cancer; Natural Language Processing; Information Extraction

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PS2-22: Accuracy of Diagnostic Codes to Identify Rheumatoid Arthritis in Archived Electronic Health System Data: Support for Future Cancer Research Network Studies of Lymphoma Risk Pathways

Robert Greenlees1; Jennifer Drahos2; Jeffrey VanWormer1; Ola Landgren3; Jill Koshiol2
1Marshfield Clinic / Security Health Plan of Wisconsin; 2National Cancer Institute

Background/Aims: In preliminary work toward Cancer Research Network-based studies of lymphoma risk pathways, we undertook an evaluation of the utility of ICD-9 CM diagnostic codes to accurately identify potential risk factor conditions, including rheumatoid arthritis (RA). Methods: Using the enrolled Virtual Data Warehouse (VDW) cohort at Marshfield Clinic Research Foundation, we ascertained a set of potential RA cases diagnosed between 2000 and 2010 by the presence of one or more diagnostic codes for RA (ICD-9 CM 714-714.89). Medical records were abstracted by trained staff on a random sample of 206 cases. Cases were adjudicated into categories of confirmed, probable, documented physician diagnosis only, equivocal, and non-ease using a literature-based gold standard definition scheme. Outcome measures included positive predictive value (PPV) and relative sensitivity, with the confirmed, probable and physician diagnosis categories considered valid cases for the main analysis. Results: Upon review, 25 subjects did not have sufficient medical records available for evaluation, leaving 181 subjects for analysis, including 57 with only one RA code and 124 with 2 or more instances of an RA code. Overall PPV for patients with one or more RA codes was 56%. Subjects with only one diagnostic code had very low PPV (12%), while PPV was higher among those with 2 or more (76%). PPV improved to 91% when requiring a rheumatologist diagnosis, but only 40% of the true cases in the set were detectable in this way. The one algorithm that provided acceptably high PPV and relative sensitivity required 2 or more RA diagnostic codes and history of a rheumatoid factor test (PPV 83%, relative sensitivity 82%). Conclusions: A single ICD-9CM diagnostic code for RA was not highly predictive of a true diagnosis, but PPV was enhanced when requiring multiple codes and incorporating other VDW data elements. With one exception, algorithms with higher PPV had strong reductions in relative sensitivity. Limitations include non-systematic collection of RA medication data preventing the use of treatment in the algorithms, and the inability to evaluate absolute sensitivity. Next steps include a joint RA analysis with investigators at Kaiser Permanente Southern California, and possible inclusion of RA treatment data into the Marshfield algorithms.

Keywords: Rheumatoid Arthritis; Diagnostic Codes; Lymphoma

PS2-25: Using Natural Language Processing to Extract Findings from Mammography Reports

Hongyuan Gao1; Erin Aiello Bowles1; David Carrell1; Diana Biust1
1Group Health

Background/Aims: Mammographic findings such as a mass may be associated with breast cancer risk, but these data are only available in free-text reports and require resource-intensive manual abstraction. We developed and tested a Natural Language Processing (NLP) algorithm to extract mammographic findings (mass, calcification, asymmetric density, and architectural distortion) from free-text mammography reports. Methods: We identified 92,947 reports for women receiving screening and diagnostic mammography at Group Health between 2007-2008. We developed an NLP algorithm based on Perl Regular Expressions in SAS v9.2. The algorithm identifies words indicating mammography findings (mass, distortion, asymmetry and calcification) and their related words denoting laterality, negation, family history, personal history and uncertainty. Three flags are made indicating possible errors of the NLP algorithm. An experienced abstractor manually reviewed a random sample of 50 mammography reports to test and refine the NLP algorithm. Results: The algorithm correctly identified a mass on 46/50 reports, calcifications on 48/50 reports, asymmetric density on 50/50 reports, and architectural distortion on 48/50 reports. The NLP algorithm misinterprets sentences such as, “there are calcifications with no other asymmetry.” The NLP algorithm incorrectly associated the negation word “No” with the key word “calcifications.” Building more refined rules on association between negation words and key words will improve the accuracy. Conclusions: This NLP algorithm holds promise for accurate and fast identification of findings from free-text mammography reports. It can be shared across institutions and is an example of what can be done with free-text radiology reports, in addition to mammography. Manual review may still be necessary for some reports with a high probability of error, depending on resources available.

Keywords: Natural Language Processing; Validation; Mammography Report

PS2-26: Coordinating Heterogeneous Data and Mixed Collection Methods to Support Population-Based Cancer Screening Research

Aruna Kamineni1; Scott Halgrim2; Gabrielle Gunderson3; Sharon Fuller4; Gene Hart5; David Carrell6; Carolyn Rutter1
1Group Health

Background/Aims: The central goal of Population-Based Research Optimizing Screening through Personalized Regimens (PROSPR), a recently-funded NCI initiative, is to develop multi-site, transdisciplinary research to improve the screening process for breast, colon, and cervical cancer. To support this goal, we aim to collect, document, and manage data for the entire colorectal cancer (CRC) screening process at Group Health (GH), an integrated health system and PROSPR Research Center. We describe the data sources, types, and collection methods being used to assemble the breadth of relevant information on patients, providers, tests, pathology, treatment, and outcomes this effort requires. Methods: To characterize the CRC screening process for GH members enrolled from 1993-2015, we employed administrative databases, previous CRC studies, data partnerships, and GH’s EpicCare-based electronic medical record (EMR). These resources contain both structured data and unstructured text requiring the use of multiple collection methods, including programmatic extraction, natural language processing (NLP), and manual abstraction. Results: We are programmatically extracting demographic information on patients and providers from well-established administrative databases. Information on stool-based tests is extracted from lab databases and EpicCare. Colonoscopy and corresponding pathology notes are available as unstructured text in EpicCare for GH-performed procedures, and we are employing NLP to extract information on family history, test indication, and results from these notes. Scanned notes from contracted colonoscopy providers require manual abstraction; however, through partnership with our largest contracted provider, we receive electronic transfers of this information as structured data, minimizing manual review. For colonoscopies occurring prior to GH’s 2005 implementation of EpicCare, we rely on data from five previously-conducted CRC studies. Treatment information is extracted from pharmacy and utilization databases, and CRC outcomes are available as structured data through partnerships with our local cancer registries. Conclusions: Under the auspices of an ambitious initiative such as PROSPR, documenting the entire screening process can be achieved by creating a comprehensive data collection system that coordinates all available data sources and maximizes their value with appropriate collection methods. Efficiencies can be gained by using data from prior studies and developing external data partnerships for access to higher-quality data.

Keywords: Data Collection System; Screening Process

PS2-37: Development and Use of a Predictive Analytics Tool in a Large Healthcare Organization

Isaac Hoch1; Tomas Karpái1
1Maccabi Healthcare Services

Background/Aims: Health organizations are beginning to apply predictive analytics as a central and critical tool for more effective healthcare management. However, the art is still far from maturity, and it is necessary to
develop and perfect the requisite analytic tools. A need exists for methods to measure illness burden and identify patients for targeted interventions. Most commercial programs are unable to use all of the data we have available for analysis. Their input is limited to age, gender, diagnoses and medications, while our database also contains a wide range of demographic, socioeconomic, clinical and financial data at the patient level. We hypothesized that utilizing the richer data would generate robust analytic and predictive capabilities. We then developed a predictive analytic system that accesses our entire database. The design requirements included flexible and generic database mapping and transparency of any algorithm’s internal processes. In addition, the system has embedded quality assurance processes and maintains an historical record of all analytical models and results. Methods: Data sources included approximately 15 years of history of physician and other medical professional visits, hospitalizations, emergency room visits, diagnoses, medications, laboratory results, imaging studies, pathology results, and extensive socio-economic, demographic data and associated costs of all medical expenditures. Analytics techniques used included linear regression, classification trees, and additional data mining methods. Models developed included: predicted annual cost and prediction of re-hospitalization within 30 days. Models were validated using R², C-statistics and Positive Predictive Value (PPV). Results: The first model (R² ~ 0.36) was used to create reports for risk adjustment and physician profiling. The second model (PPV 54%) was incorporated into an existing program for preventing re-hospitalization. Conclusions: The Maccabi analytic tool has a robust predictive ability and has been successfully used for physician profiling and predicting re-hospitalization. We suggest evaluating this tool on different databases to yield insight into its transferability and robustness. The minimal required data set for use in other organizations needs to be determined.

Keywords: Predictive Analytics; Risk Adjustment; Modeling

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PS2-38: Sensitivity to Different Criteria for Identifying Diseased Patients in the Electronic Health Record

Jove Graham1; Colin Barton1

1Geisinger Health System

Background/Aims: One of the primary challenges to observational research based on electronic health record (EHR) data is judging whether or not a patient had a given disease as of a specific date. The problem list, encounter record, and prescription medication orders are all sources of coded diagnoses, but their use varies across providers and diseases. The objective of this study was to test the sensitivity of using different diagnosis criteria for classifying patients with specific diseases in the EHR. Methods: A deidentified dataset was assembled for a randomly selected population of 10,000 patients (age 18+) who had at least one encounter per year from 2007-11, including all problem list, encounter, and prescription diagnoses. For each of the 17 diseases in the Charlson Comorbidity Index, we counted the total number of patients that had 1 or more problem list diagnoses, encounter diagnoses, prescription diagnoses, and combinations of the three. Because many past projects at our institution have used a criterion of 1 problem list entry or 2 encounter diagnoses (“P1/E2”) as an inclusion criterion, this was highlighted as a benchmark for comparison. Results: While every patient with a disease should have it documented everywhere in the EHR, this study confirmed that this ideal scenario is not the case. The criterion of “P1/E2” was usually ranked between 5th and 9th (out of 20 criteria tested), suggesting that it casts a fairly wide net for most diseases. We were surprised to find that “time elapsed between two events” did not generally impact the results; i.e., requiring patients to have two encounter diagnoses >90 days apart did not yield substantially fewer patients than requiring them >1 day apart. Overall sensitivity varied dramatically by disease: for example, for Neoplasms, the 4 least restrictive criteria yielded similar numbers of patients, but then there was a significant drop-off. For Heart Failure, there was a much more gradual decline in the number of patients as criteria became more restrictive, suggesting greater consistency across the EHR. Conclusions: In conclusion, we hope empirical data like these can aid researchers in better understanding how diagnosis criteria affect their cohorts in retrospective studies.

Keywords: Diagnosis; Electronic Health Record; Charlson Comorbidity Index

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PS2-39: Family History Data from Clarity and Other Sources

Sharon Fuller1; Deborah Seger1

1Group Health

Background/Aims: Family history information is an important tool to identify potential risks for many diseases like cancer or diabetes. Group Health Cooperative (GHC) collects family history at a variety of patient encounters. In 2004, GHC adopted Epic’s electronic medical record system. We investigated Clarity, Epic’s reporting database, to determine its usefulness as a new source of structured family history data. Methods: We compared several data sources for family history of four conditions: colon cancer, colon polyps, breast cancer, and ovarian cancer. We used proportional Venn diagrams for visualization of results. We examined all patients with a known birth date and sex, and any encounter recorded in Clarity between Jan 1, 2004 and Jun 30, 2012. For breast and ovarian cancer, we reviewed females only. Results: Among patients with any evidence of family history of a condition, Clarity’s FAMILY_HX table independently contributes as many as 75% of patients with available family history; our VDW DX dataset adds an additional 2-20%, while Clarity’s PROBLEM_LIST table adds no more than 2-3%. For female GHC patients, the Breast Screening Recruitment and Reminders survey (BSRR), completed at every screening mammogram, remains a key source, being the sole contributor of 25% (21,961 of 86,368) of patients with a family history of breast cancer and 77% (47,487 of 61,484) for ovarian cancer. When comparing information available from different data sources, it is important to be aware of varying definitions. For example, ICD-9 family history diagnosis codes are general, specifying only the primary site with none of the restrictions on relationship degree or age that may be intended in Epic. A key advantage of Clarity family history data and the BSRR survey over ICD-9 codes is that they provide detailed information about exactly which relatives are affected, including affirming a negative history. On the other hand, VDW data are available from both internal and external providers – the remaining sources are available only for GHC group practice patients. Conclusions: Examining records from Clarity’s FAMILY_HX table may significantly augment, in both numbers and detail, conventional clinical and survey sources of family history data.

Keywords: Family History; Venn Diagram; Clarity

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PS2-40: Using Automation to Add Electronic Clinical Data to a Research Patient Registry

Sharon Fuller1; David Carrell1; Beverly Green1

1Group Health

Background/Aims: Clinical research trials often rely on automated data systems, such as the electronic medical record to create and maintain a patient registry, to determine a participant’s progress through the study, or for analytic purposes. Data might come from a variety of sources and include such elements as procedures, lab results, hospitalization, vital status, enrollment and participant responses from survey software. An automated process for adding outside data to a study tracking database can save significant time over abstraction or manual data import processes, and can allow determination of an individual’s study status in close to real time. Methods: There are a number of ways of setting up an automated import process, depending on data needs and availability. Over the course of several clinical trials, we have developed a process with the following steps, all occurring automatically on a scheduled basis: 1. A SAS program performs Extract/Transform/Load (ETL) tasks: 1a. Extract and transform the desired data from each source. 1b. Load new data into a SAS dataset for historical systems, such as the electronic medical record to create and maintain a patient registry, to determine a participant’s progress through the study, or for analytic purposes. Data might come from a variety of sources and include such elements as procedures, lab results, hospitalization, vital status, enrollment and participant responses from survey software. An automated process for adding outside data to a study tracking database can save significant time over abstraction or manual data import processes, and can allow determination of an individual’s study status in close to real time. Methods: There are a number of ways of setting up an automated import process, depending on data needs and availability. Over the course of several clinical trials, we have developed a process with the following steps, all occurring automatically on a scheduled basis: 1. A SAS program performs Extract/Transform/Load (ETL) tasks: 1a. Extract and transform the desired data from each source. 1b. Load new data into a SAS dataset for historical purposes and into a staging table in the tracking database preparatory to actual use. 1c. Generate automated emails when specific milestones occur (e.g., study end date reached or first use of a given lab test code). 2. Another SAS program checks the ETL logs and sends email about any errors occurring in the ETL process. 3. A database job calls stored procedures to insert data from the staging tables into the main study events table and send email detailing how many records were processed. 3a. If manual intervention is needed before the final data is loaded, the user can call the stored
procedure once data entry is complete. 3b. A master stored procedure can call individual procedures in order (e.g., importing a positive lab result may trigger randomization). Results: The ETL process described above has proven itself to be robust and adaptable in a variety of study contexts. Conclusions: An automated system for adding clinical data to a patient registry or tracking database can save staff time, allow access to near real-time data, and facilitate integration of data from different sources.

Keywords: Patient Registry; Electronic Medical Record; Tracking Database

doi:10.3121/cmr.2013.1176.ps2-40

PS2-42:
Assessment of Drug Induced Liver Injury Using an Automated Causality Assessment Tool

T. Craig Cheetham1; Janet Shin1; Rich Murray2; Fang Niu1; Steph Reisinger2; Robert Azadian1; Gregory Powell1

1Kaiser Permanente Southern California; 2United BioSource Corporation; 1GlaxoSmithKline

Background/Aims: Drugs are a common cause of acute liver failure. However, confirming the diagnosis of drug-induced liver injury (DILI) is challenging due to its low incidence, lack of diagnostic markers and idiosyncratic nature. Our aim was to develop an automated scoring algorithm to identify potential DILI cases based on the Roussel Uclaf Causality Assessment Method (RUCAM) and test it in healthcare data. Methods: RUCAM includes seven criteria of causality assessment. Operational scoring definitions were developed for each of the criteria in collaboration with DILI experts and programmed into an automated algorithm. The automated algorithm was then tested on a retrospective cohort of patients at Kaiser Permanente Southern California. Study participants were ≥18 years old with twelve months of continuous membership plus drug benefit prior to exposure to one of 14 drugs commonly associated with DILI. Eligible patients filled at least one of the study drugs between January 1, 2003 and August 31, 2011. Patients were scored and cases were categorized into one of five categories ranging from ‘Highly Probable’ to ‘Excluded’. Rates of DILI events per 10,000 exposures were calculated and frequency counts of possible scores for each of the seven criteria were analyzed. Results: We identified 14,925 potential DILI events following 3,321,835 study drug exposures. Four antibiotics accounted for 89.4% of events. The average (SD) patient age was 60 (16) years and 54.5% of potential DILI events occurred in females. Cholestatic injury (65.0%) was the most common type followed by hepatocellular 29.4%, and mixed 5.6%. DILI events were categorized as probable or highly probable in 15.5% of cases, 59.6% were identified as possible, and 24.9% were unlikely or excluded. The overall rate of probable or highly probable DILI events was 6.9 per 10,000 exposures. The scores for most criteria spanned the entire range of possible scores and there were no obvious floor or ceiling effects. However, Criteria 5 (other non-drug causes of liver injury) showed poor discrimination of possible scores. Conclusions: An electronic causality assessment algorithm was developed and successfully tested on healthcare data. Further validation is needed comparing these results with the ‘gold standard’ medical record review by DILI experts.

Keywords: Drug Induced Liver Injury; Causality Assessment

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PS2-43:
Sensible Use of ICD-9 Diagnosis of Observational Data in Breast and Endometrial Cancer Research

Wen Feng1; Xiaowei (Sherry) Yan1; Ryan Colonia1; Jeffrey Prichard1; Radhika Gogo1; Azadeh Stark1

1Geisinger Health System

Background/Aims: Utilization of administrative data (such as EHR data) in population-based research is resource advantageous, despite its potential limitations. Few studies have fully assessed the validity and efficiency of EHR-retrieved data. We developed ICD-9 based algorithms and operational processes to evaluate applicability of EHR-derived cancer data. Methods: We retrieved data between 01/01/2002-12/30/2011 from 4 different EHR sources and developed 3 ICD9-based diagnostic algorithms (1+, 2+ and 5+). Women were classified into breast or endometrial cancers or benign breast conditions (BBC). One trained abstractor manually reviewed medical records and recorded data into a structured database. Every 10 observations were selected and reviewed. Basic descriptive statistical analyses were conducted; observations with questionable values were flagged for re-evaluation. The final dataset was considered the “gold standard” and used to validate the algorithms and to assess the duration between the diagnostic and administrative dates. Results: A total of 1,056 women contributed to this study. Of these, 189 were diagnosed with breast and 40 with endometrial cancers. An additional 268 women had BBC. For breast cancer, using the first algorithm we calculated a sensitivity of 95.2% and specificity of 96.4%. Application of the second algorithm yielded a sensitivity of 94.2% and specificity of 97.6%. For the third one, our calculations indicated 89.0% sensitivity and 97.9% specificity. Our analyses based on the same algorithms yielded similar sensitivity and specificity for endometrial cancer. For BBC, we calculated a sensitivity of 82.5% and specificity of 56.7% based on the first, 73.1% sensitivity and specificity of 71.9% for the second, and 38.8% sensitivity and specificity of 90.5% for the third algorithm. The average duration between diagnostic and administrative dates for incident breast, endometrial cancers and BBC was 0.65, 0.01, and 0.31 years, respectively. Conclusions: Our initial findings confirm the validity and potential utility of EHR for population-based cancer research. The algorithm of "2+ ICD-9 Coding System” yielded the most efficient process. The observed lower sensitivity and specificity for BBC potentially can be attributed to the wider pathologic spectrum of BBC. The relatively short duration between the EHR and diagnostic dates suggests unbiased interchangeability of dates.

Keywords: Observational Data (EHR); Validation of ICD-9 Diagnostic Code; Breast and Endometrial Cancer

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PS2-51:
Comparison of Two Different Methods of Classifying Periodontal Disease Severity

Jay Fuehrer1

1Marshfield Clinic / Security Health Plan of Wisconsin

Background/Aims: Accurately determining the severity of periodontal disease has historically been a challenge in the dental practice. The object of this pilot effort was to compare two different methods of classifying periodontal disease severity based on provider-documented data among a random sample of dental patients at Marshfield Clinic. The Marshfield Clinic’s electronic dental record provides an opportunity to collect specific data points for each tooth and its different surfaces as part of the periodontal charting conducted by the dental hygienist. The dental hygienists also classify the overall periodontal condition based on the American Dental Association (ADA) classification of gum diseases. Methods: A random sample of 50 dental patients with at least one comprehensive periodontal screening was used to conduct this retrospective study. Using the Marshfield Clinic’s electronic dental record, the study compared how the dental hygienist coded the periodontal condition based on ADA classification with that of a computer-based algorithm that was developed to classify periodontal condition based on criteria as described by the American Academy of Periodontology (AAP) and the Centers for Disease Control and Prevention (CDC). We then mapped the periodontal disease severity classifications from both methods to investigate how many of the sample of 50 patients were similar. Results: Out of the 99,255 dental patients in our data warehouse, 67,487 (68%) have had a visit in our medical system at least once in the last 3 years. Periodontal measures have been done on 44% (29,573/67,487) of these patients that have medical and dental data available. When comparing the hygienists’ classification of periodontal disease severity (using ADA guidelines) to an electronic algorithm using clinical attachment and probing depth to classify periodontal disease, there was a 72% (36/50) agreement. Conclusions: Although one limitation of this pilot study is that the purpose of ADA classification of periodontal condition (meant for clinical classification) differs from that of the joint CDC/AAP classification (meant for population-based surveillance), the results encourage utilizing measurable data points from the periodontal chart to help providers make accurate diagnosis of the periodontal condition.

Keywords: Dental; Periodontal Disease

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Background/Aims: Because of the distributed nature of dental practice, dentists tend to develop practice patterns based on the training they received in dental school. While their training was current at their graduation, as the period post-graduation increases more recent research holds the potential to improve dental care. Innovative methods are needed to educate dentists in the latest evidence-based approaches to practice. The aim of this study is to build a case-based internet simulation interface to educate dentists on the latest evidence-based approaches to practice. Methods: Due to the complexity of the project it was decided to work on multiple components in parallel. One team was formed to review possible guidelines using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) standards. Insufficient high quality guidelines necessitated examining systematic reviews using an approach based on PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analyses). A second team began work to develop standards for case creation. A third team of internet programmers began to create the front- and back-end for the case-based interface. Communication between the teams is facilitated by partial shared team membership and the attention of the principal investigator. Results: In order to complete the system within the one year development timeline, we discovered that we needed to make specific compromises to balance the ideal and the practical scenarios. First, each case would involve a single encounter where the provider would be given sufficient information to identify the problems and plan treatments for future encounters. Second, in order to limit the options for gaming the system, all sub-actions will be linked to specific time intervals. Each encounter will then be assigned total completion time based on the sum of the sub-action times. Conclusions: Case-based learning, structured around an internet interface and presented to dentists distributed across small practices throughout the world, should be an important link in educating dentists on uniform evidence-based dental information.

Keywords: Evidence-Based Dentistry; Dental Practice

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PS2-53:
Make Research Matter: A Web-Based Toolkit that Supports the Development of Interventions with High Dissemination and Implementation Potential

Michelle Hentonn1; Boriska Rabin1; James Dearing1; Ross Brownson1; Nikki Catto1
1Kaiser Permanente Colorado; 2Washington University

Background/Aims: It is now widely recognized that the mere existence of scientific knowledge is not sufficient for its subsequent application. Active dissemination methods are necessary to increase the effectiveness of dissemination and implementation efforts. Furthermore, systematic formative activity and evaluation about external validity and scale-up considerations such as reach, effectiveness, and implementation, and about diffusion considerations such as target audience structure, potential adopter perceptions of prototype interventions, and change agent support, can increase the likelihood of dissemination. Methods: We developed, implemented, and tested the Make Research Matter (MRM) website, an online toolkit that assists developers of public health and health services research interventions increase the dissemination and implementation (D&I) potential of their interventions. The toolkit was developed building on the expertise of D&I researchers and existing literature about D&I, and was funded by the National Cancer Institute. Usability testing with potential users was conducted to refine the content and format of the toolkit. Results: The MRM website consists of four main tools: 1. the Planning Tool—an interactive survey which provides a tailored report that aids researchers with their dissemination plan; 2. the Resource Library—a searchable database consisting of a compilation of D&I related articles from multiple sources which is updated monthly; 3. the Narrative Library—a freely accessible online library containing video vignettes and transcripts with junior and senior D&I experts of “how-to” knowledge to D&I problems; 4. the Glossary—containing over 100 definitions of terminology used in D&I health research. Additionally, users of the MRM website can learn more about current publications and presentations, and current news related to D&I. Conclusions: The MRM website has been presented to potential users through meetings and poster presentations at different conferences. While it is too early to tell the immediate effectiveness of the MRM website, with continued exposure, the site will be a great starting point for researchers seeking information on how to increase the dissemination and implementation potential of their interventions.

Keywords: Dissemination; Implementation

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Health Services Research / Health Policy

C2-1:
A Randomized Controlled Trial of a Patient Navigator Intervention to Reduce Hospital Readmissions in a Safety Net Health Care System

Richard Balaban1; Alison Galbraith2; Margaretue Burns2; Catherine Vialle-Valentin2; Elisa Friedman1; Dennis Ross-Degnan2
1Cambridge Health Alliance; 2Harvard Pilgrim Health Care; 3University of Wisconsin

Background/Aims: Poor care coordination at hospital discharge can result in avoidable hospital readmissions. This study’s aim was to evaluate the effect of a community health worker (CHW) intervention, the Patient Navigator (PN), on readmission rates and post-discharge health care use in a
C2-2: Impact of Patient-Centered Medical Home Transformation on Process and Outcome of Care

Sukyung Chung1; Laura Panattoni2; Dorothy Hung3; Ming Tai-Seale4

1Palo Alto Medical Foundation for Healthcare, Research and Education

Background/Aims: We evaluated changes in care processes and outcomes associated with various care-redesign initiatives toward a Patient Centered Medical Home (PCMH) at an outpatient care delivery system. Care delivery practices and the extent of the implementation of PCMH components varied widely across clinics and physicians at the organization, thereby providing a natural experiment of PCMH evaluation. Methods: We used longitudinal data from Electronic Health Records (EHR) of active primary care patients (2008-2011). The group’s patients represent diverse insurance (59% PPO, 26% HMO, 15% other insurance) and demographics. Data were aggregated into primary care physician (PCP) level (n = 256), each 6 months. We examined five indicators of patient-centeredness: 1) care continuity (%/PCP’s own patients seen), 2) timely appointment (#days to 3rd next appointment), 3) access to Personal Health Record (PHR) (#enrolled patients in a PCP panel), 4) workflow efficiency (%abnormal lab test results processed within a day), and 5) patient satisfaction (%very satisfied with physician service). Clinical quality indicators were 1) monitoring chronic conditions (monitoring of HgbA1c/LDL/blood pressure/ kidney function for patients with diabetes; monitoring of ACE-inhibitors/ARB/diuretics adherence), 2) preventive screening (breast/cervical/colon cancer), and 3) diabetes control (HgbA1c/ LDL/blood pressure control of patients with diabetes). Physician fixed-effects and relevant patient case-mix and sociodemographic factors were included in multivariate models. Results: As PCPs saw their own patients more often, their patients were significantly more likely to get cancer screening but were not more likely to get monitoring of chronic conditions or to get diabetes controlled. PHR enrollment was a positive predictor for monitoring of chronic conditions and preventive screening, but not for diabetes control. Workflow efficiency was a positive predictor for some preventive screening and diabetes control measures. Neither patient satisfaction nor timely appointment had statistically significant relationship with clinical quality indicators. Conclusions: Indicators of continuity of care, access to PHR, and workflow efficiency are associated with selected, mostly process-oriented, measures of clinical quality. In contrast, patient satisfaction and timely appointment, which are well-accepted indicators of patient-centeredness, are not associated with clinical quality. Construct of PCMH is multifaceted, and no single patient-centeredness characteristic can address all the diverse needs of primary care patients.

Keywords: Patient Centered Medical Home; Quality of Care; Access doi:10.3121/cmr.2013.1176.c2-2

C2-4: Harmonizing Measures for Implementation Science Using Crowd-Sourcing

Borsika Rabin1; Peyton Purcell2; Russell Glasgow3

1Kaiser Permanente Colorado; 2SAIC-Frederick, Inc.; 3National Cancer Institute

Background/Aims: Implementation science (IS) is a priority topic in the renewal funding of the Cancer Research Network and encompasses a broad range of constructs and uses measures from a variety of disciplines. However, there has been little standardization of measures or agreement on definitions of constructs across different studies, fields, authors, or research groups. Moreover, many measures developed are not practical in real-world settings such as healthcare delivery systems. To further the field of IS, there is a need to both identify and evaluate IS measures on both their validity and practical relevance. Methods: We describe a collaborative, web-based activity using the National Cancer Institute’s (NCI) Grid-Enabled Measures (GEM) portal that uses a wiki platform to focus discussion and engage the research community to enhance the quality and harmonization of measures for IS health-related research and practice. We present the history, process, and data from 8 months of the GEM Dissemination & Implementation (D&I) Campaign on IS measurement. Results: The GEM D&I Campaign began in March 2012 and used a combination of expert opinion and crowd-sourcing approaches. To date, it has listed definitions for 45 constructs and summarized information for over 130 measures related to D&I. Measures identified and available include those in key domains such as organizational capacity, cost, reach/penetration, stakeholder engagement, and adherence. Just under 60% of the D&I measures have at least one comment/rating. For 74 measures, the actual measure instrument is available for download. For those measure instruments available, they have been downloaded by users, on average, 93.8 times (range 2-1472). Conclusions: To date, this campaign has provided information about different IS measures in many key domains, their associated characteristics, and comments. The next step is to increase the numbers and sources rating these measures for quality and practicality. Participation in this process by researchers and practitioners from practice-based settings such as the HMORN sites is crucial and could support the identification of practice-relevant measures for IS including ones measuring practice change capacity. We invite HMORN researchers to join this virtual community and help advance the quality and harmonization of IS measures and constructs.

Keywords: Implementation Science; Measurement Harmonization; Crowd Sourcing doi:10.3121/cmr.2013.1176.c2-4

PS2-13: Implementing a Lean Management System in Primary Care: Facilitators and Barriers from the Frontlines

Dorothy Hung1; Caroline Gray1; Katie Anderson1; James Hereford2

1Palo Alto Medical Foundation for Healthcare, Research and Education

Background/Aims: As approximately $750 billion is wasted in the U.S. health system each year, equivalent to roughly one-third of every medical dollar, “Lean” thinking and techniques offer promising solutions for maximizing value in health care. This study examines a large, multispecialty practice’s journey of implementing a Lean management system beginning in primary care. We sought to understand initial drivers and barriers to implementation, with lessons contributing to a learning system of improvement in health care. Methods: This case study was based on in-depth interviews with 16 physician and administrative leaders, and 4 focus groups of medical assistants and administrative staff. Transcripts were coded and analyzed using inductive, grounded methodology. Results: Respondents’ insights were clustered around three main themes: organizational leadership, professional values/culture, and availability of resources. Informants

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described organizational characteristics critical to implementing Lean and to which they attributed its success so far, including: strong leadership and the importance that leaders embody qualities they are espousing, willingness to engage all levels of staff in the change process, and willingness to adjust performance measures according to new job roles. However, many noted that values and norms surrounding clinical practice are often at odds with the Lean principle of standardizing work to eliminate waste, representing the biggest challenge for physicians who are socialized into a culture where independent thinking and autonomy is valued. The availability of resources was also cited as an important factor in executing changes, including time to do one’s regular work while implementing change, time to absorb new ideas and changes, and proper space configurations to support the change.

**Conclusions:** Lean represents a non-traditional approach to managing the delivery of medical care. In a Lean operating system, value is seen first from the patient perspective and while this is a point of easy agreement, how that principle is operationalized can be fraught with challenges that must be negotiated. These challenges may be addressed in part by strong leadership and adequate resources. Further study is currently underway as the effort is extended to additional sites in the organization, with additional findings to be presented on how Lean can be successfully implemented in healthcare.

**Keywords:** Lean Management; Implementation Issues; Qualitative Research

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**PS2-14:**

**Ready to Change? The Role of Employee Engagement, Ownership, and Participation in Managing Change**

Dorothy Hung1; Eric Wong1; Katie Anderson1; James Hereford1

1Palo Alto Medical Foundation for Healthcare, Research and Education

**Background/Aims:** Healthcare organizations are implementing an array of changes to provide more affordable, high quality care. Many organizations achieve only partial success when implementing improvement initiatives, with half of all failures due to a lack of readiness to change among personnel. This study examines factors that contribute to change readiness among employees in an organization undergoing system-wide transformation.

**Methods:** Baseline data were collected from 706 physicians and staff in 19 primary care departments and 3 call centers in a large ambulatory care system. A validated, multi-dimensional Organizational Change Recipients’ Beliefs Scale was used to assess readiness to change. Multivariate regression was used to examine predictors of change readiness among physicians and non-physician personnel.

**Results:** Non-physicians (nurses, medical assistants, administrative staff) reporting a high level of engagement (e.g., “My ideas and suggestions are valued by my department”) and ownership (e.g., “I am willing to put in a great deal of effort to help my department succeed”) scored significantly high on four dimensions of readiness to change, including perceived appropriateness of the change, anticipated benefit from changes, perceived support for change among peers and leaders, and capability to implement changes (P < 0.01). Among physicians, commitment was positively associated with these four dimensions as well as a fifth dimension of readiness – perceived need for change. Both physicians and non-physicians reporting burnout in the form of emotional exhaustion perceived greater need for change (P < 0.01), while those with longer tenure in their department perceived less need for change (P < 0.01). Burnout among non-physicians in the form of depersonalization patients was associated with less perceived capability of implementing changes (P < 0.05). Last, participation in decision-making within departments was positively associated with non-physician engagement and ownership (P < 0.05).

**Conclusions:** Perceptions about work environment can affect employees’ beliefs about changes being undertaken by their organization. Both employee engagement and ownership were instrumental in preparing non-physicians for change; only ownership affected physicians’ readiness to change. Burnout and turnover universally affected a perceived need for change. Encouraging staff participation in decision-making can help instill a sense of engagement and ownership among non-physicians, though alternative mechanisms must be sought for preparing physicians for change.

**Keywords:** Readiness to Change; Employee Engagement/Ownership; Participation in Decision Making

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**PS2-17:**

**Does Better Care Cost More?**

Su-Ying Liang1; Sukyung Chung1; Harold Luft1

1Palo Alto Medical Foundation for Healthcare, Research and Education

**Background/Aims:** Understanding variation in resource use among primary care physicians (PCPs) and its impact on clinical quality and patient outcomes is critical for designing policies to encourage efficiency in delivery without sacrificing quality. This study examined the relationship between PCPs’ use of resources, and clinical quality and patient-assessed quality indicators.

**Methods:** We used a dataset linking electronic health records, administrative claims, and patient satisfaction surveys from a large ambulatory group practice with mixed sources of payment. We studied PCPs practicing family or general internal medicine in 2010 (n = 208). For the measure of resource use, we report fee-weighted differences for ambulatory services relative to the overall average (“cost”). For the measures of clinical quality, we combined various indicators pertinent to primary care practice and created a composite average score (number of patients who met the target/number of eligible patients). For patient-rated care quality, we examined the percent of patients who indicated in the survey that they were “very likely” (5 on 1-5 scale) to recommend their provider to others. We tested whether costs differ between PCPs who have superior quality and satisfaction scores and those who have less exceptional scores. Based on tertiles of satisfaction and quality scores, PCPs were classified into three subgroups: (1) high-satisfaction/high-quality (HS-HQ), (2) high-satisfaction/medium-quality (HS-MQ) or medium-satisfaction/high-quality (MS-HQ), and (3) the remainder (non-superior). PCPs with low-satisfaction and low-quality scores were not studied further.

**Results:** Costs were highest in the HS-HQ group (9.0% ± 3.6%) above the non-superior group, and 8.6% ± 4.4% above the HS-MQ or MS-HQ group). The difference in costs was statistically significant between PCPs with HS-HQ scores and those with non-superior scores (P = 0.01). Differences were not significant between PCPs with HS-MQ or MS-HQ scores and those with non-superior scores.

**Conclusions:** These findings are preliminary, as we plan to apply a more detailed risk-adjustment approach. However, the findings suggest that PCPs with both high clinical quality and patient satisfaction scores used approximately 9% more services for their patients (age and sex adjusted) than PCPs with less exceptional scores.

**Keywords:** Health Care Utilization; Clinical Quality; Patient-Assessed Quality

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**PS2-18:**

**Functional Limitations, Home Support, and Responses to Drug Costs Among Medicare Beneficiaries**

Christopher Whaley1; Mary Reed1; John Hsu2; Vicki Fung4

1University of California, Berkeley; 2Kaiser Permanente Northern California; 3Harvard Medical School; 4Kaiser Permanente Mid-Atlantic

**Background/Aims:** Many Medicare beneficiaries have conditions or disabilities that affect their functional status and self-care capabilities. There is limited information on the potential associations between functional limitations, home support, and self-care activities such as managing and taking medications.

**Methods:** We conducted telephone interviews in a stratified random sample of community-dwelling Medicare Advantage beneficiaries in an integrated delivery system, age 65+ years (N = 1,201; response rate = 70.0%). Participants reported their functional status as measured by activities of daily living (ADLs; e.g., bathing) and instrumental activities of daily living (IADLs; e.g., preparing meals), and whether they received any support from family members or caretakers in obtaining, paying for, or taking medications. We also examined drug cost-related changes in medication use: cost-reducing behaviors (e.g., switching to generics), cost-related non-adherence (e.g., not refilling), and financial stress (e.g., cutting back on necessities). We used multivariate logistic regression to assess associations between functional status, support with medications, and drug cost responses, adjusting for patient characteristics.

**Results:** Nearly half of respondents (42%) reported having a functional limitation: 26.7% reported 1-2, and 15.6% reported 3+. Among beneficiaries with functional limitations,
PS2-20: Developing New Quality Measures for HIV Care Using the Electronic Medical Record

Richard Meenan1; Michael Horberg2; Michael Silverberg1; Chun Chao3; Andrew Williams3; Mary Ann McBurnie1; Erin Keast1; Wendy Leyden1; Lanfang Xu4; Vinutha Vijayadeva1; Diana Antoniskis1

1Kaiser Permanente Northwest; 2Kaiser Permanente Mid-Atlantic; 3Kaiser Permanente Northern California; 4Kaiser Permanente Southern California; 5Kaiser Permanente Hawaii

Background/Aims: Life expectancy gains among HIV-infected patients have increased emphasis on quality multidisciplinary care. Among HIV-infected patients in Kaiser Permanente (KP), we evaluated new HIV quality of care measures that facilitate preventive services assessment. Services considered were CD4 and viral load (VL) testing, lipid screening, blood pressure (BP) management, and vaccines (influenza, pneumococcal, Hepatitis A/B, and tetanus). Methods: We included adult HIV-infected patients (median age 41; IQR 35-49) from four KP regions serving Northern and Southern California, Hawaii, and Oregon, employing KP administrative and electronic medical record (EMR) data. Eligible patients received an HIV diagnosis before 12/31/2009 and had 2+ years of utilization/membership during 1/1/2003-12/31/2010. We calculated two quality indices per service. The Prevention Index (PrI) is the proportion of patient time covered by receipt of a recommended preventive service, relative to the time during which patients were eligible to receive that service. The “target period” is the interval when service coverage is evaluated (e.g., calendar year). During the prior “observation period” of one recommended service interval (e.g., for BP, 12 months pre-covereage period), data are gathered on prior service delivery that inform the target period. The Disease Management Index (DMI) measures deviation of disease indicators from a management goal (e.g., undetectable VL) during the coverage period. Yes/no vaccine indices are based on whether the service was ever delivered. Results: 15,950 patients (90% male; 57% white) were analyzed. DMIs indicated mean patient-level control of CD4 and VL counts of >85% across years. Related PrIs indicated approximately 60% of eligible patient time across years was covered by receipt of tests for CD4 and VL. BP indicated similar control and apparent upward trends in BP exam delivery. Flu vaccinations were received by 60%-70% of patients annually and a similar proportion received at least one tetanus vaccination over the study period. Completed vaccination sequences were much lower for pneumococcal (3% of patients), hepatitis B (6%), and hepatitis A (14%), but these estimates are influenced by relatively short periods used to define completion. Conclusions: PrI and DMI represent innovative uses of EMR data for measuring HIV care quality. Future research should extend the methods to other healthcare services.

Keywords: HIV; Quality of Care; Prevention

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PS2-29: Implementing CHESS eHealth Breast Cancer Support in Population-Based Care

Alanna Kulchak Rahm1; James Dearing; Breanne Barela; Robert Hawkins2; Suzanne Pingree2; Helene McDowell2; Erica Morse2; Jana Bolduan Lomax3

1Kaiser Permanente Colorado; 2University of Wisconsin, Madison; 3Exempla St. Joseph Hospital Comprehensive Care Center

Background/Aims: A woman who is newly diagnosed with breast cancer faces immediate informational and social support needs. She must learn about her disease and its treatment, cope with emotional distress, and make decisions about her treatment. To answer the need for information and support, an Interactive Cancer Communication System ("CHESS") was developed, validated in several randomized trials, and is now being implemented to provide access to integrated information for decision-making, behavior change, and emotional support. Methods: This NIH R01 implementation project offers CHESS to all newly-diagnosed breast cancer patients as standard care in two Denver healthcare systems, Kaiser Permanente Colorado (KPCO) and Exempla St. Joseph’s Hospital. Through implementation tracking, patient interviews and surveys, and provider surveys, this study is evaluating the real-world feasibility of CHESS by...
answering the “how much” and “why” questions of utilization at both the institutional and patient levels. **Results:** Preliminary results indicate consistent offering of CHESS by multiple providers, and utilization of the CHESS tool by 50% of all newly diagnosed breast cancer patients. Of those accessing CHESS, most are currently using the tool at least once and visiting multiple pages. Based on interview and survey data conducted over two months post-diagnosis, we will also present preliminary data on why some women use CHESS and some do not. Through provider surveys, we will show how staff perceptions and actions affect patient perceptions and use, and how organizational strategies affect CHESS adoption and use. **Conclusions:** Conclusions from this study provide information on logistics, challenges and successes of the dissemination of a new standard of care for breast cancer patient support, and why patients choose to utilize this tool or not. This will provide evidence of how much reach an intervention like CHESS can achieve in two real-world settings, and be relevant to decisions about whether and how to disseminate CHESS more broadly. **Keywords:** Implementation, Breast Cancer, e-Health

**PS2-31:**

**Implementation of Universal Lynch Syndrome Screening in an Integrated Health Care Delivery System**

Tia Kaufman1; Mari Morse1; Jacob Reiss1; James Davis1; Carol Young1; Elizabeth Esterberg1; Cheryl McGinley1; Katrina Goddard1

1Kaiser Permanente Northwest

**Background/Aims:** Lynch syndrome (LS) is a hereditary form of colon cancer that is present in about 3% of colon cancer patients. Seventy-one percent (71%) of the NCI Comprehensive Cancer Centers conduct universal LS screening, while only 15% of the community hospital cancer programs regularly screen for LS. A previous 7 site HMORN study found that none of those sites were performing universal LS screening, and fewer than 4% of colon cancer patients were tested for LS. Currently, fewer than 5% of patients diagnosed with colorectal cancer (CRC) at Kaiser Permanente Northwest (KPNW) receive Lynch syndrome screening. KPNW relies on provider or self-referrals to Medical Genetics for appropriate LS screening. How do we improve access to LS screening? **Methods:** Through a randomized controlled trial, we are evaluating the effectiveness of universal LS screening compared to usual care. We began recruitment in February 2012. We will determine the types and impacts of system barriers on effective LS screening implementation. **Results:** Stakeholder engagement was challenging to obtain due to variation in knowledge of LS but has proven crucial to success. Cultivating relationships generated willingness and interest among stakeholders in solving issues. The pathology procedure required extensive coordination for appropriate specimen handling and timely testing. The algorithm to identify eligible patients among those scheduled for bowel surgery daily from the EMRs required revisions to locate patients correctly. We will share the lessons we have learned in implementing a universal screening program in the health plan. **Conclusions:** So far, universal LS screening implementation has yielded both successes and hurdles. Developing strong relationships with stakeholders has led to their active participation in problem-solving. The pathology procedure required extensive coordination for specimen handling and testing. Developing methods to quickly identify issues with sample processing and testing improved turnaround time. Patients had to be identified quickly in the EMR given the often short time from surgery scheduling to surgery completion. Evaluation of the implementation steps will help determine best strategies for successful universal LS screening. Since LS screening rates are low at many HMORN sites, we hope that the lessons we learned will inform future implementation efforts. **Keywords:** Implementation Research; Lynch Syndrome

**PS2-33:**

**Seniors’ Uptake of Online Survey Completion - Experience of the 2011 KPNC Member Health Survey**

Nancy Gordon1; Teresa Lin1

1Kaiser Permanente Northern California

**Background/Aims:** The aim was to describe the percentages and characteristics of seniors eligible to receive an emailed link to an online health survey and that chose to respond online vs. by hardcopy. **Methods:** We analyzed the response (69%) to a health survey mailed to 9796 seniors with contact letter containing url for online version; 5064 of these also were sent emails with a link to their personalized online survey. Response data was linked with age (65-69, 70-74, 75-79, ≥80), gender, race/ethnicity, and education from other sources. **Results:** We found: (1) Eligibility to receive the email link declined with age (65-69, 62.5%; 70-74, 53.5%; 75-79, 47.7%; ≥80, 40.1%); increased with education (<12 yrs, 33.4%; high school graduate, 44.0%; some college, 55.9%; college grad, 64.8%), and was lower among African-Americans, Latinos, and Filipinos compared to nonHispanic Whites, Chinese, and Japanese ethnicities (33.9%, 37.8%, and 43.8% vs. 56.6%, 57.0%, and 53.4%, respectively); (2) Only 8.2% of respondents completed the survey online. Respondent online participation declined with age (13.6%, 10.2%, 5.8%, and 3.5%, respectively), was higher among those with some college or college degree (1.5%, 4.6% vs. 9.2%, 11.3%, respectively), and was higher among those sent emails (approximately 18% of 65-74 and 9% of ≥75 vs. <1% of those not sent an email; by education: 4.1%, 9.8%, 15.6%, and 16.5% vs. 0.2%, 0.4%, 0.9%, and 1.4%); (3) Of those who received the email and completed the survey online, approximately 61% reached the survey using the hyperlink. Seniors aged ≥75 were more likely to use the hyperlink than those aged 65-74 (68.1% vs. 56.7%); and (4) Due to relatively small differences in response by age, the age distribution of the initial and final samples are essentially the same. However, had the survey only been conducted online, the resultant sample, in addition to being significantly smaller, would have been significantly younger, better educated, and less representative of the race-ethnic distribution of the population. **Conclusions:** Results suggest that most seniors still prefer print over online questionnaires, even when emailed a link to the online survey. Without an emailed link, online participation will be hard to achieve. **Keywords:** Survey Research; Seniors; Online Data Collection

**PS2-34:**

**Communication Barriers and Preferences of Limited English Proficient Chinese Speaking Members in Kaiser Permanente**

Nancy Gordon1; Anne Tang1

1Kaiser Permanente Northern California

**Background/Aims:** Our aim was to learn about the literacy and communication difficulties and preferences of Limited English Proficient Chinese speakers. **Methods:** This was a self-administered waiting room survey of KP Bilingual Chinese module patients. The study sample includes 1672 patients aged 35+ (775 aged 35-59, 897 aged 60+) classified from self-report as Very Limited English Proficient (VLEPs, n = 1242, speaks English not at all or not well) or Limited English Proficient (LEPs, n = 430, speaks English well, but not very well). **Results:** We found: 1) Educational attainment was low overall (approximately 36% had not completed the equivalent of high school, 37% were high school graduates, 15% had some college, and 12% were college graduates), and significantly lower among older patients and within age groups, VLEP versus LEP; (2) 97% of VLEPs and 13% of LEPs do not read English well, 13% of both VLEPs and LEPs do not read Chinese well, and 13% of VLEPs do not read either language well, with older VLEPs having the lowest literacy; (3) 88% of VLEPs and 55% of LEPs usually have trouble understanding letters in English and 43% of VLEPs and 35% of LEPs usually have trouble understanding letters in Chinese; (4) Among VLEPs, 43% preferred print instructions in Chinese, 2% in English, and 55% in both languages; among LEPs: 8% preferred Chinese, 28% English, and 64% both languages; (5) 76% of VLEPs and 42% of LEPs usually have trouble interacting with the KP Call Center on their own; Chinese Call Center agents were desired by 96% of VLEPs and 74% of
LEPs; (6) VLEPs are more likely than LEPs to have difficulty understanding instructions (VLEPs: 42% sometimes, 15% usually; LEPs: 25% and 2%) and test results (VLEPs: 41% sometimes, 39% usually; LEPs: 49% and 8%), and more frequently require help to others to understand (VLEPs: 30% sometimes, 60% usually; LEPs 43% and 12%); and (7) VLEPs are less likely than LEPs to use email and Internet, and more likely to need help when doing so. **Conclusions:** Limited English Proficient Chinese patients face many difficulties related to language, literacy, and education in ability to receive and understand health-related communications.

**Keywords:** Limited English Proficiency (Chinese); Communication Barriers; Health Services Delivery

doi:10.3121/cmr.2013.1176.ps2-34

**PS2-35:**

**Adaptation of a Disease-Specific Research Instrument for Quality of Life Assessments in Emergency Department Patients with Atrial Fibrillation/Flutter**

Nimmie Singh1; Adina Rauchwerger1; Mary Reed1; Uli Chettipally1; Dustin Ballard1

1Kaiser Permanente Northern California

**Background/Aims:** The Atrial Fibrillation Effect on QualiTy-of-life (AFEQT) is a novel disease-specific quality-of-life (QoL) instrument for patients with atrial fibrillation/flutter (AF/F). The AFEQT, which evaluates a patient’s perception of their AF/F symptoms, physical function, and emotional health, can serve as a marker of quality of care. To date, there are no reports of its practical performance. We describe the feasibility of simplifying the AFEQT for short-term QoL assessments via phone within a diverse population of AF/F patients receiving Emergency Department (ED) care across seven community hospitals. **Methods:** As part of a multicenter observational study of ED management and short-term outcomes of AF/F patients, we adapted the AFEQT for use in one month phone follow-up in patients with newly diagnosed or recent-onset (less than or equal to 48 hours) AF/F. We kept the original 20-item AFEQT format, but condensed the 7-point Likert response scale to 5 for ease of interviewing. We added questions about health in weeks prior to the ED visit, effectiveness of ED treatment, and medication compliance. The instrument was piloted to assess length and clarity of wording. Patients were consented for participation by phone and excluded if unable to discriminate between AF/F and other comorbidities; unable to recall diagnosis; too ill to talk; deceased; non-English speaking. **Results:** Among 1013 patients with newly diagnosed or recent-onset AF/F, 722 (76%) were eligible for an interview. Of these, 620 (86%) were interviewed. Twenty-two (3%) refused to participate; 80 (11%) were lost to follow-up or unreachable. Reasons for refusal included discomfort with discussing health and informed choice not to participate in research. The average time per call in a sample of 106 patients was 11.2 minutes (interquartile range [IQR] 6). **Conclusions:** These interim results suggest that our modified AFEQT is a feasible and reliable research tool for QoL assessments within a diverse subpopulation of AF/F patients. Additional analyses will evaluate QoL scores with relation to patient and treatment factors. Future investigations utilizing this and other disease-specific tools may consider modifications, such as adaptation to phone interview, to match the instrument to the study population and survey modality.

**Keywords:** Atrial Fibrillation; Atrial Flutter; Quality of Life

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**PS2-36:**

**HMO Research Network Rural Health SIG: First Report**

Thomas Elliott1; Lisa Bailey-Davis1; Laurel Copeland1; Thomas Flottemesch2; Leo Morales3; Melissa Roberts4; Jeffrey VanWormer5

1Essentia Health; 2Geisinger Health System; 3Scott & White Healthcare; 4HealthPartners; 5Lovelace Health System; 6Marshfield Clinic / Security Health Plan of Wisconsin

**Background/Aims:** The HMORN Rural Health SIG aims to facilitate rural health research by providing a forum to discuss ideas, determine needs, and identify investigators and resources that lead to research proposals, sponsored projects, and published manuscripts in peer-reviewed scientific literature.

Rural areas have about 25% of the USA population (75 million people). Their health status and needs are distinctly different from non-rural populations and have been disproportionately understudied, but yet have great health disparities. At least 7 HMORN member organizations have substantial rural populations that provide compelling research opportunities. **Methods:** The Rural Health SIG has been convened using similar methods as the 11 other SIGs, including monthly teleconference meetings, annual face-to-face meetings, and several subgroups working on various projects. Our goals: 1) implement and sustain this SIG, 2) leverage other HMORN SIGs and funded research networks, 3) determine rural research studies done or in progress by HMORN investigators, 4) produce research grant applications, 5) publish results of our research, and 6) assemble rural health-focused investigators and resources to achieve these goals. **Results:** We currently have 29 active members from 7 HMORN member organizations that have contributed to collaborative and innovative rural health research. To date, the Rural Health SIG has one manuscript under review, 3 manuscripts in process, and several initiatives that may lead to collaborative research grant applications over the next year or two. **Conclusions:** Much has been accomplished since the HMORN Rural Health SIG was formed in early 2012. We will present our work completed through April 2013, our short- and long-term goals, and encourage other HMORN organizations and investigators to join in this effort.

**Keywords:** Rural Health; Scientific Interest Group

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**PS2-46:**

**Examining Post-Discharge Medication Adherence and Gender in a Medical Aid Population**

Lorie Thibodeaux1; Raphael McIntyre1; Angela Hochhalter1; John Zeber1

1Scott & White Healthcare

**Background/Aims:** After hospital discharge, low-income populations are at risk for adverse events, partly due to poor medication adherence. HIV and CHF studies suggest that men are more likely than women to take medications properly; however, little knowledge exists regarding medication adherence in low-income populations. If gender differences also exist in adherence after discharge, those differences could potentially be addressed by tailoring interventions to meet each group’s needs. The purpose of this study was to compare medication adherence by gender following hospital discharge in patients receiving medical aid. **Methods:** Adults (n = 90) completed in-person surveys within 15 days of hospital discharge from one hospital. All were members of the hospital’s medical aid program or were Medicaid beneficiaries, and they were hospitalized for reasons other than labor/delivery. Surveys assessed demographics, health literacy (REALM-SF), depressive symptoms (CES-D), motivation for following discharge instructions, and several self-care measures including Morisky’s self-reported adherence. We employed the Chi-square test to test the hypothesis that medication adherence levels (poor, moderate, and high) differed between men and women on the Morisky scale. **Results:** The majority of the sample was female (62%), with a mean age of 50.4 (SD = 13.5). Most (56%) of the population was White; one-fifth (20%) reported Hispanic ethnicity and 26% were African-American. Most reported median (37.8%) or high adherence (48.9%) following discharge. The level of medication adherence did not differ between genders following hospital discharge for medical aid program members (Chi-square = .180, df = 2, P = .914). **Conclusions:** We observed no gender differences in medication adherence following hospital discharge among medical aid program members. However, several other behavioral or psychosocial factors conducive to appropriate adherence may differ between men and women, such as patient-activation or levels of depression. Future analyses will focus on testing for other equity issues that may warrant special attention in low-income populations. **Keywords:** Medication Adherence; Low-Income Population; Gender
PS2-47: Complementary and Alternative Medicine Use Among Children with Autism Spectrum Disorders: Findings from the Mental Health Research Network Autism Registry Web Survey

Ashli Owen-Smith1; Stephen Bent2; Frances Lynch1; Karen Coleman2; Vincent Yau1; Heather Freiman1; Kathy Pearson3; Maria Massolo3; Magdalena Pomichowska1; Lisa Croen4

1Kaiser Permanente Southeast; 2University of California, San Francisco; 3Kaiser Permanente Northwest; 4Kaiser Permanente Southern California; 4Kaiser Permanente Northern California

Background/Aims: Approximately 1 in 88 children in the U.S. are diagnosed with Autism Spectrum Disorder (ASD). Unfortunately, there is no identified etiology or definitive cure for ASD. Therefore, it is not surprising that many parents turn to complementary and alternative medicine (CAM) therapies for their affected children. Prior studies have suggested that CAM use is common in this population; however, these studies have been limited by small samples and an inability to assess response rates. The purpose of this analysis is to examine the prevalence and correlates of CAM use among a group of geographically- and racially/ethnically-diverse children with ASD who are enrolled in the Mental Health Research Network (MHRN) Autism Registry. Methods: A web-based survey of parents of children with ASD was implemented at 4 MHRN Autism Registry sites in order to obtain information not available in health plan databases including parents’ use of CAM. Parents were asked to report what CAM therapies they have ever used/used within the past 3 months, what they have paid for these therapies and the degree to which they perceived them as harmful or helpful. The domains of CAM therapies on the survey included natural products (e.g., vitamins), mind-body medicine (e.g., acupuncture) and manipulative/body-based practices (e.g., chiropractic). Results: To date, approximately 8800 recruitment letters have been mailed and 800 surveys have been completed. Findings related to the prevalence of CAM use among this population, in addition to the correlates of CAM use (including socio-demographics, age at diagnosis, severity of ASD, medical co-morbidities, health care utilization and parental satisfaction with care) will be presented. Conclusions: We were able to successfully implement a web-based survey of parents of children with ASD across 4 MHRN sites. With 800 completed surveys (recruitment will continue through November 2012 and thus this number is expected to increase), this is the largest known population-based survey on CAM use in a population with ASD to date. Prior studies indicate that CAM use among this population is common; therefore, it is critical that providers understand this phenomenon so they can help families make well-informed health care decisions and prevent possible CAM-drug interactions.

Keywords: Autism; Complementary and Alternative Medicine; Survey Research

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HMORN Administrative and Technical

B1-1: Get to Know the HMORN and Its Key Tools and Processes

Ella Thompson1; Jeffrey Braff2; Jenilee Christy2; Tyler Ross2; Daniel Ng4

1Group Health; 2Kaiser Foundation Research Institute; 3HealthPartners; 4Kaiser Permanente Northern California

Background/Aims: This session will provide investigators, project teams, and organizational administrators with a basic understanding of the HMO Research Network’s (HMORN) structure and organization, as well as several key processes the HMORN has developed to streamline collaboration across sites. Those new to the Network, to multi-center research, or just needing a refresher will benefit from an overview of HMORN governance, the Virtual Data Warehouse (VDW), multi-site grant writing tools and resources, and the IRB ceding process. Methods: HMORN staff will provide a high-level orientation of governance structures, communication tools and mechanisms, the Collaboration Toolkit, HMORN consortia, and scientific interest groups. A member of the Network’s Grant Development Resources Workgroup will provide a review of the many tools and resources available to grant writers, along with information about how to access them. The Virtual Data Warehouse (VDW) and the query-tool HMORNnet will be presented by the VDW Operations Committee, along with information about tools and resources for investigators and programmers to make the most of these resources. Finally, the IRB Workgroup lead will present an overview of the HMORN’s successful IRB ceding process in order to provide teams with the information needed to determine if the ceding process is right for their project, and if so, how to use it. Results: Session attendees will be given the opportunity to ask questions of the panel of presenters during an open discussion period at the end of the session. Conclusions: The HMORN is a dynamic organization. New staff attend the annual conference each year, and the HMORN is constantly improving upon and expanding its resources. This orientation session will serve as an excellent way for attendees to directly connect with those most able to help them understand the Network and make the most of its resources and processes.

Keywords: Orientation; Operations; Resources

doi:10.3121/cmr.2013.1176.b1-1

B1-2: The New Federal Conflict of Interest (COI) Regulations - One Step Forward?

Jeffrey Braff2

2Kaiser Permanente Program Offices

Background/Aims: All research institutions receiving federal funds must comply with new regulations regarding investigator COI. The adoption and implementation of these regulations has proven to be a challenge for many institutions and individual investigators. The purpose of this presentation is to explore what the new regulations actually mean, and to discuss best practices regarding their operationalization. Methods: We will look at how each HMORN member has implemented the regulations, the institutional policy created as a result, and the resulting practices put in place to meet regulatory requirements. Policies that go beyond the federal requirements will also be discussed. Results: We will compare strategies among HMORN members in an attempt to elicit successful practices that may be adaptable throughout the Network. Conclusions: The federal regulatory burden seems to be constantly increasing, in some cases with good reason. Meeting the burden with a minimum of disruption and cost should be the goal of any successful research program.

Keywords: Conflict of Interest; Federal Regulations; Funding

doi:10.3121/cmr.2013.1176.b1-2

B1-3: Member Engagement in Patient-Centered Research

Sarah Madrid1; Borisika Rabini2; Jo Ann Shoup3; Elizabeth Bayliss1

1Kaiser Permanente Colorado

Background/Aims: Meaningful patient-centered research requires the engagement of patients at multiple stages of the research process. The process and degree of patient engagement may differ depending on study design, methodology, and research question. However, there are few tools and guidelines on how to engage end-users in the research process. The goal of this project was to develop operational infrastructure, processes, and research designs and methods that facilitate the systematic engagement of members from the Kaiser Permanente Colorado (KPCO) region throughout the entire life cycle of research. Methods: With input from investigators, staff, operational stakeholders, and the human subject protection team, we identified relevant resources and developed a toolkit on member engagement. The process included: 1) Focused literature review on processes of stakeholder engagement in research; 2) Inventory of research projects with components of patient engagement; 3) Stakeholder interviews to identify end-users in the research process. The goal of this project was to develop operational infrastructure, processes, and research designs and methods that facilitate the systematic engagement of members from the Kaiser Permanente Colorado (KPCO) region throughout the entire life cycle of research. Results: The toolkit includes an annotated bibliography of the stakeholder engagement literature, a guide to the identification and initial engagement of members, principles for engagement of members in research, guidelines for human subject considerations for member engagement, and a set of research case examples. The toolkit was tested for usability and
Stephen Reinig
Portfolio Management: Using Lean Tools to Support Project Teams with Grant Management

Background/Aims: Group Health Research Institute (GHRI) utilizes Lean tools and techniques to enhance customer service, monitor compliance, and enhance project team interactions and communications. GHRI's Grants and Contracts Administration (GCA) recently used Lean tools to design and implement a grant "portfolio management" system and process to support Principal Investigators (PIs). The system tracks six key indicators of funded grants: award status, budgetary spend rate, effort reporting, subaward execution, subawardee invoicing, and progress reporting. The process allows issues to be identified, tracked, and resolved early on with the project team before any serious problems arise.

Methods: GCA conducted a series of stakeholder interviews to determine the viability of quarterly portfolio reviews. Project teams liked the idea of discussing the PI's portfolio, but were leery about quarterly meetings. Therefore, we constructed a process that maximized technology and built in flexibility regarding quarterly meetings. The six key indicators were selected, defined, and placed on a dashboard in SharePoint. Each PI has a customized SharePoint page with a calendar showing all major grant deadlines and deliverables; a folder of documents related to the rankings and discussion during each quarterly meeting; and an issue tracker to follow-up on team-identified issues and problems requiring attention. Customer satisfaction data was also collected after each initial quarterly meeting.

Results: As of October 2012, approximately 25 face-to-face meetings and 5 virtual meetings (i.e., materials and links emailed to the project team) have been completed (210 projects and 85 subawards have been reviewed by the end of 2012). Satisfaction survey data indicates over 75% of team members (22 of 30 individuals) like the face-to-face meetings and hope to continue the quarterly review process.

Conclusions: The new portfolio management process has been received favorably by GHRI project teams as a means of monitoring key indicators of PI project portfolios and proactively identifying and resolving any problem areas.

Keywords: Grant Management; Compliance; Team Communication

C1-2:
The Division of Research Comprehensive Clinical Research Unit Pre-Award Process and Budgeting for Clinical Trials

Nanette Hock

Background/Aims: Launched in 2008, the Comprehensive Clinical Research Unit (CCRU) of the KPNC research investigators pre-award services including industry and non-industry sponsored clinical trial budgeting and proposal preparation. The CCRU provides first-line communication for the Principal Investigator (PI) for feasibility review of study protocols, clinical trial budgets and clinical trial and sponsored research agreements. The purpose of this presentation is two-fold: (1) describe CCRU's comprehensive pre-award services and (2) describe the process and tools employed by the CCRU for developing and negotiating clinical trial budgets.

Methods: The CCRU has implemented a pre-award service model in which the CCRU reviews and conducts a comprehensive feasibility assessment of proposed clinical trials, designs a clinical trial budget, directly negotiates the budget with the sponsor, and concludes the budget process by approving (or rejecting) the budget and budget terms. The CCRU Lead Financial Analyst spearheads the budget development and negotiation, and works in tandem with the Revenue group for billing coverage analysis. Post-award functions and Clinical Trial Agreement (CTA) approval are under the auspices of KFRI's Grants and Contracts office. The CCRU employs a budget template, the Site Assessment Survey (SAS) which provides line-item delineations of pass-through costs, per-subject procedures costs, invoiceable charges, staff salaries, and overhead cost. Time and effort analysis, and standard versus research care determinations are performed with PI participation. Procedures costs are based on the most current KPNC Master Fee Schedule.

Results: The pre-award program offers KPNC investigators a directed and streamlined approach to clinical trial budgeting and other clinical trials operations functions, and helps consolidate clinical research administration overall. The overall pre-award process has yielded more transparent and defensible budgets, conducted in a highly collaborative fashion, with input from the PI, the CCRU management team, Revenue group, and KFRI Grants and Contracts.

Conclusions: The CCRU pre-award program provides high quality and timely clinical trial pre-award services that include study feasibility analysis, Medicare Coverage Analysis, study budget development, and compliance, thus enhancing KPNC clinical research capabilities. The pre-award program is critical to the sustainability and growth of the KPNC research enterprise.

Keywords: Pre-Award Process; Clinical Trial Budgets; Billing Coverage Analysis

C1-4:
Preparing for FDA Bioresearch Monitoring (BIMO) and Good Clinical Research Practice (GCP) Inspections: Fundamentals for KP Clinical Trial Sites

Nanette Hock

Background/Aims: With over 300 FDA-regulated clinical trials currently open at Kaiser Permanente Northern California (KPNC), the need for a quality-based systems approach for managing clinical trials and preparing for FDA audit of these trials is paramount. Over the past five years, the FDA's Division of Bioresearch Monitoring (BIMO) has conducted, on average, 325 to 350 inspections of medical device clinical trials each year. In 2011, FDA issued warning letters to Sponsors, IRBs, and Clinical Investigators, citing numerous GCP violations involving pharmaceutical trials. Non-compliance findings ran the gamut; from violations related to required regulatory submissions to deviations from written procedures, and failures to maintain study documents. This presentation will: (1) discuss the triggers and types of FDA audit and the procedures necessary to prepare KP investigators and sites for a successful audit, and (2) discuss the approaches to ensure GCP and audit-readiness at all times. A case study of a routine BIMO audit of a KPNC study site participating in an investigational device trial will be presented.

Methods: Prior to an FDA audit, a member of the Comprehensive Clinical Research Unit (CCRU) of the KPNC Division of Research routinely conducts a comprehensive site gap analysis to determine compliance issues or deficiencies in clinical research practices. A gap analysis includes reviewing records and procedures concerning interactions with the IRB; reviewing records and procedures concerning test article accountability, Adverse Event (AE) reporting, subject protections, subject enrollment criteria; reviewing the facility and equipment; and verifying that data collected in Case Report Forms are supported by source documents.

Results: Prior to the device BIMO audit at the KPNC site, we conducted a gap analysis of 100% of patient and research records to determine research compliance. The gap analysis allowed the study team to identify and correct deficiencies that would have otherwise increased the site's risk for unfavorable findings, and allowed the site to implement preventive actions to sustain high-level compliance. The site passed the audit successfully without a single citation from the FDA. Conclusions: Conducting a comprehensive pre-audit gap analysis and a quality-based systems approach to maintain optimal GCP compliance are essential to a successful audit.

Keywords: FDA Bioresearch Monitoring; Gap Analysis; Good Clinical Research Practice
C4-1: As the Clock Ticks... Are Questions the Answer? Audio-Recordings of Primary Care Visits Among Patients with Mental Health Needs Show Room for Improvement in Physician Communication

Ming Tai-Seale1; Patricia Foo1; Cheryl Stults1

1HealthPartners; Essentia Health

Background/Aims: The HMO Research Network’s (HMORN) key values center on collaboration and teamwork to improve individual and population health. The HMORN has a renewed interest in forming external partnerships beyond current HMORN members. Minnesota has historically been on the forefront of health reform and innovation. Providers, payers, higher education, and government agencies in Minnesota have worked collectively in the areas of quality improvement and measurement, payment reform, and public health. Building on and extending the success of the HMORN model of research, HealthPartners Institute for Education and Research (the Institute) initiated a regional model of collaborative research in Minnesota. Methods: The Institute hosted discussions with other regional health care organizations in 2010. By the end of 2011, a core group formally launched the new Midwest Research Network (MWRN). Members of the original steering committee represent several research and provider organizations (including the Institute and Essentia Institute for Rural Health; the University of Minnesota CTSI; Minnesota’s Medicare Quality Improvement Organization; and the Institute for Clinical Systems Improvement). The committee drafted a mission statement focused on collaborating “in the development, implementation, and application of research that improves the health outcomes, experience, and affordability of health care for all of the people in our region.” General principles of the network were formalized, and rules for engaging in grants and projects were established. Results: During the first six months in existence, MWRN members jointly submitted three partnership grants focused on primary care decision support tools; patient engagement in quality and cost measures; and testing data sharing protocols. Smaller interest groups have formed around topics in Informatics, Patient Engagement, and Mental Health. The MWRN Mental Health group hopes to define projects that may extend the reach of the national Mental Health Research Network. The new Minnesota Health Information Exchange is also engaged in the MWRN and will be partnering to test using the Exchange to disseminate research findings in the region. Conclusions: The HMORN model of collaborative research can be successfully implemented at a regional level, which may be a valuable source of new external partnerships for the HMORN. Keywords: Collaboration; New Partners; New Networks doi:10.3121/cmr.2013.1176.ps3-5

Mental Health / Chemical Dependency

C4-3: Implementation of a Screening Brief Intervention and Referral to Treatment (SBIRT) Protocol in Primary Care

Alanna Kulchak Rahm1; Carmen Martin2; Jennifer Boggs1; David Price1; Arne Beck1; James Dearing1; Thomas Backer2

1Kaiser Permanente Colorado; 2Human Interactions Research Institute

Background/Aims: Substance abuse in the United States is a serious public health concern; however, routine screening is inconsistent in primary care. In partnership with the Substance Abuse and Mental Health Services Administration (SAMHSA), Kaiser Permanente Colorado (KPCO) implemented the Screening Brief Intervention and Referral to Treatment (SBIRT) protocol in one primary care clinic over a 3-month period in order to determine staff perceptions, barriers, and solutions for wide-scale implementation. Methods: Based on prior feasibility studies, clinic staff were engaged in order to anticipate barriers and solutions to improve implementation success. A quantitative survey of team functioning and clinic priority for implementing SBIRT was also conducted prior to implementation. Screening was conducted by front desk staff of all adult Health Maintenance Visits (ages 19-64 years) using a 3-question paper questionnaire, followed by Brief Intervention delivered by the behavioral medicine specialist (BMS) in the case of positive screening result. This workflow was determined by the clinic despite prior feasibility results indicating optimal workflow consisting of screening by Medical Assistants and Nurses during the rooming process due to multiple competing demands from the organization during the implementation period. Results: A total of 1097 eligible patients were seen during the 3-month implementation, 321 (29%) were screened for alcohol use, and 15 (5%) required additional Brief Intervention with the BMS. Positive results of implementation included improved awareness by physicians of alcohol use, better communication among members of the care team, and integration of the BMS as a resource for the care team. Barriers included patient resistance, competing demands on the clinic, and lack of information on screening recorded in the medical record. Post-study debriefing with primary care and BMS staff led to a commitment by clinic leadership and staff to revise workflow and explore regional implementation strategies. Solutions include additional training regarding clinical utility of screening and options for normalizing screening for patients and solutions for recording screening in the EMR. Conclusions: Through continued use of SBIRT, this clinic will also demonstrate the value of screening for drug and alcohol use to the region in order to promote wider dissemination. Keywords: SBIRT, Screening and Brief Intervention in Primary Care; Alcohol and Drug Prevention doi:10.3121/cmr.2013.1176.c4-3
Autism spectrum disorders (ASD) are characterized by impairments in social interaction and communication, as well as restricted, stereotyped interests and behaviors. A recent study found that approximately 1 in 88 children in the U.S. were diagnosed with an ASD and that prevalence varied widely among different demographic groups. The goals of this study were to obtain accurate prevalence and incidence statistics for ASD across several large, diverse health systems and to describe the variation of these statistics across demographic factors. Methods: All members within the five participating health systems born between January 1, 1993 and December 31, 2010 were included in final analyses. Prevalence of all ASDs in children ≤8 years old was 1.1/1000 in 2001 (1 in 909 children) and increased steadily to 7.1/1000 in 2010. Similar secular increases were noted for incidence. Prevalence specifically for autism disorder (AD), a more severe subtype, in children ≤8 years old was 0.3/1000 in 2001 and increased to 1.9/1000 in 2010. Similar secular increases were noted for incidence. Prevalence and incidence varied greatly among demographic groups. Prevalence of all ASDs in 2010 was 8.4/1000 among Whites, 7.1/1000 among Blacks, and 10.6/1000 among Asians. Prevalence of ASDs among females was lower than among males in all years (2010 males: 7.1/1000 among Whites, 10.6/1000 among Asians. Prevalence of ASDs in 2010 was 11.2/1000, 2010 females: 2.9/1000). Conclusion: This study provides up-to-date prevalence and incidence information from a group of large, diverse, community-based settings. Incidence and prevalence differed across racial groups and sex status. Strong increasing trends in the diagnosis of ASDs in general, as well as the AD subtype, were observed.

Keywords: Autism; Prevalence; Incidence

doi:10.3121/cmr.2013.1176.ps1-13

Health-Related Quality of Life in Children with Autism Spectrum Disorders: Findings from the Mental Health Research Network Autism Registry Web Survey

Frances Lynch1; Ashli Owen-Smith2; Stephen Bent1; Karen Coleman2; Vincent Yau1; Kathryn Pearson1; Phillip Crawford2; Maria Massolo1; Heather Freiman2; Magdalena Pomichowski1; Lisa Cren3

1Kaiser Permanente Northwest; 2University of North Carolina, Chapel Hill

Background/Aims: Approximately 1 in 88 children in the U.S. is diagnosed with Autism Spectrum Disorder (ASD). ASD is a complex disorder characterized by impairment in social skills, communication, and cognitive and behavioral functioning. In order for policy makers and clinical managers to evaluate new approaches to treating and managing ASD, they need brief comprehensive outcome measures. One approach that could be useful in this context is measurement of health-related quality of life (HR-QOL). This provides a comprehensive picture of health status including an individual’s psychosocial, emotional, and physical wellbeing. This comprehensive approach is particularly important in conditions such as ASD that have multiple impacts on a person’s health. Few previous studies have examined HR-QOL in persons with ASD, and most of these studies have used small samples. The purpose of this analysis is to examine HR-QOL in a group of geographically- and racially/ethnically-diverse children with ASD who are enrolled in the Mental Health Research Network (MHRN) Autism Registry.

Methods: A Web-based survey of parents of children with ASD was implemented at four MHRN Autism Registry sites, including children’s HR-QOL, measured by the Pediatric Quality of Life Inventory (PedsQLTM). The PedsQLTM provides an overall score, as well as subscales for important domains including physical health, psychosocial health, emotional functioning, social functioning, and school functioning. Results: To date, recruitment letters have been mailed to approximately 8800 parents and 900 surveys have been completed. Preliminary analyses of respondents indicate that HR-QOL is lower in children with ASD compared to national norms. We will present the final results from the survey, which will conclude in November 2012. The presentation will examine the overall scores, scores on subscales, and scores by subgroup (e.g., age, gender, race) and will compare these scores to national norms. Conclusions: We successfully implemented a Web-based survey of parents of children with ASD across four MHRN sites. With 800 completed surveys (recruitment will continue through November 2012), this is the largest known population-based survey on children with ASD to date. The current study will help to confirm results from smaller samples and will allow for more refined analyses of subgroups.

Keywords: Autism; Health-Related Quality of Life

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Patient-Centered Outcomes Research

Carla Green1; Sue Estroff2; Bobbi Jo Yarborough3; Mark Spofford; Michele Solloway4; Nancy Perrin5

1Kaiser Permanente Northwest; 2University of North Carolina, Chapel Hill

Background/Aims: Individuals with serious mental illnesses can experience significant disability, affecting ability to guide and adhere to treatment and navigate systems. Needs for a range of services are common, yet despite recent efforts to improve care quality, persistent challenges blunt or derail reforms. Obstacles include: difficulties changing the focus of care from acute symptom control/relapse prevention to patient-centered/recovery-focused care; constructing coherent, integrated services; coordinating care while managing multiple, fluctuating funding streams; and high staff turnover that produces poor continuity of care. Our goal is to provide guidance for future comparative effectiveness and patient-centered outcomes research (CER, PCOR) to improve individual-level patient-centered outcomes (PCOs).

Methods: With stakeholders and technical experts, using an iterative consensus approach, we created a definition of what constitutes a care and service delivery intervention, constructed a theoretical model of a learning system to improve quality and coordination of care, developed an analytic framework, and conducted a narrative review to identify research gaps, high leverage points, and key questions for future CER and PCOR.

Results: (1) We need more patient centered outcomes developed by or in concert with service users. (2) Information regarding the outcomes service users value most and least remains limited. Value-based information is fundamental to patient-centered care and PCOs. (3) Most efforts to improve quality of mental health services have focused on care processes and necessary institutional structures. Links between indicators of process and structure, and PCOs, are nearly non-existent. (4) Few efforts have been made to aggregate PCOs to provide performance feedback at the clinician, organization, or system level; methods and processes are needed. (5) Financing of services is structured in ways that complicate and impede coherent, integrated delivery, and research comparisons. (6) Current CER information is not adequate to produce system change. Complexity theory suggests focusing on organizational culture/climate, supporting employees and promoting high-quality interactions/teambuilding. Interactions are the nexus of information processing/sense-making that are necessary in a learning system.

Conclusions: Health care reform is creating multiple opportunities to exceed current incremental efforts to improve outcomes. Developing learning systems that provide real patient-centered/patient-directed care to individuals with serious mental illnesses should capitalize on these openings.

Keywords: Serious Mental Illness; Comparative Effectiveness Research; Patient-Centered Outcomes Research

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PSI-18: Feasibility of Implementing Screening Brief Intervention and Referral to Treatment (SBIRT) Within Multiple Health Settings
Jennifer Boggs1; Alanna Kulchak Rahm1; Carmen Martin1; Arne Beck1; David Price1; Thomas Backer1; Maggie Gunter1; Brian Ahmadian1; James Dearing1
1Kaiser Permanente Colorado; 2Human Interactions Research Institute; 3Lovelace Health System; 4Henry Ford Health System / Health Alliance Plan

Background/Aims: Screening for alcohol and drug use has been identified as a high prevention priority for primary care by the US Preventive Services Task force; however, such screening is not routinely performed. SBIRT is a framework for population-based screening and intervention with the primary goal of reducing risky substance use before it progresses to dependence. There has been limited uptake of SBIRT in any large health system, thus the Substance Abuse and Mental Health Services Administration (SAMHSA) is supporting a series of studies, led by Kaiser Permanente Colorado (KPCO), to determine strategies to promote large-scale implementation. Qualitative examination of the feasibility of implementing SBIRT in primary care settings was previously conducted at KPCO; a continuation of this work at Henry Ford (HF) and Lovelace Health System (LHS) is currently being conducted. Methods: Individual interviews and focus groups will use selective and snowball sampling of clinical leaders and staff, with the goal to assess value placed on systematized substance use screening in primary care, feasibility of implementing SBIRT, potential barriers, solutions, and facilitators to implementation, and strategies for gaining stakeholder support. Episodic profiles or debriefing reports will be generated shortly after every interview with leaders and staff at LHS and HF to facilitate iterative analysis. Results: Qualitative findings from KPCO indicated the following key influencers: scope of practice, particularly for nurses, medical assistants and front desk staff; competing priorities for primary care physicians; and relationships between primary care, behavioral health, and chemical dependency departments. Interviews to be completed at LHS and HF will assess general feasibility as well as investigate whether KPCO’s findings generalize to other health systems. Additionally, interviews will focus on the impact of patient cultural differences for SBIRT, where HF, LHS, and KPCO have distinct racial and ethnic patient populations. Conclusions: The goal is to provide a more comprehensive understanding of the facilitators and barriers to SBIRT implementation across multiple health systems.

Keywords: SBIRT; Screening and Brief Intervention; Alcohol and Drug Prevention in Primary Care

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PSI-19: Impact of Motivational Interviewing to Reduce Alcohol Use Among Depression Patients
Derek Satre1; Stacy Sterling1
1Kaiser Permanente Northern California

Background/Aims: Hazardous drinking can exacerbate depressive symptoms and have a negative impact on depression treatment outcomes. Many individuals with depression who drink at hazardous levels first seek treatment in mental health settings. Yet prior studies have not tested the efficacy of promising interventions such as Motivational Interviewing (MI) to reduce alcohol consumption among depression patients. We examined MI to supplement depression treatment for patients who report recent hazardous drinking (3+ drinks for women or 4+ drinks for men), in an outpatient psychiatry clinic in a managed care setting. Methods: The sample consisted of 300 patients ages 18 and over in an outpatient Kaiser Permanente Northern California (KPNC) clinic in Union City, California. Participants were randomized to receive either 3 sessions of MI or to a control condition in which they received a brochure regarding alcohol and drug use risks. Follow-up interviews were conducted by telephone at 3, 6, and 12 months, with measures including alcohol and drug use, depression symptoms, and functional status. Participant interview data were linked to electronic medical records including health services utilization. Results: In the 30 days prior to the baseline interview, average number of days of hazardous drinking was 4.3 days (sd = 5.5). Based on initial findings at 3 months, among participants reporting any hazardous drinking at baseline, MI-treated participants were less likely than controls to report hazardous drinking at 3 months (P = .043). Further results to be presented include longer-term alcohol and drug use outcomes, and the impact of the intervention on depression symptoms and patterns of health services utilization. Conclusions: Initial findings demonstrated that MI is a promising intervention to reduce hazardous drinking among depression patients and can be provided as a supplement to usual psychiatric treatment. Important next steps in this program of research will investigate antidepressant treatment adherence, effect of the intervention on referral to specialty chemical dependency treatment when needed, impact of the intervention on other health services utilization (such as emergency department), and cost effectiveness.

Keywords: Alcohol; Depression; Health Services
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PSI-20: Integrating Alcohol and Drug Use Screening for Adolescents into Mental Health Settings: Rationale, Missed Opportunities and Outcomes
Stacy Sterling1; Andrea Kline-Simon1; Anna Wong1; Ashley Jones1; Jennifer Mertens1
1Kaiser Permanente Northern California

Background/Aims: Adolescent risk behaviors are often highly clustered, so screening in Mental Health (MH) settings may be even more important for this population than for adults. We explored the role of screening in MH by describing findings from adolescent studies that examined co-occurring disorders (CODs), and factors associated with treatment initiation among adolescents (N = 2,055) with CODs; 2) predictors of referrals by pediatricians to MH or SU treatment of adolescents with SU disorders (N = 400); 3) the co-occurrence of MH disorders, pathways to treatment and outcomes in a treatment sample of adolescents (N = 419); and 4) we used data from an RCT of adolescent Screening, Brief Intervention, and Referral to Treatment (SBIRT) (N = 1,070), to examine the prevalence of co-occurring problems, barriers to identification, referral, and treatment initiation. Results: Teens with CODs identified in MH were more likely than those identified in primary care to initiate treatment (P = .05). In the referral study, twice as many teens with SU disorders were referred to MH than SU treatment. In the SU treatment sample, we found: 1) high levels of CODs; 55% (230/419) had a MH diagnosis, compared to 2% (41/2077) of matched controls (P < .0001); and 2) low levels of identification and referral by psychiatric providers; fewer than half the sample seen in MH prior to intake received an SU diagnosis. In the SBIRT study, 30% (94/3177) of the teens screened positive for either SU, MH risk, or both. Many teens initially referred by providers for MH concerns exhibited SU risk upon further assessment. Conclusions: We found high rates of CODs among the adolescents in the health system, and that SU problems and CODs are insufficiently identified in MH and Primary Care settings. We discuss these missed opportunities for alcohol and drug problem identification, and implications and opportunities for SBIRT for adolescents in MH.

Keywords: SBIRT; Alcohol; Adolescents
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PSI-29: PHQ-9 Use in Clinical Practice: Electronic Health Record Data at Essentia Health
Thomas Elliott1; Colleen Renier1; Jeanette Palcher1
1Essentia Health

Background/Aims: The study aims to discover the prevalence of PHQ-9 use in primary care provider (PCP) clinical practice over a 7-year timeframe, and to determine the effect of PHQ-9 data on PCP diagnosing clinical depression and prescribing antidepressant drugs in clinical practice. Methods: We conducted a retrospective case series study analyzing data in the electronic medical records of Essentia Health, a large healthcare delivery system in the Upper Midwest from 01/01/2005-12/31/2011. All patients age ≥18 managed by a PCP were included. Data collected: patient demographics, provider
descriptors, PHQ-9 data, ICD-9CM depression codes, and antidepressant drugs. Analytical tests included Cochran-Armitage test for trend, Cochran-Mantel-Haenszel test and logistic regression modeling for year of maximum PHQ-9 score. PHQ-9 tests were considered independent only if they were: initial events; 10+ months after the most recent test; or immediately following a prior test with a total score of less than 5(normal). The logistic regression model included any depression diagnosis (DEP), year, sex, age, maximum PHQ-9 score-5 categories from Normal to Severe Depression, any PCP measured PHQ-9, and any behavioral health measured PHQ-9. **Results:** Study population included 294 PCP (~181 annually) and 216,494 patients (~105,240 annually). The measurement of independent PHQ-9 in patients managed by primary care providers increased from 0.7% (2005) to 13.5% (2011); Z = 153.34, P < 0.01. Patients with an independent PHQ-9 test were 17.87 (95% CI: 17.43-18.31) times more likely to have a diagnosis of depression. After adjustment in the logistic model, patients with DEP were more likely to be prescribed an antidepressant drug, rate ratio = 3.56 (3.33-3.80). As PHQ-9 scores increased, associated rate ratios (compared to normal PHQ-9) increased incrementally, 1.26 (1.82-1.35), 2.05 (1.90-2.25), 3.05 (2.79-3.34), and 4.18 (3.72-4.70), for PHQ-9 scores 5-9, 10-14, 15-19 and 20+, respectively. **Conclusions:** Our study found PHQ-9 use in primary care clinical practice increased significantly over 7 years. Patients having PHQ-9 testing in primary care were more likely to have a diagnosis of depression. Patients with increased severity of PHQ-9 scores were substantially more likely to be prescribed an antidepressant drug. PHQ-9 data appear to increase the diagnosis of clinical depression and prescribing of antidepressant drugs in primary care. **Keywords:** Patient-Reported Outcomes, Depression, Primary Care

**PSI-30: Examining Health Service Utilization in the Year Prior to Suicide Death**

Brian Ahmedani; Gregory Simon; Christine Stewart; Arne Beck; Beth Waitzfelder; Frances Lynch; Ashli Owen-Smith; Rebecca Rosson; Ursula Whiteside; M. Justin Coffey; Leif Solberg

1Henry Ford Health System / Health Alliance Plan; 2Group Health; 3Kaiser Permanente Colorado; 4Kaiser Permanente Hawaii; 5Kaiser Permanente Northwest; 6Kaiser Permanente Southeast; 7HealthPartners

**Background/Aims:** Suicide is the 10th leading cause of death in the United States, warranting public health prevention efforts. Such efforts require accurate risk identification. However, the US Preventive Services Task Force has suggested that there is not enough information available to recommend screening for suicide risk in primary care. While research suggests that many individuals receive services before death, studies have been limited by small samples. This study used the largest US general population sample to date to examine the frequency, types and patterns of health services utilized prior to suicide as well as variations by subgroup. **Methods:** Health care utilization and demographic data from six health systems of the Mental Health Research Network were pre-matched with official mortality records and census files using the Virtual Data Warehouse. In total, 2237 suicide deaths were identified using ICD-10 codes, X60-X84. Reverse survival curves were calculated estimating weekly utilization for the year prior to death. These data were stratified by age, sex, insurance type, socioeconomic indicators, and cause of death. **Results:** Suicide death was more common among men (77%; n = 1728) and occurred more frequently by violent means (77%; n = 1730). Approximately 81% (n = 1806) received services in the year before death, with nearly 40% (n = 900) making a visit within a month before death. While 44% (n = 992) made any visit that included a mental health diagnosis in the year before death, most visits occurred in primary care without a mental health diagnosis (59%; n = 1320). Non-mental health primary care visits and outpatient behavioral health visits were most common in the two weeks before suicide. Service use occurred most often among women (87%; 441 of 509), older adults (65+ years; 96%; 386 of 401), and those who died by non-violent means (85%; 422 of 498). The relative frequency of mental health and general medical utilization differed markedly between age groups. **Conclusions:** Most individuals who died by suicide also used health services within a year before death. Here, over half of these individuals did not have a mental health diagnosis, and were seen for other reasons in primary care.

This study may guide targeted public health prevention efforts, including risk identification strategies. **Keywords:** Suicide; Treatment Utilization

**PSI-31: Role of Multiple Chronic Conditions in Longitudinal Cognitive Decline**

Rashmita Basu; Laurel Copeland; John Zeber; Alan Stevens

1Scott & White Healthcare

**Background/Aims:** Cognitive decline associated with dementia imposes substantial economic and social burden on families and healthcare systems. Cognitive decline may be influenced by chronic disorders (e.g., heart disease, hypertension), through the development of vascular dementia or Alzheimer’s disease (AD). Our goal is to identify specific or clustered chronic conditions impacting transition from normal cognition to cognitively impaired non-dementia (CIND) to dementia, adjusting for demographic and behavioral factors. **Methods:** This study used data from the Aging Demographic and Memory Study (ADAMS) subsample of the Health and Retirement Survey (HRS). HRS is a nationally representative sample of US non-institutionalized adults. The ADAMS subsample (N = 1770; 70 years or older) was selected from the HRS 2000 or 2002 waves, based on self- or proxy-reported cognition score. Neurological assessments were performed July 2001-December 2003. Two follow-up visits in June 2006-December 2009 assessed changes in cognitive functioning. We analyzed data on 308 persons over three assessment occasions excluding persons diagnosed with dementia at baseline. **Results:** At baseline, 70% (211) of 308 sample respondents had normal cognition and 31% (97) were CIND. Among respondents with normal cognition, 33% (70) were later diagnosed with CIND and 8% (18) developed dementia, while 44% of those with CIND at baseline developed dementia. Comparing VDW data to these national data, at Scott & White only 4% of persons age 65 or over were diagnosed with dementia in 2010, suggesting a low burden from cognitive decline on this health plan where members are relatively young (US population 13% over age 65 vs. Scott & White 10%). Analysis of trends in cognitive decline by comorbidity, demographics, and lifestyle factors are in progress. **Conclusions:** At the completion of this project, we will better understand the timing and structure of interventions that could potentially delay cognitive decline and lower associated health care burden. **Keywords:** Dementia; Cognitive Impairment; Alzheimer’s Disease

**Pharmacoepidemiology**

B3-2: Validation of Administrative and Claims Data for the Identification of Anaphylaxis Cases in the Mini-Sentinel Distributed Database

Kathleen Walsh; Sarah Cutrona; Pamala Pawloski; Nandini Selvam; Susan Forrow; Meghan Baker; Azadeh Shaibani; Jerald Mullersman; Susan Andrade

1Fallon Community Health Plan / Reliant Medical Group; 2HealthPartners; 3HealthCore Incorporated; 4Harvard Pilgrim Health Care; 5Food and Drug Administration; 6East Tennessee State University

**Background/Aims:** Few published studies have evaluated the validity of health plan administrative and claims data to identify anaphylaxis. Given the severity of the condition, drug-induced anaphylaxis is a major public health concern. We developed and evaluated the positive predictive value (PPV) of algorithms for identifying anaphylaxis in the Mini-Sentinel Distributed Database. **Methods:** We conducted a retrospective study among members enrolled in 8 geographically diverse health plans (HealthCore, Inc.; Humana; three member health plans within the Kaiser Permanente Center for Effectiveness and Safety Research; and two member health plans in the HMO Research Network). Diagnosis and procedure codes were used to identify potential cases of anaphylaxis recorded in the Mini-Sentinel Distributed Database between January 1, 2009 and December 31, 2010. A random sample of medical charts (n = 131) was abstracted and adjudicated
and positive predictive values (PPVs) were calculated based upon diagnostic criteria by Sampson et al. Results: Of the 131 potential available cases, adjudicators determined that 77 were anaphylaxis, 45 were not anaphylaxis, and 9 were determined to have inadequate information to confirm whether or not a case was anaphylaxis. Overall, the PPV was 63.1% (95% confidence interval, 53.9%-71.7%). PPVs ranged from 48.1% to 78.9% across the Data Partners. In comparing different criteria, algorithms which included codes for allergy (ICD-9-CM 995.5) or adverse effects of drug, medicinal and biological substance (ICD-9-CM 995.2, E930-E949) in combination with additional treatment or symptom codes, such as injection of epinephrine, had a lower PPV (PPV = 45.8%) than algorithms that included codes specifically indicating anaphylaxis (ICD-9-CM 995.0, 999.4), although confidence intervals were wide and overlapped. Conclusions: While the PPV of the developed algorithm was higher than those reported in previously published studies, the PPV of anaphylaxis remains low. Further evaluation of individual codes and combinations of codes is ongoing as part of the present study.

Keywords: Anaphylaxis; Mini-Sentinel; Adverse Drug Event

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B3-4: Identification of Adverse Drug Events Post-Hospital Discharge in a Geriatric Population

Jennifer Donovan1; Abir Kanaan1; Jennifer Tija2; Terry Field2; Shawn Gagne1; Lawrence Garber3; Sarah Cutrona2; Leslie Harrold2; Peggy Preusse1; George Reed2; Jerry Gurwitz2

1Massachusetts College of Pharmacy and Health Sciences; 2University of Massachusetts Medical School; 3Meyers Primary Care Institute

Background/Aims: Adverse drug events (ADEs), especially those that may be preventable, are among the most serious concerns regarding medication use in older persons. The purpose of this study was to describe the incidence, severity and preventability of ADEs occurring within 45 days post-hospitalization in an ambulatory geriatric population. Methods: We studied 1000 consecutive discharges of patients aged 65 and older who received medical care from a large multispecialty medical group in Central Massachusetts. Discharges were excluded if the discharge diagnosis was psychiatric or if discharges were not to home. Three clinical pharmacist investigators reviewed the ambulatory records of each discharged patient to identify drug-related incidents occurring during the 45-day period post hospital discharge. Drug-related incidents were presented to a pair of physician-reviewers who independently classified incidents as to whether an adverse drug event was present, the severity of the event, and whether the event was preventable. When the physician-reviewers disagreed on the classification of an incident, they met and reached consensus; consensus was reached in all instances where there was initial disagreement. Results: There were 242 ADEs identified, of which 35% (n = 84) were considered preventable. Of the preventable ADEs, 63% (n = 53) were categorized as significant, 32% (n = 27) were serious, and 5% (n = 4) were life-threatening. Nearly half of all ADEs occurred within the first two weeks following discharge. Conclusions: Adverse drug events are common and often preventable among older persons in the ambulatory setting. The substantial portion of serious events that were considered preventable suggests opportunities for improving care during the post-hospital discharge period.

Keywords: Adverse Drug Event; Geriatrics

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PS3-6: Blood Safety Continuous Active-Surveillance Network Feasibility Evaluation (Blood-SCAN)

Meghan Baker1; Michael Nguyen2; Jerald Mullersman1; Jillian Lauer1; Craig Zinderman2; Karen Riedlinger2; Cynthia Nakasato3; Elizabeth Chrishilles1; Crystal Garcia2; Carolyn Balbaugh4; Madhavi Vajani3

1Harvard Medical School, Brigham and Women’s Hospital; 2Food and Drug Administration; 3Harvard Medical School; 4Kaiser Permanente Hawaii; 5University of Iowa

Background/Aims: In 2011, the US Food and Drug Administration (FDA) created the Blood Safety Continuous Active-Surveillance Network (Blood-SCAN), the first nationwide active surveillance system for monitoring the safety of FDA-regulated blood components and blood-derived products. Blood-SCAN employs the Mini-Sentinel Distributed Database (MSDD) which contains 126 million individuals within 17 Data Partners. Blood-SCAN is intended to augment the existing safety surveillance system and improve US biovigilance efforts. As a first step in creating Blood-SCAN, we assessed the feasibility of using the current MSDD to evaluate blood component and blood-derived product exposures and related health outcomes.

Methods: The assessment consisted of 4 activities: (1) an expert working group identified 20 blood components and blood-derived products and 10 health outcomes of interest (HOIs) to evaluate the data available in the MSDD, (2) a literature scan was conducted to identify electronic algorithms to capture these product exposures and HOIs, (3) HOI and exposure frequencies were tabulated using established Mini-Sentinel programs, and (4) structured discussions were conducted with all Mini-Sentinel Data Partners to assess the availability, content, and quality of data within their databases.

Results: Claims codes were available for all of the blood components and blood-derived products, and many of the claims codes for blood-derived products were sufficiently specific to allow analyses by product manufacturer, fulfilling an important regulatory need. Adequate counts of exposures to immunoglobulin products indicate the potential for future surveillance studies on these products. MSDD analyses suggest that blood-derived products are captured effectively in outpatient settings but not in inpatient settings, limiting the scope of therapeutic indications that can be assessed. Blood component exposures are also captured in outpatient settings within the MSDD; however, because most transfusions occur in inpatient settings, these data may not be completely representative of the patient population, reason for transfusion, and dose. Most Data Partners reported no current ability to access inpatient blood component exposures through existing claims data streams.

Conclusions: The current MSDD supports safety surveillance for a variety of blood components and blood-derived products in the outpatient setting. Expanding the MSDD to include inpatient data streams will ensure that Blood-SCAN achieves its full potential.

Keywords: Blood; Active-Surveillance; Mini-Sentinel

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PS3-7: Improving the Detection of Drug-Induced Liver Injury with an Electronic Causality Assessment Tool

Janet Shin1; Christine Hunt1; Fang Niu1; Julie Papay2; Rich Murray3; Gregory Powell2; Steph Reisinger3; T. Craig Cheetham1

1Kaiser Permanente Southern California; 2GlaxoSmithKline; 3United BioSource Corporation

Background/Aims: The Roussel Uclaf Causality Assessment Method (RUCAM) is the most commonly used algorithm to evaluate drug-induced liver injury (DILI). It uses 7 criteria to assess causality and provides a total score ranging from 9 to 15, which is stratified into 5 categories describing the likelihood of DILI ranging from 'Highly Probable' to 'Excluded'. An electronic RUCAM (eRUCAM) was previously developed at Kaiser Permanente Southern California (KPSC) with the Observational Medical Outcomes Partnership and GlaxoSmithKline to detect DILI in an electronic medical record. The study aim was to identify areas of improvement for future iterations of the eRUCAM based on results from chart review.

Methods: The eRUCAM was used to score potential cases of DILI identified in patients taking at least one of 14 drugs commonly associated with DILI. Patients were required to be at least 18 years of age and have 12 months of continuous membership plus drug benefit prior to drug initiation. A random sample of 20 patients without pre-existing liver disease was selected for chart review to perform quality assurance on the programming specifications and identify areas for improvement in the algorithm. A hepatologist manually scored each patient using the paper-based RUCAM. Scores from the hepatologist were compared to those from the eRUCAM using the Wilcoxon signed rank test. Qualitative findings from chart review regarding future improvements to the algorithm were summarized. Results: The total score from eRUCAM was identical to those of the hepatologist for 6 cases (30%). The absolute difference between the hepatologist and eRUCAM scores was greatest for Criteria 5, which assesses non-drug causes of liver injury (P =0.001). Differences in scores were not statistically significant for other remaining criteria. Issues that were identified with Criteria 5 included:

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inadequate time windows for identifying non-drug causes, failure to consider laboratory results (e.g., hepatitis serology), incomplete lists of ICD-9 codes for non-drug causes, and inability to extract information from physician progress notes.

**Conclusions:** Future work related to the development of an electronic causality assessment tool based on the RUCAM should focus on improving Criteria 5 by using wider time windows to identify non-drug cases, laboratory results, and natural language processing.

**Keywords:** Drug-Induced Liver Injury; Roussel Uclaf Causality Assessment Method; Electronic Medical Records

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**PS3-8:** Identification of Severe Cutaneous Reactions and Genomic Risk Factors in Users of Antiepileptic Drugs

Mia Gallagher1; Maryam Asgari2; Joseph Boscariol3; James Burmester4; Lee Grenade5; Eric Macy6; David Margolis7

1 Kaiser Permanente Southeast; 2 Kaiser Permanente Northern California; 3 Geisinger Health System; 4 Marshfield Clinic / Security Health Plan of Wisconsin; 5 Henry Ford Health System / Health Alliance Plan; 6 Kaiser Permanente Colorado; 7 Kaiser Permanente Northwest; 8 Food and Drug Administration; 9 Kaiser Permanente Southern California; 10 University of Pennsylvania

**Background/Aims:** Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) are rare, life-threatening cutaneous reactions that may occur following exposure to certain medications, including antiepileptic drugs (AEDs). No reliable incidence estimates of SJS/TEN for US populations have been calculated since the introduction of ICD-9 codes specific for SJS/TEN in October 2008. This study seeks to: 1) investigate the incidence of SJS/TEN using retrospective case identification, 2) test the positive predictive values of ICD-9 codes prior-/post-October 2008, and 3) pilot the feasibility of conducting a population-based pharmacogenomic study. **Methods:** With input from dermatologists, pharmacoepidemiologists, and pharmacogeneticists at FDA, HealthCore, and 11 HMORN sites, we validated ICD-9 codes associated with SJS/TEN in 3 cohorts: 1) patients with an inpatient code of 695.1x between 01/01/01–12/31/08; 2) codes 695.12–695.15 from 08/01/08-08/31/12; and 3) codes 279.5, 279.51, 279.53, 695.8, 695.81, 693.0x, 694.8x, 694.4x or diagnosis codes 692.9, E85x.x-E858.9, 693.8, 692.89, 695.89, 695.1x, 692.3x, 695.0x in an inpatient setting plus specific drug exposure between 01/01/01–31/12. We extracted a standardized clinical and laboratory dataset. A sample of 265 potential SJS/TEN cases at 5 sites was selected for adjudication by medical chart review. Statistical models will be created to estimate the total number of SJS/TEN cases at all sites based on the positive predictive value of the case identification algorithm. To pilot the feasibility of a pharmacogenomic study, we estimated the number of living cases available, contacted potential cases, and tested 100 random DNA samples from the Marshfield Clinic Personalized Medicine Research Project for HLA-A*3101/HLA-B*1502 alleles to establish a control source. **Results:** A total of 54,049 patients was identified from electronic records: 3,058 in cohort 1; 1,733 in cohort 2; and 49,258 in cohort 3. Potential cases (n = 9) were identified and will be invited to participate in a genetic study. Among the 100 samples genotyped, 5 were positive for HLA-A*3101 and none were positive for HLA-B*1502, consistent with known frequencies. **Conclusions:** We identified a large number of potential SJS/TEN cases using code-based algorithms that will be used to determine the incidence of these events and to plan a larger follow-up study of specific AEDs and genomic factors.

**Keywords:** Stevens-Johnson Syndrome; Toxic Epidermal Necrolysis; Antiepileptic Drugs

doi:10.3121/cmr.2013.1176.ps3-8

**Prevention and Wellness / Obesity / Behavior Change**

**A3-4:** Recreational Physical Activity and Gestational Weight Gain in Women with Gestational Diabetes

Samantha Ehrlich1; Barbara Sternfeld1; Kirsten Unger Hu1; Monique Hedderson1; Ashley Mevi1; Susan Brown1; Ai Kubo1; Assiamira Ferrara1

1 Kaiser Permanente Northern California

**Background/Aims:** Excess gestational weight gain (GWG) is associated with several adverse perinatal outcomes, including increased infant size at birth and postpartum weight retention. These outcomes are particularly problematic for women with gestational diabetes (GDM), who are already at risk for delivering a large infant and developing type 2 diabetes later in life. Participation in recreational physical activity during pregnancy may mitigate excess GWG, but the association has not been previously examined in a large cohort of women with GDM. **Methods:** This study utilized baseline data from a clustered randomized intervention trial (Gestational Diabetes Effects on Moms — the GEM study) conducted at Kaiser Permanente Northern California (KPMC) to estimate the association between participation in recreational physical activity and GWG among women with GDM. Women with multiple fetuses and those on bed rest were excluded, leaving a final analytic cohort of 790 women. Recreational physical activity (walking quickly for fun or exercise, jogging, exercise classes, swimming, dancing, yoga, pilates, weight lifting/resistance exercises and team sports) in the past 3 months was assessed using the Pregnancy Physical Activity Questionnaire (PPAQ). Data on gestational weight gain per week (kg) up until the time of the oral glucose tolerance test (OGTT) was abstracted from the electronic medical record. **Results:** Compared to those who reported not participating in any recreational physical activity, women who reported participating in some recreational physical activity had a significantly reduced risk of GWG in the upper quartile [GWG >0.39 kg (0.85 lb.) per week]; this association was independent of age, prepregnancy body mass index (BMI), race/ethnicity, and parity [OR = 0.63 (95% CI 0.41-0.97)]. In sensitivity analyses limited to women who completed the PPAQ within 6 weeks (n = 448) and 4 weeks (n = 234) of the OGTT, the associations were more pronounced [OR = 0.42 (95% CI 0.24-0.72) and OR = 0.38 (95% CI 0.12-0.63), respectively]. No dose-response relationship was observed between high (>1.07 MET hours per day) and low (≤1.07 MET hours per day) recreational physical activity. **Conclusions:** Participation in recreational physical activity during pregnancy may mitigate high GWG in women with GDM.

**Keywords:** Physical Activity; Gestational Weight Gain; Gestational Diabetes

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**C4-4:** Prevalence of Hazardous and Harmful Drinking Patterns Among Older US Adults: Data from the 2005-2008 NHANES

Sarah Knowles1; Sandra Wilson1; Qiwen Huang1; Arlene Fink2

1 Palo Alto Medical Foundation for Healthcare, Research and Education; 2 University of California, Los Angeles

**Background/Aims:** While heavy drinking and alcohol abuse pose clear health risks, even moderate alcohol consumption may be risky or frankly harmful in older adults with certain co-morbidities, medication use, symptoms, and functional limitations. However, national estimates of the prevalence of risky alcohol use by older adults are presently unavailable. **Methods:** In 2005-2008 National Health and Nutrition Examination Survey respondents 65 years and older, reported alcohol consumption was considered alone and in the context of the individual’s co-morbidities, medication use, and physical and psychological functional status to classify their consumption as Harmful (already experiencing alcohol-related health problems), Hazardous (at risk of alcohol-related health problems), or Healthwise, using the classification algorithm of the Alcohol-Related Problems Survey (ARPS), a screening tool for older adults. Weighted national prevalence estimates and adjusted prevalence odds ratios in subgroups defined by sex, age, and race/ethnicity were calculated using survey statistical procedures. **Results:** Among older adult drinkers, 85.5% (14,341,531 of 16,771,716; 95% Confidence Interval [CI]: 83.2%, 87.9%) consumed alcohol within...
recommended limits, but 37.4% (6,280,569 of 16,771,716; 95% CI: 34.9%, 40.0%) had Harmful consumption and more than half (53.3%; 8,946,997 of 16,771,716; 95% CI: 50.1%, 56.6%) had either Hazardous/Harmful consumption. Men had significantly greater odds of having Hazardous/Harmful consumption than women (Odds Ratio [OR] = 2.14 [95% CI: 1.77, 2.61]). Blacks had significantly greater odds of having Hazardous/Harmful consumption than whites (OR = 1.49; 95% CI: 1.02, 2.17) despite having lower sex-specific rates of heavy drinking. The health status indicators most prevalent among Harmful drinkers were anti-hypertensive medication use, hypertension, quantity and frequency of alcohol consumption, and symptoms of depression/anxiety. Conclusions: Most Americans 65 years and older drink less than the current recommended maxima for their age, yet in the context of their co-morbidities, medication use, functional status, and recent symptoms, the alcohol consumption of a substantial proportion compromises or places their health at risk. Issues of medication safety and effectiveness, chronic disease management, and prevention and wellness are critical issues for this population.

Keywords: Alcohol Misuse; Older Adults

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ECI-4:
Culturally-Competent Heart Health Coaching Improves Lipids in South Asians

Powell Jose1; Kristin Azar1; Jennifer Kang1; Marshall Baek2; Latha Palaniappan1; Ashish Mathur1; Cesar Molina2

1Palo Alto Medical Foundation for Healthcare, Research and Education; 2El Camino Hospital

Background/Aims: Health coaching programs, delivered by trained non-medical and medical personnel, and focused on diet and lifestyle counseling, have proven beneficial in primary and secondary prevention of cardiovascular disease. These coaching programs, however, have not been tested or validated in South Asians, who have unique dietary and lifestyle habits, and increased risk of coronary artery disease. Methods: We examined lipid values in participants who were enrolled in the Heart Health Coaching Program at the South Asian Heart Center at El Camino Hospital. Trained volunteer coaches contacted participants throughout the year by phone and email to deliver culturally-competent health education on diet, physical activity, and stress reduction. Participants were categorized, based on their level of participation, into three groups: those who did not enroll (non-coached, N=33), those who received some coaching (partially coached, N = 145), and those who completed one full year of the program (fully coached, N = 558). Fasting lipid measurements were obtained with mean differences being calculated from their baseline and last available follow-up lab test. Paired t-test was used for comparison of baseline and follow-up labs within each group. Multivariate age-adjusted analyses incorporated MANOVA to detect for differences between groups. Results: There were no significant differences in mean age (43, 42 and 43), mean BMI (25.8, 26.5 and 26.2), or baseline lipid values across the three groups (fully-coached, partially-coached, and non-coached respectively). There were significant improvements in total cholesterol (TC) (-5.5±28.4mg/dl), LDL (-4.1±24.3), HDL (1.9±6.4), triglycerides (-16.1±67.3), and TC/HDL ratio (-0.31±0.83) in the fully coached group (P <0.001 for all). The partially coached group demonstrated reductions in total cholesterol (-5.2±27.8, P=0.03), LDL (-6.1±28.0mg/dl, P <0.001), and TC/HDL ratio (-0.42±1.01, P <0.001) with a trend towards increased LDL (4.9±31.3, P=0.06). Non-coached participants did not have any statistically significant differences for any lipid measurement. Coached participants were more likely to improve lipid values than partially coached and non-coached participants (P <0.001). Conclusions: Our results suggest the benefit of a volunteer culturally-competent coaching program for South Asians in improving their lipid profile. Benefit was observed even for partially coached participants. Non-medically trained health coaches may be an effective method to deliver culturally appropriate cardiovascular health messages for South Asians at risk for developing coronary artery disease.

Keywords: South Asians; Cultural Competence; Lipids

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PS3-37:
Health Information Seeking on Behalf of Others: Characteristics of ‘Surrogate Seekers’

Sarah Cutrona1; Kathleen Mazor1; Lila Finney Rutten2; Sana Naveed1

1Fallon Community Health Plan / Reliant Medical Group; 2Mayo Clinic; 3National Cancer Institute

Background/Aims: Prior research has shown that persons of lower socioeconomic status and certain racial/ethnic minorities often face challenges with communication and information seeking and therefore rely upon interpersonal sources for health information. Understanding the seeking preferences and behaviors of surrogate seekers (those who seek health information on behalf of others) may guide efforts to reach disadvantaged populations. Methods: We used data collected in 2011 and 2012 from the Health Information National Trends Survey (HINTS) to describe the behaviors and attitudes of online surrogate seekers, and to draw comparisons with self seekers (those seeking information on their own behalf). Respondents were asked about Internet use for surrogate seeking over the prior 12 months. Sociodemographic characteristics, confidence in seeking, and trust and attention to health information from various sources was assessed. Data were weighted to allow for population estimates. Bivariate associations between surrogate seeking and independent variables were evaluated using Chi Square statistics. Results: Surrogate seekers were more likely to live in households with others (weighted percent 89.4%, [1182 of 1427] vs. 82.5% of self seekers [503 of 695]; P <0.05); no significant differences in gender, race, income or education between surrogate and self seekers were observed. Surrogate seekers were more likely to report: visits to social networking sites to read and share about medical topics; participation in online health support groups; downloading of health information to electronic devices and searching online for a healthcare provider. Surrogate seekers were more likely to pay “a lot” of attention to at least one health information source (weighted percent 43.9% [663 of 1458] vs. 32.7% of self seekers [246 of 708], P = 0.01). Conclusions: Our results offer insight for leveraging lay health communication efforts to reach populations who rely on surrogate sources for health information.

Keywords: Surrogate Seekers; Health Information; Disadvantaged Populations

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PS3-38:
The Kaiser Permanente Northern California Member Health Survey Project

Nancy Gordon1; Theresa Lin1

1Kaiser Permanente Northern California

Background/Aims: We will introduce researchers and administrators to the KP Northern California Member Health Survey Project (MHS) and illustrate how it has been used for research and to monitor population sociodemographic and health-related characteristics over time. Methods: This is a self-administered survey of independent stratified random samples of adults conducted every 3 years starting in 1993. Seniors and most race-ethnically diverse medical center service populations are oversampled. Survey data can be linked at the individual level to KP clinical, administrative, and utilization data, including kp.org use. Results: This Community Benefit-funded survey has been used to monitor KPNC member population characteristics over time, to facilitate research on the membership, and to contribute to community health needs assessment. The MHS captures information about sociodemographic characteristics, health and functional status, behavioral and psychosocial health risks, use of CAM and dietary supplements, IT access (Internet, email, and in 2011, mobile phone and text messaging), and health education modality preferences that is valuable for health research and service planning. Our sample facilitates study of race-ethnic and age group differences in these characteristics. While KPNC’s electronic data capture of member race/ethnicity and health characteristics has grown exponentially since the early 2000s, the Member Health Survey, based on self-reported information obtained from a stratified random sample of adult members, remains the most comparable source of KPNC population statistics to other surveys like the BRFSS, CHIS, and NHIS. We will use MHS data from 1993,
1996, 1999, 2002, 2005, 2008, and 2011 to show changes over time among 25-79 year olds in selected health behavior risk factors (smoking, obesity, exercise, dietary practices, stress, health beliefs), use of selected CAM modalities, and IT access; and age and race-ethnic differences in health risk factors and CAM use; and age-related differences in IT access and preferences for IT-based health education. More information about the survey and survey results can be found at www.memberhealthsurvey.kaiser.org.

**Conclusions:** Data and statistics from KPNC Member Health Surveys can be useful for researchers and administrators both within and outside KPNC for research and service planning.

**Keywords:** Member Population Health; Health Risk Behaviors; IT Access and Preferences

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PS3-39:
What Are Seniors Doing to Promote Healthy Aging?

Nancy Gordon

1Kaiser Permanente Northern California

**Background/Aims:** We describe the percentages of seniors taking health actions to promote healthy aging; how well they are achieving recommended goals; and whether healthcare provider advice influences behavior.

**Methods:** We analyzed weighted self-report survey data for approximately 6600 respondents aged 65+ to the 2011 Kaiser Permanente Northern California Member Health Survey. **Results:** Differences noted are significant at *p* < .05: (1) 73% (77%/W, 68%/M) try to eat mostly healthy foods. Those who try are more likely to eat 3+ servings of fruit/vegetables per day (64%/W, 45%/M vs. 35%/W, 24%/M), but <1/4 (23%/W, 15%/M) consume 5+ servings. “Triers” are more likely to report most of the time trying to eat reduced fat foods (65% vs. 29%) and avoiding foods high in salt/sodium (75% vs. 40%), and also more likely to read food labels/recipes (70%/W, 57%/M vs. 28%/W, 16%/M). (2) 55% (51%/W, 59%/M) try to exercise most days (44% moderate exercise, 11% nonaerobic walks). **Effort** to get daily exercise declines with age. Most (90%) who try report exercising 3+ times/week (vs. 33% of “nontriers”), but only 53% of “triers” (56%/W, 49%/W) exercise 5+ times/week. (3) 51% of overweight seniors are trying to lose weight/maintain weight loss. (4) 39% (46%/W, 30%/M) and 57% (62%/W, 50%/M) of those at high risk (recent fall history or balance/gait problem) are taking actions to reduce risk of falling. (5) 65% try to get enough sleep. (6) “Triers” are more likely to report getting advice about diet (67% vs. 58%), losing weight (66% vs. 45%), reducing fall risk (83% vs. 43%), and getting enough sleep (82% vs. 64%). (7) 71% do activities to keep their brain stimulated; 63% visit people at least once a week, and 64% do enjoyable activities at least once a week, but this declines with age. (8) 47% of seniors take low-dose aspirin for CVD prevention.

**Conclusions:** Large percentages of seniors are trying to engage in health protective behaviors, but many who are trying are falling short of recommended health behavior goals. Healthcare provider advice appears to influence patient motivation, supporting the utility of health behavior assessment and wellness counseling for seniors.

**Keywords:** Healthy Living; Senior Health Promotion; Prevention

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PS3-41:
The Role of Health Literacy on Medication Adherence After Discharge Among Medical Aid Program Members

Raphael McIntyre; Lorie Thibodeaux; Angela Hochhalter; John Zeber

1Scott & White Healthcare

**Background/Aims:** Low income and inadequate health literacy are independently associated with hospital readmission, a situation exacerbated by factors such as medication errors or non-adherence. The objectives of this study were to describe health literacy in a population of adult patients covered by medical aid programs, to test its impact on medication adherence, and to explore the role of depressive symptoms on adherence.

**Methods:** Ninety patients who had been hospitalized at Scott & White Memorial Hospital participated in the study. Within 15 days of discharge, participants completed an in-person cross-sectional survey, on health literacy (REALM-SF), medication adherence (Morisky 4-item), depressive symptoms (CES-D), demographics, and other psychosocial measures. Chi square was applied to test for differences in medication adherence by health literacy score and by depression score. Health literacy scores were categorized by grade equivalents of ≤grade 6 (0-3 points), 7th- 8th grade (4-6 points), and high school or above (7 points). Depressive symptom scores were categorized as below or above a cut-off of 16 points (higher = more symptoms). Medication adherence scores were categorized as low (0-1 points), medium (2-3 points), or high (4 points).

**Results:** The majority of participants were women (62.2%) with a mean age of 50.4 (SD = 13.5). Fifty-four percent scored a grade equivalent of high school or above, thirty percent scored a 7th to 8th grade equivalent, and 15.6% scored equivalent to 6th grade or lower. Medication adherence did not differ across REALM-SF categories (*x² = 4.97, df=4, *P* = .29) or by CES-D categories (*x² = 1.79, df=2, *P* = .41).

**Conclusions:** Health literacy scores varied in this sample of medical aid program members recently discharged from the hospital; 15% had scores indicating they may struggle with most patient education material. However, health literacy level was not associated with degree of medication adherence after discharge. Planned next steps in this study are to explore the role of motivation and other individual characteristics on medication adherence and other self-care behaviors. Improved understanding of experiences and behaviors following hospital discharge will aid in the tailoring of interventions to reduce avoidable readmissions for persons receiving medical aid.

**Keywords:** Medication Adherence; Low-Income Populations

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PS3-42:
Health Literacy and Cancer Prevention: It’s Not What You Say It’s What They Hear

Kathleen Mazor; Douglas Roblin; Andrew Williams; Paul K.J. Hart; Mary Costanza; Sarah Cutrona; Terry Field; Sarah Greene; Bridget Galgio; Joann Wagner; Brandi Robinson

1Fallon Community Health Plan / Reliant Medical Group; 2Kaiser Permanente Southeast; 3Kaiser Permanente Hawaii; 4Maine Medical Center; 5University of Massachusetts Medical School; 6Group Health; 7Kaiser Permanente Mid-Atlantic

**Background/Aims:** A growing body of literature documents the relationship between health literacy and important health behaviors and outcomes. Most research to date has focused on print literacy–few studies have examined literacy with respect to spoken information (“spoken health literacy”). We sought to examine the extent to which responses to physician advice about cancer prevention and screening were associated with spoken health literacy.

**Methods:** Participants listened to 3 simulated physician-patient discussions addressing: 1) Prostate Specific Antigen (PSA) testing; 2) tamoxifen for breast cancer prevention; and 3) colorectal cancer (CRC) screening. The physician provided information on risks and benefits but did not endorse one course of action. Post-vignette questions assessed understanding and reactions to the physician’s advice. Participants had previously completed the Cancer Message Literacy Test-Listening (CMLT-L), a measure of spoken health literacy. Bivariate analyses examined the relationship between CMLT-L scores and comprehension, attitudes, and behavioral intentions.

**Results:** Four hundred thirty-eight adults from 3 HMORN sites participated. **Comprehension:** Post-vignette comprehension scores were correlated with CMLT-L scores (*r* = 0.62, *P* < 0.001) and those scoring in the lowest CMLT-L quartile scored significantly lower on the vignette-specific comprehension scales (*P* < .001). **Attitudes:** Participants scoring in the lowest CMLT-L quartile scored significantly lower on the vignette-specific comprehension scales (*P* = .41). **Behavioral Intentions:** Participants who scored in the lowest CMLT-L quartile were more likely to report their views had become more favorable on PSA testing (*P* < 0.001) and CRC screening (*P* < .001) as a result of the vignette. Behavioral intentions: Participants who scored in the lowest CMLT-L quartile expressed stronger intent than higher scoring participants to undergo PSA testing (*P* = .028) and to take tamoxifen for chemoprevention (*P* = .017).

**Conclusions:** The ability to understand spoken information is a critical component of health literacy. In this study, spoken health literacy influenced patients’ comprehension of, and reaction to spoken health information provided by a physician. The findings that participants scoring in the lowest quartile on the CMLT-L were more likely to respond favorably to physician advice on cancer prevention but were less likely to comprehend content of the vignettes, may indicate that physician mention of a prevention
service is interpreted as endorsement of a prevention service in the absence of a full understanding of its risks and benefits.

**Keywords:** Health Literacy; Cancer Screening and Prevention; Health Communication

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PS3-43:

**Using the Electronic Health Record to Evaluate the Collateral Impact of Bariatric Surgery**

Annemarie Hirsch1; G. Craig Wood1; Christopher Still1

1Geisinger Health System

**Background/Aims:** Bariatric surgery is the only effective long-term treatment for morbid obesity. The bariatric program includes commitment to lifestyle changes that may have a collateral effect on co-inhabitants. Studies of the collateral impact are limited by small sample sizes and results have been conflicting, with studies showing both weight loss and weight gain in family members of surgery patients. This is the largest study to investigate the impact of bariatric surgery on the BMI of adults living in the same household. **Methods:** Adult co-inhabitants of Roux-en-Y gastric bypass patients were identified by matching addresses from an electronic health record. The sample was limited to co-inhabitants with BMI measures within the year prior and within a year after their household member’s surgery. Paired t-tests and repeated measures regression was used to determine if change in BMI from pre- to post-surgery was associated with the co-inhabitants’ age, gender, and BMI. **Results:** Of 443 co-inhabitants (from 388 bariatric patients), 61% (n = 269) were male, and 21% (n = 91), 50% (n = 223), and 29% (n = 129) were aged <40, 40-59, and ≥60 years, respectively. Pre-surgery BMI was normal, overweight, moderately obese, and extreme obese (>40kg/m2) in 12% (n = 54), 26% (n = 116), 46% (n = 205), and 15% (n = 68), respectively. The overall change in the co-inhabitants’ BMI was not significant (pre-surgery mean = 32.9, post-surgery mean = 32.8, paired t-test p-value = 0.072). Change in BMI from pre- to post-surgery was not associated with gender (P = 0.231) or pre-surgery BMI (P = 0.129). Older age was associated with significant decrease in BMI. Co-inhabitants aged ≥60 had a significant decrease in BMI (pre-surgery mean = 32.3 kg/m2, post-surgery mean = 31.9, P = 0.0002). **Conclusions:** Older co-inhabitants (aged ≥60) of bariatric surgery patients had a significant reduction in BMI, while younger age, gender, and initial BMI were not associated with BMI change. The lifestyle changes required of bariatric surgery patients might have more of an impact on older co-inhabitants who are less likely to be influenced by competing lifestyle behaviors in the workplace than their younger counterparts. With more than 60 percent of co-inhabitants obese prior to surgery, it is critical to identify strategies for broadening the positive impact of bariatric surgery to co-inhabitants in all age groups.

**Keywords:** Bariatric Surgery; Obesity

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PS3-44:

**Can Health Insurance Improve Employee Health Outcome and Reduce Cost? An Evaluation of Geisinger’s Value-Based Insurance Design**

Daniel Maeng1; James Pitcavage1

1Geisinger Health System

**Background/Aims:** Employers have recently seen rapid increases in their cost of providing health insurance benefits for their employees, partly because the traditional health insurance benefit design does not reflect the value of healthcare consumed. Value-based insurance design (VBID) seeks to address this problem by incorporating value as well as cost in each beneficiary’s healthcare decisions. Since 2007, Geisinger Health System (GHS) has implemented its own version of VBID called MyHealth Rewards for its employee population. Key components of the program included zero-copay prescription drugs for patients with certain chronic conditions and a health management program designed to enhance employee self-management. In this study, we examine whether MyHealth Rewards has led to improvements in employee health outcomes in terms of reduced incidence of stroke and MI and also whether it has lowered the cost of care. **Methods:** A cohort of GHP members who remained as Geisinger employees throughout the study period was identified (N = 4,895). Because MyHealth Rewards program was offered only to Geisinger employees starting in 2007, this cohort was compared against a comparison group consisting of GHP members who remained as non-GHS employees during the same period (N = 12,077). Propensity score matching was used to stratify the sample based on a set of baseline characteristics. Cox proportional hazard model was used to estimate time to first incidence of stroke or myocardial infarction (MI) since 2007. The total medical cost excluding prescription drugs was analyzed using a two-part model consisting of a generalized linear model and a logistic regression model. Covariates included employee age, gender, disease management and chronic condition status, and medical home status. **Results:** The Geisinger employee cohort experienced stroke or MI later than the non-Geisinger employee group (hazard ratios of 0.73 and 0.56, respectively; P < 0.01). There was also reduction in cost of care by about 10% to 13% associated with the Geisinger employee cohort relative to the non-GHS employee group during the second and third years of the program. However, the cost reduction disappeared in subsequent years. **Conclusions:** VBID has the potential to be an effective tool in achieving the dual goal of improving health outcomes while lowering cost.

**Keywords:** Value Based Insurance Design; Health Outcomes; Cost of Care

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PS3-46:

**Do Rural and Urban Populations Define “Health” Differently?: Findings from a Review of the Literature**

Charles Gessert1; Stephen Waring1; Pat Conway1; Jeffrey VanWormer2; Lisa Bailey-Davis3; Melissa Roberts4

1Essentia Health; 2Marshfield Clinic / Security Health Plan of Wisconsin; 3Geisinger Health System; 4Lovelace Health System

**Background/Aims:** An earlier analysis of rural and urban focus group discussions of end-of-life care preferences documented that rural and urban participants often discussed “good health” and “meaningful survival” differently. In that study, rural participants tended to equate “health” with being able to function, particularly on one’s own behalf, and to dismiss the idea of meaningful survival when unable to do so. Urban participants were more likely to describe health and survival as goals independent of function. **Methods:** We conducted a review of the literature to assess the current understanding of rural definitions of health. PubMed and CINAHL and other databases (PsycINFO, AnthroSource, Sociological Abstracts, etc.) were searched for years 1970 to 2011 using terms including health definition, health belief, health attitude, health values, and health behavior for relevant articles pertaining to rural US, Canada and Australia. The initial search and subsequent follow up of cited material identified 101 articles, which were reviewed by the authors for content, methodology and rigor. **Results:** Thirty-nine of the articles included commentary or findings relevant to a rural definition of health. Rural residents had been found to characterize good health as being able to “take care of what has to be done” and to avoid dependency. In particular, rural residents assessed their health on the basis of their ability to work and to reciprocate in social relationships, and associated health with independence. While these findings were consistent across much of the literature reviewed, few studies compared rural and urban definitions of health directly. That is, a distinctive rural definition of health is suggested in the literature, but there has been little empirical documentation of differences between rural and urban health concepts. **Conclusions:** Rural-urban differences in the definition of health may be important in promoting healthy behavior, and in the delivery of health education, preventive services, and primary care. Future research must overcome conceptual challenges, including the heterogeneity of rural communities, inconsistent definitions of what is “rural,” the need to adjust for rural-urban differences in socio-economic status, and especially the need for valid rural/ non-rural comparisons.

**Keywords:** Prevention and Wellness; Health Education; Health Behaviors

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Assessing Appropriate Treatment of Familial Hypercholesterolemia in Children

Lisa Underland; Laurel Copeland; Catherine McNeal; Justin Zachariah

1Scott & White Healthcare; 2Boston Children's Hospital / Harvard Medical School

Background/Aims: In 2008, the American Academy of Pediatrics promulgated guidelines to identify and treat children with life-threatening elevations in low density lipoprotein cholesterol, aka familial hypercholesterolemia (FH). FH is fairly common with heterozygotes characterizing roughly 1/500 births. Primary treatments are lifestyle modification and antilipemics. The 2011 expansion of NHLBI guidelines to include universal pediatric screening fueled the controversy of medicating kids with predictions of “an epidemic of…lipid-lowering drug therapy,” implying some are wrongly treated. While debate abounds, there are no data on the effects of the 2008 guidelines. Datasets large enough to have significant numbers of FH kids or robustly populated with relevant data are rare. The HMORN Virtual Data Warehouse (VDW) is an exception. We hypothesized that (a) the 2008 guidelines have not influenced medication use or FH identification, and (b) common healthcare disparities correlate with likelihood of therapy. Methods: This exploratory study of children 2-20 years old in the Scott and White VDW will use a time-series design to study the cumulative proportion treated and yearly rate of new treatment, comparing 2005-07 vs. 2009-11. Over the same periods, we will also identify temporal trends in FH diagnosis and its sociodemographic correlates. Results: We use standardized data definitions and data abstraction methods developed as part of the Cardiovascular Research Network (CVRN) VDW. Data abstracted include pharmacy claims; ICD-9 diagnosis; and predictors: age, sex, race, obesity, socioeconomic status, geographic region, urban vs. rural practice area, family history of cardiovascular disease, and provider characteristics. Primary analysis will compare the proportion treated with lipid-lowering therapy pre-2008 vs. post-2008 using multivariable adjusted regression models (logistic for proportions or Poisson for rates) to identify correlates of therapy or diagnosis and association with implementation of the 2008 guidelines as evidence of change in indications. Secondary outcomes will be treated similarly. Conclusions: The CVRN VDW represents a unique resource to ascertain if pediatric lipid treatment is being rationally applied consistent with published guidelines. This pilot study may identify VDW construction and population issues that interfere with addressing this data gap.

Keywords: Dyslipidemia; Pediatric; Guideline-Concordant Care

Variation in the Self-Care Behaviors of Healthcare Personnel: Physicians, Nurses, and Others

Nangel Lindberg; Allison Naleway; Sarah Balf; Manjusha Gaglani

1Kaiser Permanente Northwest; 2Aet Associates; 3Scott & White Healthcare

Background/Aims: The personal self-care and health habits of healthcare personnel may influence patients’ own health-related behaviors including smoking, physical activity, weight management, and alcohol consumption. This study describes the degree to which healthcare providers adhere to recommended health-enhancing behaviors, and whether adherence differs by occupation. Methods: A prospective cohort of healthcare personnel was enrolled in fall 2010 from two large health care organizations: Scott & White Healthcare, and Kaiser Permanente Northwest. Participants were physicians, nurses, and other healthcare personnel providing direct patient care and working full time. Potential participants were invited to take part in a study of “respiratory illness and healthcare workers.” Participation was voluntary. The study tool was a self-administered internet-based questionnaire which participants completed at home or on facility computers. The questionnaire included items on demographic information, occupational factors, and health-related behaviors. Upon completion of the enrollment questionnaire, participants received a small incentive in the form of cash or gift card. Results: Data are presented for 1701 participants who completed the enrollment survey. Participants were grouped in three occupational categories: Physicians (n = 175), Nurses (n = 484), and Other Providers (n = 404). Significant differences emerged in demographic characteristics, with physicians being younger, more likely to be male, married, having a higher median household income, and higher level of education (P < 0.001). In terms of body mass index (BMI) physicians were more likely to report a normal weight (55%), and were the least likely group to be obese (10%; P < 0.001). By contrast, nurses and other healthcare providers were evenly distributed along three BMI categories (normal weight, overweight, obese). Physicians were more likely to report engaging in exercise at least once per week (85%) than the other two occupational categories (74%; p < 0.005). Approximately 5% of nurses and nearly 10% of other healthcare providers reported smoking, compared to less than 1% of physicians (P < 0.001). No differences were found in the self-report alcohol consumption by occupational category. Conclusions: Results suggest the need to target healthcare personnel in health promotion interventions, particularly those focused on weight management and physical activity.

Keywords: Health Behaviors; Healthcare Workers
PS3-52:
Heart Health in Your Pocket: Lessons Learned from the Development of a Smartphone App

Jeffrey VanWormer1; Yin Xu2; Bryan Weichelt3; Shawn Williams4; Dan Burish5; Marsha Barwick6; Robert Moritz7; Simon Lin1

1Marshfield Clinic / Security Health Plan of Wisconsin

Background/Aims: As part of the Million Hearts national initiative to prevent cardiovascular disease (CVD), there are increasing calls to leverage health information technology. The Marshfield Clinic developed a Heart Health Mobile application (app) that is designed to improve awareness of CVD risk and promote risk factor control among regional smartphone users. It deploys an engaging user interface that provides a brief CVD risk assessment that takes into account self-reported behavioral, familial, and biometric risk factors, including blood pressure and lipids. Users are then directed to nearby community pharmacies, clinics, and other locations where more advanced CVD risk factor screenings can be obtained. Along with social media connections and measurement prompts, basic education materials are provided on key CVD prevention topics such as hypertension, dyslipidemia, weight management, and tobacco cessation. Methods: A multidisciplinary team of 24 members was created to develop the app over a 30-day timeframe. This team included a broad cross-section of clinical professionals from medicine, epidemiology, health IT, usability and graphic designers, business analytics, and marketing. An Agile programming method was used to promote adaptive planning and evolutionary development in self-organizing, cross-functional teams. Results: The iOS app was successfully developed, tested, and launched within the 30-day timeframe. It was submitted competitively as part of the Million Hearts Risk Check Challenge, a CVD prevention app contest sponsored by Office of the National Coordinator for Health Information Technology. The final product is shown in detail at http://www.youtube.com/watch?v=qfEStQipjtW. The app was developed in six different languages, and epidemiologic data on downloads, unique users, geo-segmentation, risk factor profile, and customer loyalty, among other data points, are actively collected. Conclusions: Health-related consumer smartphone apps can be developed rapidly and brought to scale as part of healthcare delivery systems’ business and clinical strategies. They provide users with important information, education, and directions on CVD prevention and have wide-ranging potential across numerous health conditions. From an HMORN perspective, such apps also provide real-time data collection methods that can be used to identify health trends at a lower cost (and comparable quality) relative to traditional population research methods.

Keywords: Cardiovascular Disease; Prevention; Smartphone
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PS3-53:
A Multi-Site Comparison of Laparoscopic Gastric Band vs. Laparoscopic Gastric Bypass Bariatric Surgical Procedures

Elizabeth Bayliss1; J. David Powers2; W. Troy Donahoo3; Darren Toh4; Sarit Polsky5; Lisa Herrinton6; Melissa Butler7; Robert Moritz8; Simon Lin9

1Kaiser Permanente Colorado; 2Group Health; 3Essentia Health; 4Kaiser Permanente Northern California; 5Kaiser Permanente Northwest; 6Kaiser Permanente Northern California

Background/Aims: The two most common bariatric surgical procedures are laparoscopic gastric band (LAGB) and laparoscopic gastric bypass (RYGB). Single site comparisons suggest that RYGB may result in greater weight loss at the expense of more short-term complications, whereas LAGB may be associated with less weight loss and more long-term complications. It is unclear whether these results extend to other populations. Methods: This is a multi-site retrospective cohort investigation of LAGB vs. RYGB. Outcomes are: 30-day operative complications; rehospitalization at 1 and 2 years; and weight loss at 2 years. Multivariable logistic regression, Cox proportional hazards, and repeated measures will be used to assess outcomes as a function of type of surgery. Results: From 2005–2009, there were 1,521 LAGB and 5,963 RYGB procedures at 11 sites. Mean pre-surgical BMI was 42.6 and 44.6, and mean age was 47.0 and 45.8 for each procedure respectively. RYGB patients were more likely to have diabetes, hypertension, gastric reflux, and sleep apnea. RYGB patients had more commercial insurance (89% vs. 72%), were less likely to be Caucasian (67% vs. 73%), and were 84% (vs. 82%) female. Results at 30-days for LAGB vs. RYGB respectively were: Failure to discharge, 0 (0%) vs. 8 (0.1%); mortality, 0 (0%) vs. 1 (0.02%); thrombotic diagnoses, 6 (0.5%) vs. 63 (1.1%); and reintervention, 10 (0.9%) vs. 30 (0.5%). Mean long-term follow-up BMI was 37.2 for LAGB and 33.3 for RYGB. All differences were statistically significant at P = 0.05 in bivariate models. Conclusions: Across multiple sites, individuals with higher BMI and morbidity burden were more likely to receive RYGB surgery. Preliminary results suggest that long-term weight loss and certain short-term complications are significantly greater for RYGB than LAGB procedures, and that LAGB procedures are more likely to have 30-day reintervention. Multivariable comparisons adjusting for pre-operative covariates and follow up time will better clarify risks and benefits of these procedures.

Keywords: Obesity; Bariatric Surgery
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PS3-54:
Effect of Bariatric Surgery on Chronic Use of Opioid Medications

Marsha Raebel1; Sophia Newcomer2; Denise Boudreau3; Thomas Elliott4; Lynn Debar5; Ameena Ahmed6; Elizabeth Bayliss7

1Kaiser Permanente Colorado; 2Group Health; 3Essentia Health; 4Kaiser Permanente Northwest; 5Kaiser Permanente Northern California

Background/Aims: Opioids are used to manage chronic painful conditions associated with obesity. It is unknown whether weight loss attained after bariatric surgery results in a change in chronic opioid use and if so, over what timeframe. We explored the effect of bariatric surgery and associated weight loss on chronic opioid use. Methods: This retrospective cohort study included patients from ten Scalable Partnering Network for Comparative Effectiveness Research (SPAN) sites who had bariatric surgery between 1/1/2005 and 12/31/2009. Patients had health plan enrollment and a drug benefit during the year before and after surgery. Patients were classified based on total oral or transdermal opioid days1 supply dispensed during the year prior to surgery as having no, some, or chronic use. To assess change in opioid use in the year following surgery relative to the year prior to surgery, total opioid use for each user was determined using morphine equivalents. Dispensings within 30 days post-surgery were excluded. Longitudinal mixed effects models were used to assess change in morphine equivalents dispensed before/after surgery. Results: The cohort included 11,719 patients. Overall, 1016 had chronic opioid use in the year before surgery and 1222 had chronic opioid use in the year after surgery. Of the chronic users pre-surgery, 760 (74.8%) remained chronic users post-surgery. Of the 10,703 with some or no opioid use pre-surgery, 462 (4.3%) became chronic users post-surgery. The most commonly dispensed opioids were hydrocodeine combinations, oxycodone, and codeine combinations. Among pre-surgery chronic users, median daily morphine equivalents increased from 22.36 pre-surgery to 25.22 post-surgery (paired sign test P<0.001). Conclusions: During the year after bariatric surgery opioid use appears to increase in the overall bariatric surgery population or in those with pre-surgery chronic opioid use. Longer timeframes should also be evaluated.

Keywords: Bariatric Surgery; Opioid; Pain
doi:10.3121/cmr.2013.1176.ps3-54

PS3-55:
Utilization of High-Technology to Collect Health Risk Assessment Information from Medicare Members: A Feasibility Study of Interactive Voice Response (IVR) and an Online Survey Tool

Debby Freedman1; Nicole VanderHorst1

1Kaiser Permanente Program Offices

Background/Aims: Kaiser Permanente (KP) has been working to develop a standardized approach to preventive care for Medicare members that includes completion of a Total Health Assessment questionnaire to provide data that the patient’s health care team can use to generate a personal prevention plan as part of an Annual Wellness Visit. In order to minimize the
Virtual Data Warehouse

A4-1: Evaluation of the Utilization-Based Population Denominators in the HMORN Context

Irina Haller1; Paul Hitz1; Christine Bredfeldt2; Amy Butani2; Roy Pardee3; Brian Johnson4

1Essentia Health; 2Kaiser Permanente Mid-Atlantic; 3HealthPartners; 4Group Health

Background/Aims: Defining a population denominator is a major challenge in practice-based research. Because health plan membership is unknown, population denominators must be determined by alternate methods, e.g., healthcare utilization. Such an approach may introduce bias since the resulting population may only represent a small portion of individuals who are affiliated with a healthcare organization. Moreover, healthcare utilization is often confounded by demographic and socio-economic factors, potentially compounding bias in the population estimates. Methods: The majority of HMORN member organizations have health plans, whose enrollment information is captured in the Virtual Data Warehouse (VDW) Enrollment file. The health plan enrollment provides a well-defined population denominator. In order to participate in multi-site research, HMORN member organizations without health plans, such as Essentia Health (EH), need to determine an enrollment proxy. The purpose of this pilot study was to evaluate a utilization-based enrollment proxy algorithm. Four HMORN sites with Epic electronic medical records (three sites with and one site without standard VDW enrollment files) participated in the study. The utilization-based algorithm was applied in two steps: 1) creating the base table from Clarity (Epic) database; and 2) creating the utilization-based enrollment proxy using predetermined selection rules. Results: EH implementation of the enrollment proxy for years 2002-2012 contained 390,000 “enrollment” periods for 378,000 unique patients. The EH algorithm was applied to the data from the three sites with health plans; the resulting enrollment proxy files were compared to the standard enrollment files. Patient demographic data (age, sex) and place of residence categorized by rural-urban commuting area (RUCA) codes (urban, large rural, small/isolated rural), as well as race and socio-economic measures (Census file), were used to characterize the deviations between two population denominators. Conclusions: The results of this study will inform HMORN researchers about the comparability of the patient populations between standard health plan enrollment and the utilization-based proxy. This study will also evaluate patient characteristics likely to affect utilization, and therefore, accuracy of the utilization-based proxy as a population denominator. It may also be useful for further development of the algorithm.

Keywords: Virtual Data Warehouse; Enrollment Proxy; doi:10.3121/cmr.2013.1176.a4-1

A4-2: Complex VDW Queries - So Easy, a PI Can Do It

William Tolbert1

1Group Health

Background/Aims: GHRI has created a SAS program that takes all of its input from a configuration file. The configuration file is nothing more than a text file, formatted to easily convey the datasets, variables, and criteria necessary for data extraction. Methods: There are numerous benefits of this approach: (1) complex logic can be encapsulated in a single file; (2) extensive comments in the configuration file are allowed; (3) the program is “safe” for multi-site requests; (4) after review, the program does not need to be redistributed, only the configuration file needs to be distributed and reviewed for each request, and it cannot execute without the program that supports it; (5) summary-level datasets with sophisticated criteria can be created; and (6) current summary-level efforts prevent person-level analysis.

Results: Here is how the program works: The configuration file consists of different sections. The first section tells the program which VDW datasets are to be used. Other sections create criteria for selection and analysis. For example, here are two criteria for diabetes identification.

# outpatient criteria
criteria_name=outpatient /
criteria_where=type eq "enctype not in ("IP","ER") and (dx
int(357.2, 366.41, 362.01, 362.02, 362.03, 362.04, 362.05, 362.06,
362.07, 648.83) or
substr(dx,1,3) eq '250') /
criteria_keys=dx dx_date /
criteria_data=dx dx_date /
criteria_sort=a /
# lab a:1 criteria
criteria_name=lab a:1 c /
criteria_where=test_type eq "HGBA1C" and input(result_c, 8.) gt 6.5 /
criteria_keys=test_type result_c lab_date /
criteria_data=test_type result_c lab_date /
criteria_sort=a /

Conclusions: Multiple criteria blocks can be assembled to create flags for each person in a cohort. The resulting summary-level dataset can then be used to make determinations based on the presence or absence of particular flags. The criteria blocks use simple boolean expressions and concentrate the “intelligence” of the analysis in one location.

Keywords: VDW; SAS
doi:10.3121/cmr.2013.1176.a4-2

A4-3: Clarity Translation of Chemotherapy Infusion Data

Jamila Gul1; Mei Lee1; Michael Matza1; Daniel Ng1

1Kaiser Permanente Northern California

Background/Aims: The aim is to educate programmers on how to pull chemotherapy infusion data from Clarity. The data are complex, and it can be a take while to learn the Clarity Data model, which can be difficult to understand. At Kaiser Permanente Northern California (KPNC), we developed a smaller model and an easy-to-understand workflow of the data. We would like to share our learnings, including how to link treatment plans, orders, dispensing, and administration together; and our knowledge of how to find completed treatment plans, days and cycles. Methods: To demonstrate the method for pulling data, we will show a data diagram with linkages to the different Beacon Clarity tables and a sample SQL explaining some of the filters/business logic and why the linkage must be done a certain way.

Results: We hope users will find the information from KPNC’s experience useful, and that by the end of the presentation, users will gain a better understanding of how to pull chemotherapy infusion data from Clarity. We
also hope to save other sites from having to spend as much time doing the initial analysis work that KPNC did. **Conclusions:** For KPNC, pulling chemotherapy infusion data was eye-opening. The complexity of the data was significant, particularly linking the data from the initial “planned” treatments to orders, episodes, flowsheets, dispensing, mixing the medications, and finally to what is administered. Often times treatment plans were changed along the way due to chemotherapy reaction or toxicity, and linking the data back to the original plan was therefore complicated. We will review what we learned in this process with other users, so that they may benefit from KPNC’s experience.

**Keywords:** Chemotherapy Data; Infusion Data

**A4-4: Visualizing VDW Lab Results Data: Why You Should, and How You Can - Easily!**

Roy Pardee¹

¹Group Health

**Background/Aims:** One of the most difficult tasks facing the VDW lab results file implementer is figuring out which records from local lab data should be included in their VDW file, and which should be left out. These decisions frequently hinge on neat points of clinical science that are often outside the expertise of the programmer. We will describe a set of graphics that implementers can use to shed light on these decisions, useful during implementation, and afterwards as indication of data quality and even as documentation. **Methods:** SAS’ new Statistical Graphics procedures allow unprecedented control and ease of use in the creation of descriptive graphs and charts. The ODS Graphics Designer utility, paired with the SGDESIGN procedure make it easy to create a single image composed of multiple different graphs, each of which can use its own dataset. These tools allowed us to create something of a “data report card” for each VDW test type, depicting: (1) number of result records over time; (2) number of result values that are numeric vs. character, stratified by the local lab codes used; 3) distributions of numeric result values, by unit; (4) number of numeric result values, by unit and local lab code; (5) values of character results by local lab code. The report card is produced by a standard VDW program available from the author, which can be run at any VDW lab results-implementing site with access to SAS version 9.2 or greater. **Results:** The graphics produced by this program allow both implementers and end-users to evaluate at a glance, how cohesive the data from various different local codes are, how much data there is, how it waxes and wanes over time, whether the values are of the expected types, and whether units and character values are within valid values. Being able to depict all of this disparate information in a single, compact display allows users to glean insights that, for example, viewing series of larger graphs separately would not afford. **Conclusions:** The author has found this program an extremely useful tool in implementing VDW labs by quickly pinpointing misclassified local codes. Other sites surely will also.

**Keywords:** Graphics; Laboratory; SAS

**doi:** 10.3121/cmr.2013.1176.a4-3

**A4-3: Updates: The Heart and Vascular Health (HVH) Study Experience**

Updates: The Heart and Vascular Health (HVH) Study Experience

**Background/Aims:** Since the 1980s, the HVH study, run at Group Health Northwest, Marshfield, and HealthPartners Institute). This is because each dental procedure is related to a specific tooth and encounter and is very similar to the comparable VDW table. Where dental data starts to diverge from medical is the ‘Dental Diagnosis and Procedures’ table. This is because each dental procedure is related to a specific tooth and surface and can have its own diagnosis code. The ‘Provider’ table is similar to the medical VDW but with different provider specialties. **Conclusions:** The HMORN is working to create a Dental VDW within an existing Medical VDW that will support efforts to conduct research that crosses the divide that currently exists between medical and dental research. It will be a multi-directional system, allowing medical data within dental studies and dental data within medical studies.

**Keywords:** VDW; Medical VDW; Dental VDW

**doi:** 10.3121/cmr.2013.1176.ps3-10

**PS3-11: Beyond General Equivalency Mappings (GEMs): Understanding the Implications of ICD 10 in Research**

Rick Riordan¹

¹Kaiser Permanente Northern California

**Background/Aims:** With the implementation of ICD 10 CM and ICD 10 PCS less than two years away, there are still unanswered questions as to how research teams will effectively translate or use ICD 10 codes in research. Approximately 84% of the ICD 10 codes have only approximate matches with 10% having multiple matches and only 5% have exact one-to-one matches between ICD 9 and ICD 10. With the number of codes increasing five-fold, this offers additional opportunities and risks when pulling data. **Methods:** Besides looking at the General Equivalency Mappings and other tools that are used to translate ICD 9 codes to ICD 10 codes, we will examine some common research areas where only approximate matches between ICD 9 and ICD 10 exist. We will also discuss how the finer level of detail that ICD 10 gives allows research teams to pinpoint exactly what type of asthma, Crohn’s disease, and diabetic retinopathy they wish to study without including some of the other cases that do not meet their research criteria. **Results:** There are significant ambiguities and irregularity in several common areas such as diabetes, mental health, asthma, and gastroenterology due to approximate, multiple, or combination matches. Even in the case of exact matches such as an old myocardial infarction where there is an exact match, the definition of when a myocardial infarction becomes “old” is different. **Conclusions:** ICD 10 offers a finer level of detail and a higher level of specificity, thereby allowing research teams to be more targeted when pulling data. On the other hand, research teams need to exercise caution when using GEMs and other tools to translate ICD 9 codes into ICD 10 codes and vice versa, especially if they are looking at data that overlaps the implementation date of October 1, 2014. **Keywords:** ICD 10; Code; Coding

**doi:** 10.3121/cmr.2013.1176.ps3-11

**PS3-12: VDW Dashboards to Assure the Quality and Stability of Monthly Updates: The Heart and Vascular Health (HVH) Study Experience**

Dustin Key¹; Gene Hart¹; Nicholas Smith²; Susan Heckbert³; James Floyd³; Kerri Wiggins²; Bruce Patsy²

¹Group Health; ²University of Washington

**Background/Aims:** Since the 1980s, the HVH study, run at Group Health (GH) and University of Washington, has used computerized billing and hospital-discharge data to identify potential cases of myocardial infarction (MI). Recently, HVH adopted the local implementation of the VDW as a replacement for the legacy system. Monthly dashboards that compare the yields and subjects identified by the two systems were enacted to monitor the transition and assure comparable ascertainment over time. **Methods:**
Potential MI cases were identified monthly. Counts of MI diagnoses generated by the VDW were calculated with each system update. These were overlaid with prior VDW updates, as well as those generated by the legacy sources. Cohort eligibility criteria such as age, which make use of other data sources, were factored into the comparisons. Plans were made to compare new data to a running mean by the use of a dashboard. Unexpected and non-trivial divergence in the number of new cases identified by the two approaches will prompt additional investigation. Results: The dashboard was implemented in September and October of 2012. Counts for MI diagnostic codes appearing in each month starting in January 2004 were compared across the September and October runs. The two series were nearly coincident between these successive versions of the VDW for events ranging from 2004 through February 2012. The divergence that began in March 2012 and continued through August 2012 represented the expected new case volume. Additional dashboard plots confirmed that the distribution of new cases by event month was not due to missed events or to variance in other data sources such as enrollment, demographics, pharmacy, and opt-outs.

Conclusions: From the point of view of HVH, the dashboard monitors a transition between case-identification methods and assures comparability over time. From the point of view of GH, the dashboard also serves as a method of monitoring the quality of the VDW data updates and alerting the GH local VDW infrastructure team to warnings about unexpected deviations over time. This process can be expanded to monitor other major elements of the VDW and adopted as a local quality improvement effort.

Keywords: Dashboards; Quality Assurance; VDW

PS3-21:
Extracting Utilization Data from Clarity into VDW Using Oracle and SAS

Srivardhan Chimmula

1Kaiser Permanente Northern California

Background/Aims: The purpose of the presentation is to demonstrate how we use SAS and Oracle to load VDW_Utilization, VDW_DX, and VDW_PX tables from Clarity at the Kaiser Permanente Northern California (KPNC) Division of Research (DOR) site. Methods: DOR uses the best of Oracle PL/SQL and SAS capabilities in building Extract Transform and Load (ETL) processes. These processes extract patient encounter, diagnosis, and procedure data from Teradata-based Clarity. The data is then transformed to fit HMORN’s VDW definitions of the table. This data is then loaded into the Oracle-based VDW table on DOR’s research database and then finally a copy of the table is also created as a SAS dataset. Results: DOR builds robust and efficient ETL processes that refresh VDW Utilization table on a monthly basis processing millions of records/observations. The ETL processes have the capability to identify daily changes in Clarity and update the VDW tables on a daily basis. Conclusions: KPNC DOR combines the best of both Oracle and SAS worlds to build ETL processes that load the data into VDW Utilization tables efficiently.

Keywords: Virtual Data Warehouse; Utilization; ETL

doi:10.3121/cmr.2013.1176.ps3-21

PS3-22:
HMORN VDW Mortality QA: Evaluating Completeness and Consistency of Death and Cause of Death Data

Stephen Fortmann1; Jason Hermosillo2; Daniel Ng3; Tyler Ross4; Wei Tao1

1Kaiser Permanente Northwest; 2Kaiser Permanente Colorado; 3Kaiser Permanente Northern California; 4Group Health

Background/Aims: Patient mortality data is a critical component of health research data, especially where death is a clinical outcome of interest. Mortality data is also important for cohort selection and to avoid communications with families of deceased patients. The HMORN Virtual Data Warehouse (VDW) has a DEATH file and a CAUSE OF DEATH file that contain data on whether a patient is dead or alive, date of death, confidence of death status, and causes of death. VDW mortality data is synthesized from multiple sources, such as state death certificates, federal data, and health plan utilization and membership data. These sources are combined using complex, probabilistic algorithms. There is variation in both source data and the transformation logic used by sites. This poses potential challenges for researchers to derive accurate results from multi-site studies. Our aim is to measure the quality of VDW mortality data across HMORN sites, highlight areas of consistency and variation, report issues for remediation, and identify opportunities to improve data specifications and guidelines. Methods: A multi-site QA program was distributed to all HMORN sites by the VDW Mortality Ad Hoc Workgroup. Results were returned to the workgroup, which combined, analyzed, and reported the results. Results: 14 sites returned results for DEATH and 12 sites for CAUSE OF DEATH. The DEATH file had good overall data quality: 3 sites had minor issues related to missing values or duplicates. Records at 11 sites were checked for post-death patient activity and all sites scored 93% or better. There was significant variation in the CONFIDENCE and SOURCE variables, indicating potential areas for improvements to the specifications. The CAUSE OF DEATH file had mixed quality: 7 sites had issues related to missing values and disagreement with the DEATH file, but there was good agreement on the most common causes of death. Additional research is needed to understand the sources of variation in the data and to recommend specification improvements. Conclusions: The VDW DEATH and CAUSE OF DEATH files provide quality mortality data that satisfy a number of uses for multi-site studies. Improving the quality of VDW mortality data will require sustained effort by all HMORN sites.

Keywords: VDW; Mortality; Death

doi:10.3121/cmr.2013.1176.ps3-22

PS3-23:
VDW Data Source: Essentia Health

Paul Hitz1; Brian Johnson1; Jeremy Meier1; Bruce Washbotten1; Irina Haller1

1Essentia Health

Background/Aims: The Virtual Data Warehouse (VDW) was created as a mechanism to produce comparable data across sites for purposes of proposing and conducting research. The VDW is not a multi-site physical database at a centralized location, but a distributed ‘virtual’ database with the data remaining at the local sites. At the core of the VDW are a series of standardized file definitions. Content areas and data elements that are commonly required for research studies are identified, and data dictionaries are created for each of the content areas, specifying a common format for each of the elements - variable name, extended definition, code values. Local site programmers have mapped the data elements from their legacy data systems into this standardized set of variable definitions, names, and codes, as well as onto standardized SAS file formats. This common structure of the VDW files enables a SAS analyst at one site to write one program to extract and/or analyze data at all participating sites. Methods: This poster demonstrates the data sources used at Essentia Health (EH) for our local implementation of the VDW. Results: EH local implementation of the VDW contains detailed medical information on EH patients. These files contain details on 18.5 million unique medical encounters (2002-2012), 25.9 million diagnoses, and 37.7 million procedures. The VDW Enrollment file, which was created to define patient population engaged with EH, has 390,000 “enrollment” periods for 378,000 unique patients. The Demographics file has 2.4 million records. Conclusions: The EH VDW provides an easily employable unified central repository of data from available source files. This resource enables the sharing of compatible data in multi-site studies, and also improves programming efficiency, accuracy, and completeness for local single site studies by expending resources to link these legacy systems only once.

Keywords: Data Sources; Essentia VDW

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PS3-24: HMORN Sites: Organization Models and Their Data
Amy Butani1
1HealthPartners

**Background/Aims:** We aim to describe the various organization models across the HMORN and the resulting data. **Methods:** Each HMORN site has patients and/or insurance members. The data available for these two populations are different; the differences will be demonstrated. **Results:** The VDW has been designed to accommodate data for both member and patient populations. **Conclusions:** Understanding the data available for each population will help in designing studies, especially multi-site studies.

**Keywords:** HMO Model; Data; VDW

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PS3-27: Virtual Tumor Registry or Albatross
Rick Krajenta1
1Henry Ford Health System / Health Alliance Plan

**Background/Aims:** Creating a virtual tumor registry to function within the Cancer Research Network (CRN) enables us to identify tumors in our members. This is critical for performing cancer research for the CRN. Data standards and staging schema are defined by regulating agencies external to CRN and require all users to adhere to these standards. This establishes a gold standard for modeling our data structure that all participating plan sites should be able to achieve. **Methods:** Initial datasets were modeled from a commercial registry package. The vendor-provided data dictionary included variable names, formats, and length. The data dictionary also included whether the variable was required or optional, and if the data entry was system-provided or added with keyboard entry. Unfortunately, health plan-specific data characteristics were soon added and the virtual tumor registry began to diverge from the gold standard. It had been assumed that it was a static target (i.e., not requiring adjustment). However, the regulating agencies had changed the standards and a major revision was impending. To remain compliant with the gold standard, the tumor registry would need to be expanded to 117 variables and the data needs to be destroyed and rebuilt each time the data is refreshed. **Results:** Once expanded to 117 variables, we are having difficulties getting health plans re-synchronized with the data standards. We have developed some QA SAS code to investigate anomalous findings and return results to the health plan. **Conclusions:** The virtual tumor registry is the key dataset to allow the CRN to function as a cancer research consortium. It allows the identification of tumor diagnoses, tumor staging, initial cancer directed treatment and annual follow-up. Recent additions capture advanced testing including immunostains, nucleic acid polymorphisms or mutations, and other personalized prognostic molecular markers. The virtual tumor registry can be used for cancer research feasibility estimates, treatment modality identification, survival calculations and molecular marker studies.

**Keywords:** Tumor Registry; Database

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PS3-28: The Evolution of Tumor Standards and Its Effect on Observational Data
Jack Richter1; Lela McFarland1; Chu-Ling Yu1
1Kaiser Permanente Mid-Atlantic

**Background/Aims:** Quality information is essential to analyzing tumor data. Tumor data standards change over time, making it paramount to understand how the external standards affect the data. The changes, over time, can create artificial data quality issues that result in inaccurate conclusions and inhibit observational research. Improving the quality of data, information, and knowledge is foundational to utilizing the VDW Tumor data for cancer research. The challenges associated with maintaining high quality data in the VDW Tumor data requires a clear understanding of the various data content standards that have historically affected these data. As experts on their tumor data, tumor researchers need to understand and identify which data content standards affect their data. They also need to know how the data standards were implemented and managed in their systems as well as in the standards world of tumor data. **Methods:** We gathered information from the tumor standards agencies and compiled into one document. We then evaluated each change in the standards for its potential impact on VDW Tumor data elements. **Results:** We developed a timeline/calendar view to show the version changes implemented, by date for each standard. For each version change, a callout contains a table with the VDW Tumor data elements that were impacted and a description of the impact. **Conclusions:** VDW Tumor data content is impacted by various standards, and when utilizing and loading this data, they must be taken into account. This presentation provides a guideline of the changes over time that can be used when accessing or loading VDW Tumor data.

**Keywords:** Tumor; Data; VDW