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P1.01
Multimorbidity Profile of Urologic Patients in a Large, Integrated Healthcare Delivery System

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Background: Two-thirds of urologic surgeries are performed in patients over 65 years. As the American population ages, urologists are faced with increasingly complex older adults with multimorbidity. Our objective was to describe the multimorbidity profile of urologic patients in a large, integrated healthcare delivery system. We hypothesized that urologic patients are older and have more chronic conditions than the general primary care population.
Methods: We identified all Geisinger Health System (GHS) primary care patients from 2001 to 2015 and the subset that had at least one outpatient encounter in the urology department. The AHRQ Clinical Classifications Software tool was applied to identify prevalent conditions based on diagnosis codes attached to outpatient visits, lab and pharmacy orders, and procedures.
Results: We identified 390,271 GHS primary care patients and 33,085 had at least 1 urology outpatient visit (8.5%). Compared to the general GHS population, urology patients tended to be older (mean age 48 years vs. 61 years). Urology patients had a mean of 7 chronic conditions. The 5 most common conditions were: hypertension, hyperlipidemia, prostate disorders, GERD, and other. The poster will include comparisons of urology population condition profiles to the GHS primary care population. We will also include chronic condition profiles by urologic condition.
Conclusion: Urologic patients were older compared to the general GHS primary care population and had significant numbers of chronic conditions. Multimorbidity profiles in the urologic population may be used to inform future efforts toward surgical prognostication and decision-making.

Keywords: Rural Health, Aging/Elderly/Geriatrics, Demographics, Geriatrics, Complex Disease Management / Multiple Chronic Conditions, Chronic Disease, Epidemiology

P1.02
Outcomes of an Embedded Resource and Education Program for Patients and Families with Memory Loss

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Background: Patients with a new diagnosis of memory loss or dementia and their families typically wait 2 years before connecting to and utilizing community resources. Lack of education and support frequently results in crisis-driven care and hospitalization for patients, as well as care-related strain, depression, and other negative outcomes for caregivers. Memory PREP (Patient Resource & Education Program) is a 4-month embedded program for patients with dementia and their families that involves meeting with a social worker in person or by phone to cover a curriculum of disease education, support, and connection to community resources.
Methods: Patients and their care partners (dyads, n=90) were recruited from two sources: physician referral from HealthPartners Center for Memory & Aging and through a mailing to patients throughout our care delivery system that were identified to have a new diagnosis code of dementia in their electronic health record. The intervention consisted of 5 encounters with a masters level, specialty trained social worker and randomization to either phone-only or 2 in-person plus 3 phone visits. The intervention curriculum was similar and ad hoc phone support was available to both groups. Outcomes were evaluated at baseline, after program completion (4 months) and at 8 months and included disease knowledge, mood, social support, health, stress, caregiver burden, and quality of life. Changes from baseline were assessed using paired t-tests; ANOVA was used for comparisons.
Results: The Memory PREP program significantly increased care-partner's knowledge of Alzheimer's disease, emotional support, and completion of care planning (e.g., power of attorney, driving and safety plans, and use of support groups). The program was equally effective when administered by phone as it was when administered in-person. The program received strong positive feedback from participants, especially care-partners and family members. Ninety-three percent of participants were likely to recommend the program to others.
Conclusion: Health care providers are struggling to meet the needs of patients and families facing dementia. Education and support are an important part of the care plan that is often outsourced to community partners. This embedded program led to increased knowledge, feelings of support, and completion of important safety and planning actions. Delivery of this program by phone may be a useful option to reduce barriers of access.

Keywords: Aging/Elderly/Geriatrics, Communication between Patients and Providers, Ambulatory/Outpatient Care, Geriatrics, Complex Disease Management / Multiple Chronic Conditions, Chronic Disease

P1.03
Proportions of Patient Centered Outcomes and Utilization Attributable to Chronic Conditions Among Adults with Asthma and/or Chronic Obstructive Pulmonary Disease

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Background: Patients with chronic obstructive pulmonary disease (COPD) often have multiple chronic conditions. It has not been

previously investigated what proportions of patient-centered outcomes and healthcare utilization can be attributed to individual chronic conditions that concurrently manifest among patients with either asthma, COPD, or both.
Methods: Using data from rounds 1 -3 from the cohorts initiated in years 2008 - 2012 of the Medical Expenditure Panel Survey (MEPS), we evaluated all patients 40 years and older who had been told by a doctor that they currently had either asthma, chronic bronchitis, or emphysema. The total sample size was 3486 patients and data recorded at round 1 (baseline) were used as explanatory variables for occurrence of each of the seven dichotomous outcomes over a one year period corresponding to the time between rounds 1 and 3. Based on multivariable logistic regression, the average attributable fractions (AAFs) for 12 distinct chronic conditions were calculated for 3 patient-centered outcomes and 4 healthcare utilization outcomes. The twelve conditions were as follows: angina, asthma,cancer, CHF, cognitive decline, COPD, diabetes, high blood pressure, lung cancer, myocardial infarction, and stroke. The three patient-centered outcomes were: seven or more disability days, incident mobility, and incident worsening in perceived health. The four utilization outcomes were the following: any ER visit, any hospitalization, any outpatient visit, and respiratory hospitalization.
Results: Outcome Models; The models of the seven outcomes exhibited fair to good discrimination (C statistics between 66% and 76%) and calibration ranging from poor to excellent (Hosmer-Lemeshow p-values from 0.01 to 0.84). Patient Centered Outcomes: The 12 conditions collectively explained the great majority of each of these outcomes. Presented immediately below are the sum of the AAFs from all 12 conditions followed by the four conditions, in descending order, that yielded the largest AAFs of each outcome. Seven or More Disability Days (sum of AAFs = 77.8%) arthritis 24.2% COPD 18.3% Cognitive Decline 13.9% Asthma 8.4% Incident Mobility (sum of AAFs = 72.1%) arthritis 29.5% COPD 10.4% Asthma 10.4% High Blood Pressure 6.4% Incident Worsening of Perceived Health (sum of AAFs = 68%) COPD 21.3% arthritis 15.4% High Blood Pressure 9.4% Asthma 6.8% Utilization Outcomes: The 12 conditions collectively explained somewhere between a small fraction through a minority of each utlization outcome. Any ER Visit (sum of AAFs = 17.7%) COPD 4.4% High Blood Pressure 3.0% arthritis 2.6% Cognitive Decline 2.5% Any Hospitalization (sum of AAFs = 15.6%) COPD 4.3% arthritis 3.0% Diabetes 2.1% High Blood Pressure 2.1% Any Outpatient Visit (sum of AAFs = 35%) arthritis 12.8% High Blood Pressure 6.1% Asthma 3.9% Cancer 3.3% Respiratory Hospitalization (sum of AAFs = 5%) COPD 4.0% Diabetes 1.0%
Conclusion: Despite largely similar performance of the underlying multivariable logistic models, the twelve chronic conditions explained a much greater share of the overall occurrence of the patient centered outcomes than for the utilization outcomes. In the patient-centered domain, from among the twelve conditions, arthritis, COPD, and asthma consistently account for substantive proportions of outcome events.

Keywords: Chronic Disease, Biostatistics, Patient Reported Outcomes / Functional Status, Epidemiology

P1.04
Age and Sex Differences in the Magnitude of, and Hospital Death Rates Associated With, Multiple Chronic Conditions in Older Adults Hospitalized with Acute Myocardial Infarction

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Background: Despite the high prevalence of accompanying multimorbidity in older patients hospitalized with acute myocardial infarction (AMI), there are limited data available describing the burden of multimorbidity in different age strata of elderly men and women. The objectives of this study were to examine age and sex specific differences in the frequency and impact of multimorbidity on short-term outcomes in older persons hospitalized with AMI.
Methods: The study population consisted of 3,973 patients hospitalized with AMI on a biennial basis at the 11 medical centers in Worcester, Massachusetts, between 2001 and 2011.
Results: The mean age of this population was 78 years and almost half were men. In the younger older group (65-74 years), one in five women versus one in four men presented five or more of the 11 chronic conditions examined. The proportion of “younger” older women receiving evidence- based in-hospital medications and cardiac interventions was significantly lower as compared with men in the same age group Among older old patients (>75 years), men were more likely to be diagnosed with a NSTEMI and presented with a higher prevalence of chronic conditions as compared with similarly aged women. Similar proportion of men and women in the older old group received evidence- based in-hospital medications. A higher prevalence of multimorbidity was significantly associated with a greater risk of dying during the index hospitalization among younger older patients, but not in the older old groups.
Conclusion: The prevalence of multimorbidity in persons hospitalized with an AMI is significant, and highly associated with the risk of dying in younger men and women. Our findings highlight the importance of screening for these chronic conditions in older patients hospitalized with AMI.

Keywords: Cardiovascular Disease, Aging/Elderly/Geriatrics, Chronic Disease

P1.05

Research Priorities to Advance the Science of Multiple Chronic Conditions in Older Adults from the AGING Initiative Steering & Advisory Committees

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Background: There is an increasing recognition of the substantial gaps in knowledge that exist surrounding the health and healthcare of older adults with multiple chronic conditions (MCCs). A survey was developed to rank and prioritize research topics relevant to advancing the science of multimorbidity in the geriatric population.
Methods: A web-based survey was developed containing 37 topics organized into 11 domains. Topics were gathered from white papers, grant announcements, or funded research projects relating to older adults that included the terms MCCs, multimorbidity, and/or comorbidity. The search included 2010-2015 and employed the PubMed database, and the websites of AHRQ, PCORI, NIH, National Academy of Medicine, and Google Scholar.
Results: Of the 366 respondents to the survey, 37% were investigators affiliated with the Health Care System Research Network, 25% were affiliated with The Claude D. Pepper Older Americans Independence Centers, 22% were affiliated with academic health centers, 5% were affiliated with the Veterans Affairs system, 5% were affiliated with federal agencies, 1% were affiliated with the Patient-Centered Outcomes Research Institute, and 4% were affiliated with other organizations. Based on top-two box methodology, the top 10 research topics were: interactions between medications, disease processes, and health outcomes in older adults with MCCs; health related quality of life in older adults with MCCs; assessment tools in older adults with MCCs(e.g. to assess symptom burden, quality of life, function, etc.); shared decision-making to enhance care planning in older adults with MCCs; disability in older adults with MCCs; symptom burden in older adults with MCCs; tools to improve clinical decision making in older adults with MCCs; the role of the caregiver in caring for older adults with MCCs; self-management interventions in older adults with MCCs; and management of pain or other symptoms in older adults with MCCs.
Conclusion: Our findings are complementary to prior efforts to create a coherent and comprehensive research agenda to address the complex challenges facing these “high-need, high-cost” populations of older adults, and the healthcare systems struggling to serve them. Future efforts should incorporate the views of patients, caregivers, and other stakeholders to validate and broaden this important research agenda in this growing population.

Keywords: Aging/Elderly/Geriatrics, Quality of Life, Survey Research and Methods, Quality of Care, Disability, Geriatrics, Health Care Organizations, Complex Disease Management / Multiple Chronic Conditions, Chronic Disease, Patient Reported Outcomes / Functional Status

P1.06

Obesity, Falls and Hip Fractures Among Nursing Home Residents

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To examine the association between obesity status and the occurrence of falls and hip fracture among newly admitted nursing home residents.
Design: A cohort study of newly admitted nursing home residents using national data from 2006-2010.
Setting: US nursing homes Measurements: Using the Minimum Data Set, we determined the occurrence falls and hip fracture among newly admitted nursing home residents based on information available from the first quarterly assessment, and according to obesity status. Residents were categorized as normal-to-overweight (18.5≤BMI<30), mildly obese (30≤BMI<35), and severely obese (BMI>35).
Results: Among newly admitted nursing home residents, 55.1% of non-obese residents, 50.4% of mildly obese residents, and 44.0% of severely obese residents experienced a fall. We also found that 6.9% of non-obese residents, 4.4% of mildly obese residents, and 2.9% of severely obese residents experienced a hip fracture. After adjustment for resident-level and facility-level characteristics, mildly obese residents were 8% (OR=0.92 (95% CI, 0.91-0.93)), and severely obese residents were 16% (OR=0.84 (95% CI, 0.83-0.85)) less likely to experience a fall compared with non-obese residents. Mildly obese residents were 20% (OR=0.80 (0.78-0.83)), and severely obese residents 29% (OR=0.71 (0.68-0.74)) less likely to experience a hip fracture compared with non-obese residents.
Conclusion: Obesity is associated with reduced risk for falls and hip fracture among nursing home residents. Future studies are needed to examine the reasons for the associations noted and to better understand the implications for care of obese nursing home residents.

P2.01
Lung Cancer Screening: A Qualitative Study Exploring the Decision to Opt Out of Screening

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Background: Lung cancer screening with annual low-dose computed tomography is relatively new for long-term smokers in the U.S. supported by a US Preventive Services Task Force Grade B recommendation. As lung cancer screening programs are more widely implemented and providers engage patients about screening, it is critical to understand what influences a patient's decision to screen, or not, for lung cancer. Understanding lung cancer screening behavior among high-risk smokers who opt out provides insight, from the patient perspective, about the shared decision-making process for lung cancer screening. The purpose was to explore screening-eligible patients' decision to opt out of lung cancer screening after receiving a provider recommendation. This knowledge will inform intervention development to enhance shared decision-making processes between long-term smokers and their providers and decrease decisional conflict about lung cancer screening.
Methods: Semi-structured qualitative telephone interviews were performed with 18 lung screening-eligible men and women who were members of an integrated, mixed model healthcare system in Seattle about their decision to opt out of lung cancer screening. Participants met lung cancer screening criteria for age, smoking and pack-year history. Audio-recorded interviews were transcribed verbatim. Two researchers with cancer screening and qualitative methodology expertise conducted data analysis using thematic content analytic procedures.
Results: Participant mean age was 66 years (SD 6.5). Majority were female (61%), Caucasian (83%), current smokers (61%). Five themes emerged: 1) Knowledge Avoidance; 2) Perceived Low Value; 3) False Positive Worry; 4) Practical Barriers; and 5) Patient Misunderstanding.
Conclusion: Many screening-eligible, smokers opt out of lung cancer screening. The participants in our study provided new insights into why some patients make this choice. While there are known drawbacks to lung cancer screening, and it is not necessarily the best option for everyone who is eligible, it is known to be effective in early lung cancer detection among high-risk patients. Understanding why people decide not to screen will enhance future efforts to improve knowledge transfer from providers to patients about the risks and benefits of lung cancer screening and ultimately enhance shared decision-making about lung cancer screening.

Keywords: Cancer, Primary Care, Communication between Patients and Providers, Qualitative Research

P2.02
Incidental Thyroid Nodules: a Radiologic Epidemic

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Background: The incidence of well-differentiated thyroid cancer has risen dramatically over the last several decades. One proposed explanation for this is the rapid growth in utilization of different radiology studies, which have resulted in large numbers of incidentally identified thyroid nodules. The objectives were to: (1) Determine, at our institution, the incidence of incidentally identified thyroid nodules requiring fine needle aspiration, (2) describe the imaging modality and indication for these incidentally identified nodules, and (3) assess the outcomes including surgical rates among these nodules.
Methods: A retrospective review was performed of all patients who underwent FNAs of thyroid nodules, between January 2006 and December 2010, by the Endocrinology division at a large, academic medical center. Medical records were reviewed to identify whether the biopsied thyroid nodule was discovered incidentally through non-thyroid related imaging or whether it was identified by palpation by patient or physician. Demographic, radiological, surgical, and pathological data were assessed.
Results: FNAs were performed on 2,296 total thyroid nodules and 1,794 patients. Twenty-four percent (n=431) of patients underwent a biopsy for incidentally identified nodules. The most common indications documented for the initial imaging that resulted in an incidental finding of a nodule were neck pain (32.4%), non-thyroid cancer workup (26%), and evaluation for pulmonary embolus (12.8%). Chest CT, MRI of the spine or neck, and CT of the neck were the most common imaging modalities that led to thyroid incidentalomas (29.2%, 19.9%, and 16.1%, respectively). Rates of surgery and identification of cancer did not differ significantly based on the modality or indication for imaging.
Conclusion: In this study, nearly a quarter of patients undergoing FNA had their thyroid nodule identified incidentally on imaging. With the continued proliferation of radiology studies this flood of thyroid nodule incidentalomas is likely to continue to expand.

Keywords: Cancer, Ambulatory/Outpatient Care, Clinical Practice Patterns / Guidelines, Racial/Ethnic Differences in Health and Health Care

P2.03
Diabetes treatment and risks of adverse breast cancer outcomes among elderly breast cancer patients: A SEER-Medicare analysis

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Background: Metformin, a first line diabetes treatment, is hypothesized to lower the risk of incident breast cancer, but it is unclear whether metformin or other anti-diabetic medications influence the likelihood of adverse breast cancer outcomes.
Methods: A retrospective cohort study was conducted using the linked Surveillance, Epidemiology and End-Results (SEER)-Medicare database. Diabetic and nondiabetic women were included if they were aged 66-80 years, newly diagnosed with stage I or II breast cancer, and enrolled in Medicare Parts A, B and D during 2007-2011. Information on filled diabetes related prescription medications was obtained from Medicare Part D claims data. Our primary outcomes of interest were a second breast cancer event and breast-cancer specific mortality. Time varying Cox proportional hazard models were used to estimate hazard ratios (HRs) and their associated 95% confidence intervals (CIs).
Results: Among 14,766 women included in the study, 791 were identified as having had a second breast cancer event, 627 had a recurrence, and 237 died from breast cancer. Use of metformin after breast cancer (n=2,558, 17.3%) was associated with 28% (HR: 0.72, 95% CI: 0.57-0.92), 31% (HR: 0.69, 95% CI: 0.53-0.90), and 49% (HR: 0.51, 95% CI: 0.33-0.78) lower risks of a second breast cancer event, breast cancer recurrence, and breast cancer death, respectively, compared to metformin nonusers. Use of sulfonylureas (n=1,701, 11.5%) was associated with 1.49 (95% CI: 1.00-2.23) higher risk of breast cancer death. A 2.58-fold higher risk (95%CI: 1.72-3.90) of breast cancer death was also seen among insulin users (n=1,099, 7.4%). In assessing potential confounding by indication, similar patterns were observed in analyses restricted to pharmacologically-treated diabetic patients.
Conclusion: We observed variation in the relationship between different diabetes medications and risk of adverse breast cancer outcomes, with metformin associated with reduced risks and sulfonylureas and insulin with increased risks. Pending confirmation of these results, metformin may be a preferred treatment for diabetes among breast cancer survivors, and further research examining its benefits among non-diabetic patients may be warranted.

Keywords: Cancer, Pharmacy, Medicare

P2.04
Reasons for Never and Intermittent Completion of Colorectal Cancer Screening after Receiving Multiple Rounds of Mailed Fecal Tests

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Background: Long-term adherence to colorectal cancer (CRC) screening is particularly important for fecal testing. As few as a quarter of patients repeat fecal testing the next year in some U.S. settings. The purpose of this qualitative study was to identify barriers and facilitators reported by patients with suboptimal screening adherence to refine interventions for ongoing adherence to CRC screening. We also explored whether participants, particularly never screeners, would be willing to do a CRC screening blood test.
Methods: 41 patients who previously enrolled in the Systems of Support to Increase CRC Screening (SOS) trial were interviewed 4-5 years later. Participants were purposively selected to include men and women with diverse race/ethnicities who had either been inconsistent screeners or had never screened during the first 3 years of SOS despite receiving at least 2 rounds of mailed fecal tests. Two interviewers conducted an approximately 30-minute telephone interview using a semi-structured interview guide. An iterative thematic analysis approach was used.
Results: Barriers were more pervasive among never-screeners: (1) Avoidance (2) Aversion to stool (3) Health concerns (4) Fear. Facilitators were more often mentioned by repeat-screeners: (1) The simpler 1-sample test (2) Mailings and testing at home convenience (3) Prevention (4) Social influence. Participants had diverse preferences for types (phone, mail) with some not preferring e-mail links to the EHR. A nurse not from their clinic calling was acceptable if they were knowledgeable about their records and could communicate with their physician. Participants, especially never-screeners, were enthusiastic about a screening blood test.
Conclusion: Future CRC screening programs should be designed to minimize these barriers and maximize facilitators to improve long-term screening adherence.

Keywords: Cancer, Qualitative Research, Patient Experience / Satisfaction

P2.05
Systems of Support to Increase Colorectal Cancer (CRC) Screening - A Randomized Trial to Increase Long-Term Adherence to CRC Screening: Time in Compliance Over 5 Years

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Background: Importance: Colorectal cancer (CRC) is the second-leading cause of cancer deaths. Morbidity and mortality could be rapidly reduced through higher uptake and adherence to CRC screening. Information on longer-term screening adherence comes from organized programs that lack a comparison group. Objective: Systems of Support to Increase Colorectal Cancer Screening and Follow-Up (SOS) (grant number) is an ongoing trial testing a centralized mailed and phone-based program to increase long-term CRC screening adherence. We hypothesized that compared to usual care intervention-arm patients would have more time in compliance with CRC screening guidelines over 5 years.
Methods: Design: Individual randomized-controlled trial. Setting: Integrated healthcare organization in Washington State. Usual care included patient-centered medical home and clinic-based interventions to increase CRC screening. Participants: 4675 individuals initially aged 50-74, without CRC or first-degree relative with CRC before age 60, no inflammatory bowel disease, no life-limiting disease, and not current for CRC screening. All participants contributed data, but were censored at disenrollment, death, age 76, or diagnosis of CRC. Interventions: Included a mailed pamphlet on CRC screening choices, a call-in number if colonoscopy was preferred, and mailed fecal tests for those not choosing colonoscopy. Patients were randomly assigned in years 1 and 2 to receive this only, this plus brief telephone assistance, or both mailings and assistance and nurse navigation for those still unscreened. In year 3 intervention group participants still CRC screening-eligible were randomized to stopped or continued mailed interventions in years 3 and 5. Primary outcome: A-priori primary outcome: the percent of time covered for CRC screening testing over 5 years (2008-2014). Screening tests contributed covered time based on national guidelines for screening intervals (fecal tests annually, sigmoidoscopy 5 years, colonoscopy 10 years). All participants contributed data, but were censored at disenrollment, death, age 76, or diagnosis of CRC.
Results: Results: On average over 5 years, intervention participants had 224 more days of “covered time” or 31% more time not in need of CRC testing (rate ratio, weighted for exposure time and adjusted relative risk 1.31 (1.25, 1.37). Fecal testing was responsible for almost all additional covered time.
Conclusion: An organized mail and phone program led to increased CRC screening adherence over 5 years, mainly because of regular fecal testing uptake.

Keywords: Cancer, Health Promotion / Prevention / Screening, Clinical Trials

P2.06
A Cost-Effectiveness Analysis of an Adenocarcinoma Risk Prediction Biomarker Test for Patients with Barrett’s Esophagus

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Background: Current surveillance guidelines for identifying patients with Barrett’s Esophagus (BE) at high risk of progressing to esophageal adenocarcinoma (EAC) are considered inefficient since less than 1% of all BE patients are likely to develop EAC. A new tissue systems pathology risk prediction test (RPT) stratifies BE patients by their risk of progression to high grade dysplasia (HGD) or EAC by assigning them to low, intermediate or high risk categories based on an individualized risk score. These categories can be used to guide endoscopic surveillance and treatment decisions. This study evaluates the cost-effectiveness of this new RPT versus the current standard of care (SOC) for surveillance and treatment of BE.
Methods: Decision analysis with Markov modeling and simulation were used to compare cost and quality-adjusted life-years (QALYs) from the perspective of a U.S. health insurer with care delivered by an integrated health system. Model assumptions and disease progression probabilities were derived from the literature. Performance metrics for the RPT were from an independent clinical validation study. Cost of the RPT was based on reimbursement rates from multiple payers. Other costs were derived from Geisinger payment data.
Results: Base-case results of a 5-year model indicated an incremental cost-effectiveness ratio (ICER) of the RPT compared to the SOC of $50,181/QALY in 2012 U.S. dollars. RPT versus SOC total surveillance endoscopies over the 5-year period were 17.6% lower and endoscopic treatments (radiofrequency ablation--RFA or RFA/endoscopic mucosal resection) were 64.7% higher. The RPT also reduced the number of cases of HGD, EAC and EAC-related deaths by 55.1%, 49.6%, and 37.1%, respectively. Sensitivity analysis indicated that the probability of the RPT being cost-effective compared to the SOC was 56.4% at the $100,000 /QALY acceptability threshold. The following changes in the model variables can make the RPT more cost-effective: higher BE to EAC progression rate, lower RPT cost, higher endoscopy cost, lower EAC utility, and higher physician RPT adherence/use.
Conclusion: The new RPT is cost-effective after 5 years and improves patient outcomes due to improving the effectiveness of surveillance and treatment protocols resulting in fewer patients transitioning to HGD, EAC and death.

Keywords: Cancer, Clinical Decision Making, Health Care Costs / Resource Use, Economic Studies

P2.07
Can Thyroid Cancer Overdiagnosis, Overtreatment and Costs be Reduced by Following Guidelines?

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Background: There is worldwide consensus on an alarming increase in overdiagnosis and overtreatment of papillary thyroid cancer in recent decades mostly attributable to increased screening with more advanced diagnostic technology (e.g., ultrasound, CT, and MRI) detecting small papillary nodules. In 2009 evidence-based guidelines by the American Thyroid Association recommended against routine fine needle aspiration (FNA) for unsuspicious papillary nodules < 1 centimeter. The purpose of this study is to compare the change in the ratio of patients with thyroid cancer to all patients with thyroid nodules before and after the issuance of the 2009 guidelines as well as to provide national healthcare cost estimates.
Methods: The hypothesis is adherence to evidence-based guidelines targeting inappropriate testing of small nodules which are highly prevalent in the general population and are mostly benign (~80%) will be effective at reducing overdiagnosis of thyroid cancer without significant harm to patients with malignant nodules (~20%) which can be tested and treated when they are larger. We use the Medical Expenditure Panel Survey (MEPS) which provides annual nationally representative cross-sectional data on respondents' health service utilization as well as the cost of these services. Binary variables will be used to denote the presence of thyroid nodules and thyroid cancer in adults based on 3-digit ICD-9-CM diagnosis condition codes.
Results: MEPS data estimates will be used to compare the difference in the proportion of respondents with thyroid cancer to thyroid nodules before and after the issuance of the 2009 guidelines and measure the cost of thyroid nodules over the recent 10-year period 2005-2014 by using generalized linear models with a log-link function on total, inpatient, outpatient, and prescription medication healthcare expenditures.
Conclusion: The results of this analysis will contribute additional information to the growing body of evidence on overdiagnosis and overtreatment as well as the financial burden of thyroid cancer in the U.S. It highlights the need for further study using detailed medical record data inclusive of nodule size and diagnostic procedures to determine the extent of guideline adherence and whether better adherence would effectively address a substantial portion of the overdiagnosis and overtreatment problem.

Keywords: Cancer, Clinical Practice Patterns / Guidelines, Health Care Costs / Resource Use

P2.08
External validity of electronic health record studies of cancer patients

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Background: Electronic health records (EHRs) from academic and community based health care systems are increasingly used for epidemiologic and health services research. The external validity of study findings is often unreported, and some question the representativeness of the patient population. We evaluate the generalizability of Sutter Health cancer patients and potential bias in cancer research based on available EHR data.
Methods: We linked the patient population of Sutter Health, a large multispecialty health care delivery system in Northern California, with the statewide, population-based California Cancer Registry and compared the distributions of demographic, socioeconomic, and cancer characteristics for two groups: 1) all Sutter Health members diagnosed with cancer in 2012-2013 and 2) all cancer patients in the 17-county Sutter Health catchment region for the same period. To evaluate potential bias of EHR data, a validation study was conducted to additionally compare those characteristics among Sutter patients who had cancer-related charges or encounter on in the Sutter EHR system with the catchment region, also for 2012 and 2013.
Results: 43.1% (N=69,344) of cancer patients diagnosed between 2012 and 2013 in the catchment region were Sutter patients. Compared with all regional cancer patients, Sutter's population had proportionally more non-Hispanic Whites (70.5% vs. 65.2%); slightly more breast cancer patients (32.9% vs. 29.6%); were more likely have Medicare (37.2% vs. 28.0%), but they were similar in terms of age, gender, socioeconomic status, tumor stage and treatment types. Our validation study showed that 28.5% of (N=69,344) cancers diagnosed during 2012-2013 in the catchment area were Sutter patients with EHR information available. These Sutter patients with EHR information have more comparable distributions to the underlying cancer patient population with the exceptions in payer source, where they were more likely to pay with Medicare (38.8% vs 28.8%), and race/ethnicity distribution as they represented more non-Hispanic Whites (71.1% vs. 65.2%).
Conclusion: Research based on EHRs from single or integrated healthcare systems have unknown generalizability. We found that cancer patients from Sutter health system are generally representative of the underlying population, thus, cancer research based on Sutter EHR data can provide good external validity, while minimizing potential biases.

Keywords: Cancer, Observational Studies, Demographics, Racial/Ethnic Differences in Health and Health Care, Epidemiology

P2.09

Establishing a population-based cohort of non-muscle invasive bladder cancer cases to improve care by enhancing surveillance and risk-stratification

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Background: Among the ~75% of bladder cancer patients who present with superficial (stage
Methods: We are developing a risk-assessment tool using a population-based cohort from Kaiser Permanente Northwest (KPNW). The cohort includes all superficial bladder cancer cases diagnosed and treated at KPNW from 1990-2014. Data from tumor registry, pathology, and health plan membership files comprise our database. We conducted in-depth interviews with eight urologists in a variety of practice settings to idenfity use cases for improving clinical care through personalized risk-assessment. Our analysis describes key characteristics of our cohort as well as stakeholder suggestions for how a risk-calculator could enhance care.
Results: We identified 2131 cases of superficial bladder cancer. The population had a median of 2.0 pathology records per case, ranging up to 24 records, with 95% of cases having 6 or fewer records. Over half of the population did not have a recurrence or progression of bladder cancer during follow up. Overall, 86% of pathology reports per case reported positive bladder cancer findings. Stakeholder interviews with urologists identified numerous use cases for personalized risk calculations of recurrence and progression. These included: enhancing patient communication and documentation about recurrence/progression; providing guidance about when to discontinue or reduce surveillance for very low-risk patients; idenfitying and creating scheduling and call-back supports for patients who have high priority for follow up cystoscopy; and contexualizing bladder cancer mortality risk in the context of competing comorbid conditions. Urologists in general practice reported different use preferences than urologic oncologists.
Conclusion: By interviewing a variety of clinicians, we have identified a range of clinical decision support and patient education uses for a personalized risk-calculator for bladder cancer surveillance based on a large population-based cohort reflecting “real world” practice.

Keywords: Cancer, Communication between Patients and Providers, Engagement of Stakeholders, Clinical Decision Making, Risk Adjustment for Clinical Outcomes, Epidemiology

P2.10

Patterns of repeat colorectal cancer screening and follow-up of abnormal results in an integrated safety-net healthcare system

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Background: Colorectal cancer (CRC) screening with stool-based tests, including fecal immunochemical test (FIT), can reduce CRC mortality if patients with normal test results are repeated annually and those with abnormal results receive timely follow-up with colonoscopy. However, most studies focus on one discrete step rather than longitudinal adherence to screening (i.e., undergoing repeat screening and timely follow-up). We examined patterns of repeat CRC screening and follow-up of abnormal results over a four-year period at Parkland Health & Hospital System, a large, integrated safety-net healthcare system in Dallas County, TX.
Methods: Eligible patients were age 50—60 years, completed an index FIT between January 1, 2010 and December 31, 2010, and were followed through the end of the study period in 2014. Patients with a history of CRC, colectomy, or prior CRC screening with colonoscopy or sigmoidoscopy were excluded. We defined longitudinal adherence as a composite outcome of: 1) FIT screening with normal results in each calendar year; 2) crossover to endoscopy screening after one or more normal FITs; or 3) colonoscopy within 180 days following abnormal FIT. We also characterized inconsistent screening as being up-to-date with screening in none, one, two, or three out of four possible calendar years.
Results: A total of 4,826 patients were included in the analysis. Most were Hispanic (41.1%) or non-Hispanic black (38.1%), female (65.1%), and uninsured or receiving medical assistance/charity insurance (80.2%). Across the study period, 834 (17.3%) showed longitudinal adherence by completing repeat, on-schedule screening with some combination of FIT and endoscopy. Some (n=940, 19.5%) patients completed endoscopy after one or more normal FITs, and 367 (7.6%) had an abnormal FIT result at some point during the study period. A decreasing proportion of patients were up-to-date with screening recommendations in one (n=1,740, 36.1%), two (n=1,221, 25.3%), or three (n=973, 20.2%) out of four calendar years.
Conclusion: Less than 20% of patients in a safety-net healthcare system show longitudinal adherence to the CRC screening process, which may reduce the effectiveness of screening. Efforts to improve timely receipt of repeat FIT and follow-up colonoscopy after abnormal FIT may increase the proportion of minority and low-income patients up-to-date with ongoing screening.

Keywords: Cancer, Racial/Ethnic Differences in Health and Health Care, Health Promotion / Prevention / Screening

P2.11
Predictors of colorectal cancer screening prior to implementation of a large pragmatic trial in federally qualified healthcare centers

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Background: Colorectal cancer (CRC) screening can prevent unnecessary cancer deaths. Federally qualified healthcare centers (FQHCs) serve a unique patient population that often is not screened. Knowing who in the FQHC environment is getting screened via fecal testing (FIT/FOBT) and via colonoscopy can assist in tailoring intervention to raise rates of CRC screening.
Methods: As part of the STOP CRC study, we examined the associations among patient-level and neighborhood-level characteristics and being up to date with colorectal cancer screening guidelines (i.e., having had a fecal test in the past year or having had a colonoscopy in the past 10 years). We also examined associations between these factors and being screened with a fecal test only. We derived neighborhood-level characteristics by linking census data to zip code information obtained from the electronic health record. We used logistic regression, adjusted for clustering at the health center level, to calculate our associations.
Results: We observed a steady rise in CRC screening rates from 2010-2015 (17.7%-46.8%). In adjusted analysis, factors associated with being up to date with CRC screening overall were: being older, having health insurance, having prior office or emergency room visits, and having other preventive screenings. Among patients who were up to date with CRC screening, factors associated with use of fecal testing were: being younger, speaking a non-English language, being uninsured, having prior office visits, having had a flu shot in past year, and living in a neighborhood with higher unemployment.
Conclusion: Encounter-level variables—such as insurance status, number of office visits in the past year, types of chronic health conditions, and other screenings– were most often associated with predicting CRC screening, and FIT/FOBT use was more common among typically underscreened populations. Our findings may inform clinic-based effort to raise rates of CRC screening, especially in the community clinic setting.

Keywords: Cancer, Demographics, Racial/Ethnic Differences in Health and Health Care, Social Determinants of Health

P2.12
Adolescent and Young Adult Cancer Data in the Cancer Research Network

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Background: Cancer is the leading cause of disease-related death among U.S. persons aged 15–39. Certain cancers are more common in this AYA (Adolescent/Young Adult) population than in younger children or older adults. Research supported by initiatives like the Cancer Research Network (CRN) is needed to address late effects of cancer and its treatments among AYA survivors. The CRN consortium is funded by the National Cancer Institute to support cancer research at a subset of HCSRN sites. The data collected and maintained by CRN sites facilitate a variety of AYA cancer research opportunities.
Methods: Counts and characteristics of primary malignant tumors diagnosed during 1996–2015 among health plan enrollees aged 15–39 were obtained from the Group Health VDW. Descriptive analyses included counts of incident cases by selected demographic characteristics and cancer type. In early 2017, updated counts as well as post-diagnosis retention metrics will be obtained from Group Health and up to 11 additional CRN sites via a centrally developed SAS® program.
Results: During 1996–2015, 1,982 AYA Group Health enrollees (18% adolescent, ages 15–24; 82% young adult, ages 25–39) were diagnosed with cancer. Females comprised 65% of total AYA diagnoses, although the disparity was less pronounced among adolescents (54% female) than young adults (67%). Whites accounted for 78% of all diagnoses, while Asians, Blacks, and Hispanics comprised 6.8%, 3.6%, and 5.1% of diagnoses, respectively. Hodgkin lymphoma was the most commonly diagnosed cancer among adolescents (15% of diagnoses), while breast cancer was the most commonly diagnosed (19%) among young adults. Melanoma, thyroid cancer, and testicular cancer were the second, third, and fourth most commonly diagnosed malignancies among both adolescents and young adults.
Conclusion: The CRN supports the infrastructure to maintain high-quality data on AYA cancer patients at eight funded and four affiliate sites. Additionally, the multisite CRN environment allows for the study of AYA cancers among a large, demographically diverse patient population. Thus, the CRN provides a setting that is well suited for research in what is potentially one of the largest AYA cancer cohorts with longitudinal data.

Keywords: Child and Adolescent Health, Cancer, Virtual Data Warehouse

P3.01
The impact of family support on health care utilization after inpatient care

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Background: Effective post-acute care following an inpatient stay is important to high-quality care, as it has been shown to prevent readmissions and complications. It has been argued that the presence of a family member serves as a substitute for formal care; however, there is very little research quantifying the impact of informal caregivers on patterns of post-acute health care utilization. We leverage health plan administrative data collected under managed Medicare coverages to explore the impact of informal caregivers on post-acute care and recovery.
Methods: Our population was Medicare-eligible members who had an inpatient admission in 2014-2015. Our "treatment" variable was the presence of another adult in the home; the outcome variables of interest include use of post-acute care (SNF, HHC), intensity and reuse of inpatient care (LOS, readmissions), emergency department visits after discharge, and overall health care expenditures. In this pilot work, we use the term "spouse" to indicate another adult in the home to provide care to Medicare members post-discharge. We imputed the presence of a spouse by matching covered individuals by address (distinct to the apartment unit).
Results: We seek to determine how the presence of a spouse in the home, and the spouse's health status, affects transition from an inpatient setting. Our hypothesis is that the presence of a healthy spouse reduced the probability that post-acute care was needed, and reduced the probability of ED visits and IP readmissions after discharge, resulting in lower overall expenditures. The presence of a spouse in poor health may actually increase the rate of post-acute care, relative to single members, because the need for transition care is less defined.
Conclusion: By understanding the impact of spousal support, we can better target transition care to improve patient outcomes. This pilot work provides preliminary data in support of survey funding to create better controls for family and friend support post-discharge.

Keywords: Observational Studies, Quality of Care, Acute Inpatient Care, Medicare, Health Care Costs / Resource Use, Hospitals

P3.02
Choosing Reports Wisely: Considerations in Reporting for Clinical Improvement

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Background: Group Health has undertaken a number of clinical improvement initiatives arising from the ABIM Choosing Wisely campaign. Currently, the particular focus is on reducing the use of antibiotics for upper respiratory infections. To support this effort, clear, timely, reliable reporting is required to understand the current state and motivate and recognize change.
Methods: Throughout the Choosing Wisely campaign, we have developed and refined our reporting methods, tools and dissemination strategies. We target reports to different audiences – numerical summaries for grant funding, clinic-level charts for clinical leaders, and detailed provider-level reporting. A single data set of visit-level data is used for all reports, and rolled up to the appropriate level. We have focused much of our effort on provider-level reporting. Goals include giving providers insights into their own practice patterns, highlighting improvements, and identifying peers who could be consulted for ideas on successfully changing practice. To this end, we have been working to develop reports that summarize rates, volume and temporal trends into a single easily interpreted graphic. Migrating to Tableau visualization software has been instrumental in this effort.
Results: For report consumers, we have developed reports that are regularly disseminated, clearly documented, visually appealing and easy to interpret. For report development, we have worked toward automation and adopted tools geared toward rapid data exploration. The rate of antibiotic prescription for URIs has decreased sharply since reporting began. We have observed that providers appear engaged with the improvement process, and that leadership is enthusiastic about the potential for future developments in reporting to facilitate ongoing change. Long-term support from executive, clinical, IT and research leadership has been critical to our work. We also benefit from provider feedback -- we share visit-level data on request, enabling providers to do chart audits and report potential data quality problems.
Conclusion: With sustained work over time, we have developed a suite of reports that effectively support important clinical improvement efforts. We plan to adapt this reporting scheme for use with other quality measures as well. We also look forward to migrating to an online interactive platform where leaders and providers can access reports directly.

Keywords: Technology Adoption and Diffusion, Information Technology, Quality of Care, Ambulatory/Outpatient Care, Clinical Practice Patterns / Guidelines, Engagement of Stakeholders, Clinical Decision Making, Health Care Costs / Resource Use, Dissemination and Implementation of Innovations, Quality Improvement, Pharmaceuticals: Prescribing, Use, Costs

P3.03
Impact of Physician Practice Style on Costs, Clinical Quality, Patient Experience, Physician Productivity and Physician Time

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Background: During acute care visits, some primary care physicians (PCPs) typically focus on the presenting problem ("the focused"); others typically address additional issues ("max-packers"). Processes

and outcomes may vary between these distinct practice styles. Max-packers, by managing additional conditions or preventive services during an acute care visit, may reduce the number of future visits and encourage up-to-date screening but may require more visit or charting time or increase testing and referrals. The focused, on the other hand, are expected to better manage patient flow. This study compares resource use ("costs"), clinical quality, patient experience, physician productivity, and physician time for focused and max-packing PCPs.
Methods: We used administrative, electronic health record data and Press-Ganey surveys of a large ambulatory group practice. Our study population included 302 PCPs in 2011-2013 (828 PCP-years). The outcome variables were costs (per-visit PCP evaluation & management (E&M), and per-episode and annual costs except for inpatient care), clinical quality metrics pertinent to primary care practice, patient experience (patient-reported satisfaction with the care provider and wait time), physician productivity (work RVUs and panel size), and physician EHR open time away from office. All outcome measures were risk-adjusted to account for patient mix in PCP panels. PCPs were classified into three tertiles based on the average number of "other conditions" (identified through diagnosis codes) addressed per acute care episode. We compared PCP-years in the top third (max-packer) and bottom third (the focused).
Results: Max-packing was associated with higher per-visit E&M costs, higher total per-episode costs, but lower annual total costs. Compared to the focused, max-packers had higher scores for clinical quality and overall patient satisfaction, generated more work RVUs per clinical FTE, but had more EHR open time away from office and their patients had longer wait times in clinics.
Conclusion: Physician typical practice styles impact multiple dimensions of care delivery. Organizations with potentially competing priorities (affordability, care quality, patient experience, productivity, and efficiency) should consider organizational structures and physician incentives with balancing metrics with appropriate risk adjustments that encourage physician behavior achieving primary organizational goals.

Keywords: Primary Care, Quality of Care, Health Care Costs / Resource Use, Patient Experience / Satisfaction

P3.04
Pay-for-Performance Quality Measures: Why Do New Physicians Score Lower?

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Background: Public reporting of quality metrics for organizational benchmarking is well-established. Most metrics are well-specified, e.g., the proportion of patients with diabetes whose HgA1c is at target, or the proportion of patients in a specific age range having colorectal cancer screening. Patients become eligible for inclusion by developing a condition (diabetes), achieving a specific age (screening), or joining the organization—with an undocumented history of prior care. Newly hired physicians may have relatively more of the latter than established physicians with stable panels. We examine whether adjusting for how patients "enter" a panel impacts physician-level quality scores.
Methods: We used administrative and electronic health record data of a large ambulatory group practice. Our study included 389 primary care physicians (PCPs) in 2011-2014 (1,261 PCP-years). We examined adult primary care practice quality metrics for diabetes management and screening services (colorectal / breast / cervical cancer screening and chlamydia). A quality score (# patients who met the target / # eligible) was constructed for each metric. Patients were classified into three groups: 1) new to the organization, 2) newly eligible for screening or newly diagnosed with diabetes, and 3) continuing eligible patients. We compared each set of quality scores for the 3 patient groups. Adjusted panel-based scores (ratio of observed score to expected score based on patient mix) were compared between newly hired and established PCPs.
Results: Quality scores varied across the patient groups (e.g., 57% vs.76 % vs. 63% for HbA1c control, 37% vs. 44% vs. 73% for colorectal cancer screening, 60% vs. 44% vs. 50% for chlamydia screening, at 6th-month post enrollment / diagnosis for new and 6th calendar-month for continuing patients). The 'quality gaps' between new and continuing patients were wider shortly after enrollment or diagnosis, but narrowed over time. In general, new PCPs had lower scores than established PCPs, but the differences were reduced after this adjustment for patient mix.
Conclusion: Time since a patient is eligible for a quality metric impacts the likelihood of that patient being at goal. When assessing quality metrics across physicians within an organization, the composition of the physicians' panels should be considered.

Keywords: Primary Care, Quality of Care, Quality Improvement

P3.05
Value of Physician Performance in Diabetes System of Care among the elderly Medicare Patients: Implications for Pay-for-Performance

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Background: While pay-for-performance (P4P) for physicians is appealing, a direct translation of quality performance into physician payment remains challenging. This study seeks to quantify in dollar terms the value of incremental improvements in Geisinger's diabetes system of care (DSC) – i.e., an all-or-none "bundle" of nine diabetes-related performance measures consisting of the following elements: A1C measurement and control; LDL measurement and control; blood pressure measurement; urine protein testing; influenza immunization; pneumococcal immunization; and smoking cessation. Since 2006, Geisinger's primary care physicians (PCPs) have been evaluated and compensated based on their DSC performance.
Methods: This study focused on Medicare Advantage members attributed to Geisinger Clinic's PCPs between 01/01/2006 and 9/30/2014. Claims data were obtained for the subset of the DSC-eligible patients who were Geisinger Health Plan Medicare Advantage members. The key explanatory variable was the DSC

performance of the PCP responsible for each patient in the sample, measured as percentages of the PCP's patients meeting all nine bundle elements. The association between this explanatory variable and per-member-per-month (PMPM) allowed amount was examined using a multivariate regression model.
Results: The results indicate one-percentage point improvement in the percent of diabetes patients attributed to a same PCP and met all the DSC elements in a given year – i.e., DSC bundle score – was associated with approximately $4 PMPM (in 2006 dollars; $p<0.05$) reduction in total medical cost (excluding prescription drugs) incurred in the same year, driven mainly by reductions in inpatient cost. Moreover, there is variation in how much each DSC element contributes to the cost reduction: among the nine elements, urine protein testing and blood pressure measurements were most consistently associated with lower total medical costs.
Conclusion: These findings suggest the DSC may be useful in establishing a feasible P4P scheme that incentivizes PCPs to improve diabetes care quality.

Keywords: Financial Analysis, Primary Care, Diabetes, Health Care Costs / Resource Use

P3.06
Primary Care Provider Use Rates of a Clinical Decision Support Tool and Change in Diabetes Performance Measures

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Background: A previously published randomized controlled trial demonstrated that implementation of an electronic health record-linked personalized clinical decision support (PCDS) tool within primary care clinics improved mean A1c and BP control. We subsequently implemented a modification of the CDS for expanded use with high cardiovascular risk adults (CV-PCDS) that also retained the decision support for glycemic control for patients with diabetes. Here we analyze the association between primary care provider use rates of CV-PCDS with diabetes performance measures in patients with diabetes.
Methods: Using data from a cluster randomized trial in 2012-2014, we analyzed the association of CV-PCDS provider-specific use rates in March 2014 with diabetes performance measures 6 months later, using Pearson correlation coefficients. Performance measures included the proportion of a provider's diabetes patients who (a) achieved A1c < 8%, and (b) achieved a composite measure of optimal diabetes care (ODC) that required simultaneous achievement of A1c < 8%, SBP < 140 mm Hg, LDL < 100 mg/dl, non-tobacco user, and ASA use for secondary prevention.
Results: Providers (N=43) used the CV-PCDS tool at a mean of 82.1% of targeted encounters of adults with high CV risk (range across providers 36.0% to 100% of encounters). The mean percentage of the diabetes subgroup who achieved A1c <8% was 73.7%, and the percentage of patients who achieved the ODC goal was 46.8%. Pearson correlation coefficients between March 2014 CV-PCDS provider use rates and A1c and ODC performance measures in August 2014 were 0.16 ($p= 0.31$) and 0.24 ($p= 0.12$) respectively.
Conclusion: In this high-performing health care system with high CV-PCDS use rates, there was a positive but non-significant association of provider use of the CV-PCDS tool and provider-level quality of diabetes care 6 months later. The generalizability of this finding to lower-performing care systems, and to providers with lower baseline quality of diabetes care remains to be determined.

Keywords: Primary Care, Diabetes

P3.07
Impact of Improving Diabetes Care on Quality Adjusted Life Expectancy (QALE) and Costs: A 40-Year Perspective

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Background: There has been a trend towards better management of glucose, lipids, BP, smoking, and other aspects of diabetes care in the last decade. The goals of this study are to assess changes in quality of diabetes care over a 14-month period of time in a large multi-specialty U.S. medical group, to quantify treatment costs associated with the improved care, and to estimate the impact of care improvement on long-term costs and quality adjusted life expectancy.
Methods: : Study subjects included 7,054 persons with diabetes age 40-75 years who at baseline had one or more of: SBP > 140 mmHg, LDL-cholesterol > 129 mg/dl, or current smoking. We quantified their clinical status including A1c, BP, lipids, and smoking status both at baseline and after a median 14-month follow-up period. We similarly quantified their visit frequency and medication use and associated costs in the year prior and year following their baseline visit. We employed these clinical risk factors and observed costs as data inputs into a log-term simulation model of diabetes outcomes - the UKPDS Outcomes Model (Version 2) – in order to estimate changes in quality-adjusted life years (QALYs), and costs associated with changes in clinical care, projected over a 40-year time period. We applied costs of complications that were derived from a previous study within this health system. We then estimated the cost per QALY gain for these adult diabetes subjects who are experiencing better clinical care over time.
Results: Observed improvements in clinical care significantly increased expected QALY from 10.83 to 11.06, for a gain in 0.22 QALY. Incremental costs associated with outpatient visits and intensification of pharmacotherapy were $167 per year and $2,323 over the study period. Total costs increased by $4,453. Cost per QALY was estimated to be $19,866. Sensitivity analysis indicated that estimates of cost per QALY were more favorable in simulations with longer follow-up periods and in simulations that more narrowly targeted BP control among those with high BP at baseline.
Conclusion: Observed improvements in diabetes care over a recent 14-month period of time are sufficient to significantly improve clinical

and health outcomes. The cost-effectiveness of the slightly more intensive diabetes care provided appears to be satisfactory using standard thresholds for cost per QALY, both in the base case and across a range of sensitivity analysis scenarios. However, improvements in diabetes care are not cost saving from the point of view of the payer.

Keywords: Patient Experience / Satisfaction

P3.08
Clinical Decision Support Impact on Overuse and Underuse of Aspirin for Primary Prevention of Cardiovascular Events

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Background: The US Preventive Services Task Force (USPSTF) recommends aspirin for primary prevention of atherosclerotic vascular disease (ASCVD) when the ASCVD benefit outweighs the risk of gastrointestinal hemorrhage. The complexity and time required to assess aspirin risks and benefits can result in overuse and underuse of aspirin.
Methods: As part of an NIH-funded study to lower ASCVD risk, we implemented electronic clinical decision support (CDS) algorithms to guide aspirin use based on USPSTF criteria and major bleeding risks. Baseline data was collected for whether aspirin was algorithmically recommended for all patients at their first eligible primary care encounter in 20 clinics over 2012-2014. The analysis excluded patients with CHD and included 6651 adults with diabetes (mean age 55.6, mean 10-year ASCVD risk 27.8%) and 11,682 adults meeting pre-specified criteria for high ASCVD risk without diabetes (mean age 58.4, mean 10-year ASCVD risk 24.7%). Overuse and underuse was determined by comparing concordance with (a) aspirin recommendations and (b) documented aspirin use.
Results: The CDS recommended aspirin for 4,139 (63.1%) patients with diabetes and 8,722 (74.7%) without diabetes. Among patients with aspirin recommended, aspirin was not used in 829/4139 (20%) with diabetes and 6493/8722 (74.4%) without diabetes (underuse). Among patients for whom the CDS did not recommend aspirin, aspirin was used in 1448/2969 (59.8%) with diabetes and 1021/2960 (34.4%) without diabetes (overuse).
Conclusion: Those with diabetes who were likely to benefit from aspirin use had higher aspirin use rates (less underuse) than similar high CV risk patients without diabetes. However, those with diabetes who were unlikely to benefit from aspirin based on USPSTF criteria and bleeding risks also had higher aspirin use rates (more overuse) than patients without diabetes. Strategies to ensure greater evidence-based use of aspirin, such as providing electronic clinical decision support, may help providers more accurately assess individualized risks and benefits of aspirin.

Keywords: Patient Experience / Satisfaction

P3.09
Can Prioritized Clinical Decision Support in Primary Care Reduce Cardiovascular Risk?

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Background: The objective of this project was to develop and implement sophisticated point-of-care EHR-based clinical decision support (CDS) that (a) identifies and (b) prioritizes all available evidence-based treatment options to reduce a given patient's cardiovascular risk (CVR).
Methods: We randomized 19 primary care clinics with 102 primary care providers (PCPs) and 39,025 adults with diabetes, cardiovascular disease (CVD), or 10-year ACC/AHA reversible CV risk >=10% into one of two experimental conditions: Group 1 included 10 clinics that received the CV Wizard. Group 2 included 9 usual care clinics. The study formally tested the hypothesis that after control for baseline CVR, post-intervention American College of Cardiology/ American Heart Association (ACC/AHA) 10-year CVR (risk of fatal or non-fatal heart attack or stroke) will be significantly better in Group 1 than Group 2 in the post-intervention period
Results: The CV Wizard system was integrated successfully into the workflow of primary care visits, and use rates at targeted visits in intervention clinics ranged from 44% to 77% and improved over time. In the high reversible CV risk sample (N=7,595), 10-year ACC/AHA CVR declined by -.030% per visit in the control group (p=.001) and by -0.46% per visit in the intervention group (p=0.28), this difference in annual rate of change in CVR was statistically significant and favored the intervention group (p<0.001). In the diabetes sample (N=5,510), the observed change in 10-year ACC/AHA CVR was +0.06% per visit in the control group (p=.56) and by -0.23% per visit in the intervention group (p<.03); this difference in rate of change in CVR was statistically significant and favored the intervention group (p=.049). The predicted annual change in CVR was +0.91% in the control group (p=.16) and +0.38% in the intervention group (p=0.55), this difference in annual rate of change in CVR was not statistically significant (p=.56). In the CVD sample (N=2,078), 10-year ACC/AHA CVR change over visits (p=.42), and over time (p=.92) was not significant when comparing intervention and usual care clinics.
Conclusion: The overall pattern of change in CVR, whether measured by visit or time, was consistent with the assertion that CVR decreased at a faster rate (or increase at a slower rate) in the Wizard intervention clinics relative to control clinics for those with diabetes or high reversible CV risk, but not for those with known CVD. The difference in trajectories reached statistical significance over the course of visits among diabetes patients, and over time among patients with high reversible CV risk. Use rates and PCP satisfaction with the CV Wizard were very high, and economic analysis suggests improved care is cost-effective. Based on these and other research results, the CV Wizard clinical decision support system is currently being used at three large health care delivery systems in 4 states that provide care to 1,500,000 patients.

Keywords: Patient Experience / Satisfaction

P3.10
Taking Action on Overuse: Implementing an Action-Planning Framework to Engage Providers.

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Background: Unnecessary care contributes to high costs and places patients at risk of harm. While most providers support reducing low-value care, changing established practice patterns is difficult and requires active engagement in sustained behavioral, organizational, and cultural change. Here we describe an action-planning framework to engage providers in reducing overused services.
Methods: The framework is informed by a comprehensive review of social science theory and literature, published reports of successful and unsuccessful efforts to reduce low-value care, and interviews with innovators of value-based care initiatives in twenty-three health care organizations across the United States. A multi-stakeholder advisory committee provided feedback on the framework and guidance on optimizing it for use in practice.
Results: The framework (www.maccollspe.org) describes four conditions necessary for accelerating change: prioritize addressing low-value care; build a culture of trust, innovation and improvement; establish shared language and purpose; and commit resources to measurements. When these conditions are present, they catalyze productive sense-making conversations between providers, between providers and patients, and among members of the health care team about the potential for harm from overuse and reflection on current frequency of use. Through these conversations providers, patients and team members think together as a group, learn how to coordinate individual behaviors, and jointly develop possibilities and plans for coordinated action around specific areas of overuse. Key changes used by innovative health care organizations to create conditions for change and foster sense-making conversations are described along with examples of activities used to implement these changes. Early work with health care systems to utilize the framework in three settings will be described: an outpatient specialty care clinic, an acute care inpatient setting, and a state-wide regional cooperative.
Conclusion: Organizational efforts to engage providers in value-based care focused on creating conditions for productive sense-making conversations that lead to change. Organizations can use this framework to enhance and strengthen provider engagement efforts to do less of what potentially harms and more of what truly helps patients.

Keywords: Health Care Costs / Resource Use, Dissemination and Implementation of Innovations, Patient Safety

P3.11
System-level Barriers to Follow-up Colonoscopy Completion After Positive Fecal Test: Interviews with Gastroenterologists and Staff

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Background: Despite the efficacy of colorectal cancer (CRC) screening, many adults are not screened at recommended intervals or screened at all. Federally Qualified Health Centers (FQHCs) serve a unique patient population that often experience barriers to CRC screening. Yearly fecal testing and colonoscopy follow-up for positive test results can reduce CRC incidence and mortality. However, many patients with positive fecal test results forgo follow-up colonoscopy, nullifying the potential benefits of fecal testing.
Methods: As part of the Strategies and Opportunities to STOP Colon Cancer in Priority Populations (STOP CRC) study, we qualitatively explored factors associated with referral to and completion of follow-up colonoscopy after a positive fecal test. Through interviews with gastroenterologist (GI) providers and office staff, we sought to elucidate system-level barriers to colonoscopy completion and identify areas for improvement for patients referred from FQHCs. Specialists and their staff were recruited via email, and interviews were conducted in-person or by phone using an interview guide. Interviews were recorded, transcribed, coded, and content-analyzed by trained qualitative staff, resulting in refined themes.
Results: We completed 15 in-depth interviews with GI providers (n=8) and office staff (n=7). The most frequently cited challenges by all interviewees related to increase in demand following the Affordable Care Act, complexity and time delay issues with insurance requirements, and inadequate staffing at the specialist office. GI providers emphasized capacity issues including long-wait times and limited appointment options. Office staff highlighted lack of complete referral and medical review documentation and language barriers. Improving communication and electronic referral documentation between the FQHC and GI office was identified by participants as vitally important. GI providers also advised on the need to reduce no-show rates and improve scheduling; and office staff desired preparation instructions in additional languages and skilled interpreters to attend the colonoscopy procedure with the patient.
Conclusion: The life-saving benefits of CRC screening can be maximized by identifying challenges to follow-up colonoscopy after a positive fecal test. Uncovering system-level issues and possible areas for improvement in referral coordination and procedure completion can further contribute to increasing CRC screening rates for patients receiving care in FQHCs.

Keywords: Cancer, Referrals and Referral Networks, Communication between Patients and Providers, Engagement of Stakeholders, Qualitative Research, Access to Services, Health Promotion / Prevention / Screening, Quality Improvement

P3.12
Reducing opioid exposure following hip and knee surgery: Results: of a randomized, pragmatic, pharmacist-led intervention

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Background: Opioids have a role in managing pain for orthopaedic patients, but there is compelling evidence that this exposure should be kept as short as possible. Setting patient expectations for pain and its treatment has been recommended for orthopaedic surgeons as part of minimizing opioid exposure.
Methods: Patients scheduled to undergo total hip arthroplasty (THA) or total knee arthroplasty (TKA) were randomized, weekly, to usual care (UC) or intervention (INT). INT patients received mailed materials 2-weeks before and after surgery; plus telephone intervention from specially trained pharmacists if they filled opioid prescriptions in the 28-90 days following surgery. Materials were developed using qualitative methods involving patients and orthopaedic clinicians. In order to direct resources toward the riskiest patients, we ranked patients according to predicted risk of persistent opioid use and selected the top 60%. Our primary outcome was the morphine equivalents (MEQ) dispensed in the 90-days following surgery, modeled using a natural log transformation (lnMEQ). We report the relative percentage decrease in geometric means between study groups, with a $p<0.05$ cut-point for statistical significance. Our a-priori analytic plan specified testing for effect modification on treatment group by 1) THA or TKA, 2) baseline quartile of opioid use, and 3) quartile of predicted opioid persistence. Informed consent was waived, consistent with pragmatic trial principles.
Results: A total of 561 patients were randomized (286 UC, 118 THA, 275 INT, 107 THA); mean age was 66 years and 60% were female. The intervention failed to reduce lnMEQ in the entire surgical population ($P>0.50$), but the intervention reduced lnMEQs by a larger percentage in the THA patients than the TKA patients ($P<0.003$). Among THA patients, those randomized to INT used 62% less MEQ ($p<0.003$) than UC. We found no statistically significant difference in opioid use among TKA patients ($p>0.1$). We found no effect modification by baseline opioid use or predicted opioid persistence.
Conclusion: Our pharmacist-led intervention to reduce opioid use had clinically meaningful impact on the use of opioids in the 90 days following THA, but not TKA.

Keywords: Pharmacy, Quality of Care, Clinical Trials, Pharmaceuticals: Prescribing, Use, Costs

P3.13
A Clinical Decision Support System Promotes Shared Decision Making and CV Risk Factor Management

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Background: CV Wizard is a web-based EHR-integrated point-of-care clinical decision support (CDS) system that presents personalized cardiovascular (CV) risk information to providers and patients in both a low numeracy visual format and a high numeracy quantitative format. Here we report primary care provider perspectives on how this CDS system affected shared decision making and CV risk factor management
Methods: Twenty clinics were randomized to either usual care (UC) or use of the CDS system with diabetes, heart disease, or high reversible cardiovascular risk adults. The CDS system targeted 20% of office visits, and was used at 70-80% of targeted visits over a 2-year period. Consented providers (n=102) were surveyed at baseline and 18 months after implementation. Corrected survey response rates were 90% at baseline and 82% at follow-up. Generalized linear mixed models were used to compare UC and CDS responses to common questions at baseline and follow-up, and CDS users were queried on their perceptions of the CDS system at follow-up only.
Results: Compared to UC provides, those in the CDS group reported increased follow-up rates of CV risk calculations while seeing patients (73% vs. 28%, p=.006), being better prepared to discuss CV risk reduction priorities with patients (98% vs. 78%, p=.03), providing accurate advice on aspirin for primary prevention (75% vs. 48%, p=.02), and more often discussing CV risk reduction (60% vs. 30%, p=.06). CDS users reported that the CDS system improved CV risk factor control (98%), saved time when talking to patients about CV risk reduction (93%), efficiently elicited patient treatment preferences (90%), was useful for shared decision making (95%), influenced treatment recommendations (89%), and helped initiate CV risk discussions (94%); 85% of providers reported that their patients liked CV Wizard.
Conclusion: The CV Wizard CDS system was successfully integrated into the workflow of primary care visits with high sustained use rates, high primary care provider satisfaction, high patient satisfaction, and positive impacts on provider-reported clinical processes related to CV risk factor management.

Keywords: Clinical Decision Making, Patient Experience / Satisfaction

P3.14
Aspirin for Primary Prevention of Atherosclerotic Cardiovascular Disease: Challenges to Appropriate Use

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Background: Aspirin use for primary prevention of atherosclerotic cardiovascular disease (ASCVD) should be highly individualized in order to accurately balance benefits and risks. There are now practical approaches for clinicians to calculate ASCVD and bleeding risks using web-based tools and mobile apps to facilitate good decision making, but their lack of integration with the electronic

health record (EHR) and need for extensive data input are barriers to use by busy clinicians.
Methods: As part of a clinic randomized trial with 20 primary care clinics, we developed and tested an EHR-integrated Web-based clinical decision support (CDS) system that provided individualized aspirin recommendations to patients and clinicians using risk-benefit calculations. During the 18 month intervention, aspirin recommendations were printed for patients and providers at 75% of eligible encounters. We evaluated the effects of the intervention on rates of appropriate primary prevention aspirin use among 3958 patients with diabetes and 7000 patients without diabetes age 40-75 with uncontrolled CVD risk factors.

Results: At baseline, among patients using aspirin, it was not recommended (overused) for 840/1474 (57%) patients with diabetes and 564/1659 (34%) without diabetes. Of patients not using aspirin, it was recommended (underused) by 522/2484 (21%) of patients with diabetes and 4,006/5371 (75%) without diabetes. At the last follow up visit, no significant differences were noted in aspirin use patterns for patients with diabetes. However, among patients without diabetes who were “underusing” aspirin at baseline, 12.9% were using aspirin in CDS clinics compared to 10.4% in control clinics (p=.03). Among patients who were “overusing” aspirin at baseline, 4.1% had discontinued using aspirin in CDS system clinics compared to 7.9% in control clinics (p=.06).
Conclusion: Patterns of appropriate aspirin use are different among patients with and without diabetes, with overuse being more common in diabetes and underuse more common in those without diabetes. Our study results suggest that the use of accurate CDS by clinicians and patients improve overall concordance with aspirin. A better understanding of how best to present understandable risk-benefit information to providers and patients is needed.

Keywords: Clinical Decision Making, Patient Experience / Satisfaction

Results of a Cluster-Randomized Trial Testing the Effects of TeenBP, an EHR-based Clinical Decision Support Tool, on Recognition of Adolescent Hypertension P4.01
Elyse Kharbanda, Stephen Asche, James Nordin, Alan Sinaiko, Heidi Ekstrom, Nancy Sherwood, Patricia Fontaine, Steven Dehmer, Jerry Amundson, Deepika Appana, Patrick O'Connor

Development and validation of a risk equation for appendicitis in children presenting with abdominal pain P4.02
Gabriela Vazquez-Benitez, Elyse Kharbanda, Dustin Ballard, David Vinson, Richard Bachur, Uli Chettipally, Mamata Kene, Patrick O'Connor, Steven Dehmer, Heidi Ekstrom, Peter Dayan, Nathan Kuppermann, Anupam Kharbanda

P4.01

Results of a Cluster-Randomized Trial Testing the Effects of TeenBP, an EHR-based Clinical Decision Support Tool, on Recognition of Adolescent Hypertension

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Background: Hypertension (HT) occurs in 1-3% of adolescents and is associated with long term cardiovascular morbidity. Although blood pressure (BP) is routinely measured, HT in adolescents is often missed during outpatient visits. This study sought to evaluate whether "TeenBP", an electronic health record (EHR) linked, web-based clinical decision support tool, could improve recognition and early management of HT in adolescents.
Methods: We randomized 20 primary care clinics to receive the CDS or to continue usual care (UC). At intervention sites, TeenBP was activated at the point of care, when a BP was elevated. TeenBP graphically displayed systolic and diastolic BP values and percentiles over the prior 2 years, identified patients meeting criteria for HT (3 or more BPs ≥95th percentile), provided a summary of comorbidities and medications that may affect BP, and offered patient-specific order sets. HT recognition, within 6 months of meeting criteria, was defined as adding HT or elevated BP (EBP) to the problem list or clinical notes, indicating HT or EBP as an outpatient visit diagnosis, prescribing a medication to lower BP, or diagnostic testing related to HT, identified through chart review. Generalized linear mixed models were used to test the effect of the intervention.
Results: Among 21,618 patients age 10-17 years with a primary care visit at the 20 study clinics over one year (May 2014 – April 2015), 315 (1.5%) met criteria for new onset HT. Most BPs were modestly elevated, < 99th percentile. Clinical recognition of HT within 6 months occurred for 36.2% (27.7 – 45.8) of patients in UC clinics and 68.0% (56.6 – 77.6) in the CDS clinics (p=0.0003). Clinical recognition of HT in the TeenBP clinics was most often met by adding HT or EBP as an outpatient visit diagnosis (52.2%) or to the text of the clinical note (52.4%). Within 6 months of meeting criteria for HT, <10% of TeenBP or UC subjects had an echocardiogram or renal ultrasound and only one patient initiated an antihypertensive medication.
Conclusion: We observed a large and statistically significant beneficial effect of this clinical decision support system on recognition of new onset hypertension, without increasing diagnostic workups or early initiation of antihypertensive medication.

Keywords: Child and Adolescent Health, Primary Care, Clinical Decision Making, Chronic Disease

P4.02

Development and validation of a risk equation for appendicitis in children presenting with abdominal pain

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Background: Appendicitis is a common surgical emergency in children, yet the diagnosis remains challenging. A widely used risk score, the Pediatric Appendicitis Score (PAS), is not sufficiently sensitive or specific to be used alone, with many patients classified as "intermediate risk". Goals of this study were to develop and validate an improved appendicitis risk calculator for children with acute abdominal pain to aid in clinical decision-making.
Methods: We developed our risk calculator using data from a multi-center cohort of children 5 to 18 years presenting to the emergency department (ED) with acute abdominal pain. We validated the risk calculator in two independent cohorts with similar enrollment criteria. Patient history, physical examination, and laboratory data were prospectively recorded by clinicians during ED visits. Appendicitis was confirmed by pathology reports and follow-up telephone survey. Variables evaluated for inclusion in the risk calculator were: age, sex, pain duration, pain with walking, migration of pain, temperature, heart rate, guarding, maximal tenderness in right lower quadrant, white blood cell count, and absolute neutrophil count (ANC). A step-wise regression approach was followed to select the best model, using Akaike Information Criteria (AIC) and the C-statistic. We forced inclusion of age and sex, including first-order interaction terms. Laboratory values were evaluated for non-linear associations with appendicitis, and a two-step linear association was included. Validation included calibration and discrimination analyses.
Results: The development sample included 2423 children, of whom 40% had appendicitis; the validation sample included 1426, and 35% had appendicitis. Our final risk calculator included: sex, age, duration of pain, guarding, migration of pain, and ANC. In the validation sample, calibration plot and Hosmer and Lemoshow test (p<.0001) showed high calibration, and a high discrimination, C-statistic 0.86. Among 248 (17%) patients in the validation sample at <5% predicted risk we observed 4% had appendicitis. Of an additional 318 (22%) patients with predicted risk 5-<15%, appendicitis occurred in 8%. Of 48 (3.4%) patients in the validation sample at predicted risk >90%, 96% had appendicitis.
Conclusion: Our validated pediatric appendicitis risk calculator can accurately quantify risk for appendicitis and can identify children with acute abdominal pain at high or low risk for appendicitis.

Keywords: Child and Adolescent Health, Clinical Decision Making

Bisphosphonates Use and Risk of Hip Fractures P5.01
Sarah Sharman Moser, Inbal Goldshtein, Jingbo Yu, Clara Weil, Sophia Ish-Shalom, Vanessa Rouach, Varda Shalev, Gabriel Chodick

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P5.01
Bisphosphonates Use and Risk of Hip Fractures

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Background: Osteoporosis affects 200 million women worldwide, and fractures resulting from bone fragility are a major complication. Bisphosphonates slow down bone resorption by osteoclasts and have been shown to lower the risk of hip fractures among patients with osteoporosis in clinical trial settings. Most clinical guidelines recommend pharmacological treatment for post-menopausal women with an existing fracture or bone density t-score of -2.5 or lower. These guidelines were based on randomized controlled trials that typically lasted 3–4 years, although some of these studies have been extended for up to 10 years. We undertook this study to examine the association between adherence with bisphosphonate therapy and long-term risk of hip fracture, using up to 14 years of retrospective observation.
Methods: Included in the present nested case-control study were osteoporotic women (N=14,357) who initiated bisphosphonate therapy between the years 2000-2010 and were retrospectively followed-up for incident hip fracture through November 2014. All cases of primary hip fracture within the cohort (N=411) were individually matched with 411 controls based upon age (±1 year) and calendar year at therapy initiation as well as follow-up duration (±1 year). For each study participant, the total dispensed packs of bisphosphonates during the follow-up period were counted.
Results: Compared to patients discontinuing therapy within one month, therapy with bisphosphonates for 1 to 3 years, and 3 to 6 years was associated with an adjusted odds ratios (OR) for hip fractures of 0.48 (95% confidence interval: 0.27-0.86) and 0.40 (0.22-0.73), respectively. Comparable ORs were calculated for patients covered for longer periods; for 6 to 8 years (0.36; 0.17-0.76) and eight years or more (0.57;0.27-1.21) .
Conclusion: Results suggest that three years or more of bisphosphonates use is associated with a substantially lower risk of primary hip fracture compared to non-persistent patients. The results do not indicate further reduction in risk among patients treated for 8 years or more.

Keywords: Aging/Elderly/Geriatrics, Observational Studies, Primary Care, Quality of Care, Clinical Practice Patterns / Guidelines, Clinical Decision Making, Chronic Disease, Risk Adjustment for Clinical Outcomes, Patient Safety, Epidemiology

P5.02
How do Patients with Chronic Conditions Prefer to Get Health Information and Advice: Results: from the 2014-15 KP NCAL Member Health Survey

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Background: Management of chronic conditions requires patient engagement in health promoting self-care, which ongoing health education, advice, and reinforcement may enhance. Information about sociodemographic differences in patient preferences for patient health information/advice services (HIA), especially regarding web-based/digital (eHIA) versus more traditional modalities, can inform development and delivery of interventions.
Methods: Weighted data from the 2014 Kaiser Permanente NCAL Member Health Survey for 2780 adults aged 40-79 with diabetes, hypertension, CAD, and/or history of stroke (CCPs) were used to assess ability to use digital technology (internet, email, text messages, smartphone), prior year use of eHIA and more traditional health information/education resources, and preferred methods for getting information and advice about health conditions and behavior change (restricted to those who indicated 1+ method). Data were analyzed by age (40-64, 65-69, 70-74, 75-79), gender, and will be analyzed by race/ethnicity and education and compared to all aged 40-79 when 2015 survey data become available.
Results: Among CCPs, use of digital technology declined with age: Internet and email (alone or with help): 94%, 92%, 85%, 71%; text messages: 74%, 54%, 46%, 33%; smartphone: 63%, 46%, 32%, 20%. Nearly 3/4 of CVDPs (no age or gender difference) had obtained HIA in the past year, 49% of ages 40-74 and 38% of ages 75-79 from online resources. HIA preferences of 65-69 year olds were similar to 40-64 year olds, but those >74 were less open to eHIA modalities. Among those indicating interest in any HIA modality, 55% were interested in eHIA resources (by age, 59%,58%, 48%, 37%): 48% reading information on websites (50%, 53%, 45%, 35%), 35% emailed newsletters (35%, 40%, 32%, 28%), 34% secure email (range 39%-25%),19% watching online videos (21%, 20%, 15%,9%), 16% health apps (21%, 15%, 8%, 5%),11% online programs (14%, 8%, 9%,3%), 8% webinars (range 9%-2%), 6% podcasts, and 3% chat rooms. Interest in more traditional HIA modalities: 41% individual counseling (30% in-person, 18% phone-based), 37% print materials, 22% workshops, and 15% classes/groups. Minimal gender differences were observed.
Conclusion: While most patients with chronic conditions use internet and email, many, and especially older seniors, still prefer using more traditional modalities for obtaining health information and advice.

Keywords: Aging/Elderly/Geriatrics, Survey Research and Methods, Racial/Ethnic Differences in Health and Health Care, Chronic Disease, Health Promotion / Prevention / Screening

P5.03
Post-Deployment Mental Health Status and Obesity among a Multi-generational Sample of U.S. Veterans

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Background: Since history of PTSD and depression have been associated with obesity in previous studies, the objective of the current study was to assess if these disorders were associated with obesity among formerly deployed U.S. veterans.
Methods: We surveyed a random sample of U.S. veterans who were patients in a large non-VA multi-hospital system located in Central and Northeastern Pennsylvania to assess their mental health, physical health, and obesity status. Obesity was defined as having a BMI > 30. Our hypothesis was that mental health status, including having PTSD or depression, was associated obesity.
Results: Of 1,289 veterans surveyed (response rate ~ 60%), 53.6% were from the Vietnam era, 95.0% were male, 54.5% were 65 years old or older, 95.7% were white race, and 26.9% were recent National Guard or Reserve service members. Altogether 44.3% (95% CI = 41-5-47.1) of veterans were classified as obese. Study variables associated with obesity included non-white race, not having a college degree, having a lower income, reporting lower unit support during deployment, currently using the VA system, having applied for or received VA disability, having ever used mental health services, currently using psychotropic medications, reporting poor/fair health status, and reporting pain in the past month (p-values < 0.05). Contrary to our hypothesis, neither having PTSD nor depression were associated with obesity among veterans in the current study. In multivariable analyses that adjusted for age, gender, education, combat exposure, life stressors, and social support, no association was for mental health status and obesity. The best predictors of current obesity among veterans was having a college education (OR=0.53, p<.001) , suggesting that college was protective, and reporting poor or fair health status (OR=1.51, p=.001).
Conclusion: These preliminary data do not support the link between mental health status and obesity among deployed U.S. veterans. Further research that examines obesity, and eating disorders, among formerly deployed veterans is planned.

Keywords: Epidemiology

P5.04
Specificity of the Framingham Heart Failure Signs and Symptoms: Bridging the Gap between Epidemiological Research and Clinical Practice

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Background: While the Framingham Heart Failure Signs and Symptoms (FHFSS) have been around for decades, little is known about the specificity of the relation between presence of each FHFSS and early detection of heart failure (HF). The FHFSS continue to be used in epidemiological research; however, their clinical relevance has been criticized. We examined variation in the ability of the individual FHFSS to predict HF diagnosis by assertion or denial of each feature, by counts, and by a composite score.
Methods: We extracted EHR data from 2001-2010 from a single health system. A total of 1,684 incident HF cases were identified and 13,525 matched controls were selected from the same primary care practices. We performed LASSO logistic regression analysis to determine which FHFSS are the strongest predictors of HF. We explored predictive value by observation window (12 versus 24 months) and by prediction window (6, 12, 18, and 24 months). FHFSS score statistics were used to determine if prediction is improved and to determine if changes in score over time improved the model performance.
Results: Our findings indicate the following: 1) Less features yield better prediction performance (LASSO model) with the following FHFSS features being most predictive: Negative/Positive Acute Pulmonary Edema, Negative/Positive Bilateral Ankle Edema, Positive Dyspnea on Ordinary Exertion, Positive Neck Vein Distension, Negative/Positive Pleural Effusion, and Negative/Positive Radiographic Cardiomegaly. 2) More patient encounters perform better than less encounters and also have a greater average number of FHFSS mentions. 3) Different features are more predictive during specific prediction windows.
Conclusion: This study aims to bridge the gap between epidemiological research and clinical practice as it relates to a highly prevalent, serious, and costly disease. In practice, providers are left with the difficult task of basing their decisions to act on the examination of a patient in the moment, not based on a sophisticated quantitative assessment of longitudinal patient data. Our findings show that a smaller number of FHFSS can be used individually to predict early onset of HF.

Keywords: Cardiovascular Disease, Primary Care, Natural Language Processing, Epidemiology

P5.05
Assessing the Association between Exercise Status and Poor Glycemic Control

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Background: Increased physical activity may be associated with greater glycemic control among adults with diabetes mellitus (DM). However, the area is understudied. The objective of the study was to examine the independent association of exercise status with poor glycemic control, adjusting for patient-level covariates.
Methods: We studied a population of Kaiser Permanente Northwest (KPNW) members with type 2 DM who were in: 1) good glycemic control (hemoglobin A1c [HbA1c < 8%; N=15,891]) or 2) poor glycemic control (HbA1c > 9%; N=3,709). Additional inclusion criteria included: an HbA1c test between 7/1/2014 and 6/30/2015, age 18-plus at time of test, and continuous health plan coverage 12 months prior to Hba1c test. The primary independent was current physical activity status—whether an individual exercised four or more times per week (yes vs. no)—and was assessed as closely as possible to the HbA1c test date. Multiple logistic regression was used to analyze the independent association of exercise status with poor glycemic control, adjusting for demographics, medication adherence, medical comorbidities, health care utilization, receipt of DM care management services, and intensity of DM treatments.
Results: Those who exercised four or more times per week were less likely to have poor glycemic control (OR=0.75; 95% CI=0.68-0.82, P < .0001), compared to those who exercised three or fewer times per week.
Conclusion: Increased exercise is independently associated with a lower likelihood of poor glycemic control among an adult population with type 2 DM. Because physical activity is a potentially modifiable factor, further studies are needed to evaluate whether interventions aimed at increasing physical activity result in subsequent gains in glycemic control.

Keywords: Observational Studies, Diabetes, Chronic Disease

P5.06
Loop Diuretic Use in the Months and Years Preceding a Heart Failure Diagnosis: A Case-Control Study

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Background: Loop diuretics are routinely prescribed for patients with HF to minimize symptoms due to fluid overload but relatively little is known about prescribing patterns in individuals preceding a formal HF diagnosis. We want to understand the prescribing of loop diuretics in primary care patients without a heart failure (HF) diagnosis and to determine if their use signals an increased probability of a future HF diagnosis.
Methods: A nested case-control study of 1,288 new-onset (incident) HF cases and 10,319 matched controls was completed with electronic health record (EHR) data extracted between 2001- 2010 from primary care practices affiliated with the Geisinger Health System. New loop diuretic prescriptions, and associated orders <36 months before and 12 months after an incident HF diagnosis in cases, and a comparable time in controls were evaluated.
Results: Loop diuretic use was significantly greater (11.3% versus 3.5%, p<0.001) in future HF cases compared with controls 2 to 3 years preceding a HF diagnosis. Their use progressively increased in cases such that by 3 to 5 months preceding a HF diagnosis 27.1% of cases versus 7.5% of controls (P<0.001) had been prescribed a loop diuretic. Edema (ICD-9 782.3) and essential hypertension (ICD-9 401.x) were the most commonly associated diagnoses for starting a loop diuretic in both eventual HF cases as well as in controls. By multivariate analysis, being prescribed a loop diuretic was one of the strongest clinical predictors of an eventual diagnosis of HF (OR 2.44, 95% CI: 2.10-2.83, p<0.001).
Conclusion: In primary care, loop diuretic use is not uncommon in the months and years preceding a formal incident HF diagnosis. These results suggest there is substantial opportunity to improve the diagnosis and earlier treatment of individuals with HF.

Keywords: Cardiovascular Disease, Clinical Practice Patterns / Guidelines, Chronic Disease

P5.07
Patterns of Prednisone Use during Pregnancy: Daily and Cumulative Dose

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Background: Descriptions of oral corticosteroid use during pregnancy are usually limited to trimester prevalence estimates. We sought to better characterize the use during pregnancy.
Methods: Data were collected from the MothertoBaby Pregnancy Studies (2005-2014) that enrolled pregnant women with asthma and autoimmune diseases before gestational week 20. Information on medication use and pregnancy outcomes was collected by telephone interview at enrollment, 24 and 32 weeks' gestation, and after

delivery, plus by medical record review. Women were included if they had a live or still birth and reported dates of oral prednisone use and dose during pregnancy. Women were classified by diagnosis: asthma (n=15), rheumatoid arthritis (n=254), Crohn's disease (n=39), ankylosing spondylitis (n=15), >1 autoimmune disease (n=29). Prednisone daily dose and cumulative dose by gestational day were plotted using a heatmap for each individual and stratified by disease. To summarize the many observations for rheumatoid arthritis, we used k-means clustering method to identify and plot group trajectories for prednisone dose. The associations between trajectory group and maternal age, race/ethnicity, socio-economic status, obesity, rheumatoid arthritis severity measured by the Health Assessment Questionnaire-Disability Index (HAQ) (range 0-3) before gestational week 20, and gestational age at delivery were evaluated.
Results: Women used prednisone on 1 to 292 days total during pregnancy. Daily doses ranged from 2-60mg for asthma, <1-60mg for rheumatoid arthritis, ankylosing spondylitis and >1 autoimmune disease, and <1-70mg for Crohn's disease. Total cumulative dose ranged from 15-1,325mg for asthma, 8-6,225mg for rheumatoid arthritis, 10-9,105mg for Crohn's disease, 60-2,720mg for ankylosing spondylitis, and 20-5,120mg for >1 autoimmune disease. High dose prednisone for a short duration was more common for asthma, whereas lower doses for longer was more common for rheumatoid arthritis. For women with rheumatoid arthritis, the highest vs lowest cumulative dose trajectory groups had significantly different disease severity (median HAQ: 0.7 vs 0.0) and gestational length (gestational weeks: 35.9 vs 39.0).
Conclusion: The individual-level plots illustrate variability in prednisone dosage (amount and pattern), which may impact pregnancy outcomes. Group trajectories, used to summarize these factors, provide an alternative to the typical trimester exposure approach when studying risks of corticosteroids and other medications during pregnancy.

Keywords: Observational Studies, Maternal and Perinatal Care, Biostatistics, Epidemiology, Pharmaceuticals: Prescribing, Use, Costs

P5.08
Patient Experience-of-Care is Associated with Adherence/Persistence to Cardiometabolic Disease Medications in an Ambulatory Setting

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Background: We aimed to investigate associations between patient ratings of experience-of-care and medication adherence or persistence to cardiometabolic disease (CMD) medications in an ambulatory-care setting.
Methods: This retrospective study was conducted using electronic health records and administrative data from an ambulatory-care network in Northern California. We included managed-care beneficiaries (≥18 years) with a prescription for a CMD medication between 2010 and 2014. CMD medications included antihyperglycemic, antihyperlipidemic, and antihypertensive agents. Within each class, we chose the first medication prescribed within 14 days of an office encounter that was associated with a completed Press-Ganey patient-experience survey. Primary outcome measures were adherence (proportion of days covered ≥0.80) and persistence (no gap in pharmacy fills >1.5x of a days' supply). The main predictor variables were experience-of-care domains, comprising healthcare providers': (i) explanation about problems or conditions; (ii) effort to include patients in treatment decisions; (iii) information about medications; and (iv) information about follow-up care. Experience-of-care was rated on a scale of 1 (very poor) to 5 (very good). Multivariable logistic regression models were fitted to assess associations between adherence or persistence (yes/no) and ratings for each experience-of-care domain (dichotomized as 5 vs. <5), with statistical adjustment for important patient, prescription, and provider characteristics. Odds ratios (ORs) were generated.
Results: Eligibility criteria were met by 5,045 patients. The majority of patients were ≥65 years (61.8%) with a median of 2 CMD medications. Patients receiving antihyperglycemic medications had higher odds of adherence when they had better experience-of-care with "inclusion in treatment decisions" (OR:1.64) and "information about follow-up care" (OR:1.60). Patients receiving antihyperlipidemic medications had higher odds of persistence when they had better experiences-of-care within each domain (ORs:1.38-1.57). Patients receiving antihypertensive medications had higher odds of persistence when they had better experiences-of-care with "inclusion in treatment decisions" (OR:1.52) and "information about medications" (OR:1.55).
Conclusion: In an ambulatory-care setting, better experience-of-care with a healthcare provider in making shared treatment decisions was consistently a positive predictor of adherence/persistence. The relationship between other domains of experience-of-care and adherence/persistent differed by therapeutic class. Improving adherence or persistence to CMD medications through better patient experiences with their healthcare providers will likely require tailored approaches.

Keywords: Cardiovascular Disease, Observational Studies, Communication between Patients and Providers, Diabetes, Clinical Decision Making, Chronic Disease, Patient Experience / Satisfaction

P5.09
A Shared Medical Appointment on the Benefits and Risks of Opioids in Chronic Pain Management: Evaluation of a Pilot Program in an Ambulatory Setting

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Background: We sought to evaluate a pilot shared medical appointment (SMA) designed to educate patients on the safe use of opioids and build empowerment in self-managing chronic pain (CP).
Methods: This prospective study was conducted at an ambulatory clinic within a healthcare system in Northern California. The pilot SMA began in February of 2016. The SMA is a single 90-minute billable office appointment, led by a primary-care physician to a group of 15-20 patients. Patients were included in the study if they were adults with a CP condition and referred to the SMA by a clinic physician. Data were collected by a brief survey administered to patients immediately before and immediately after the SMA. In addition to demographics and clinical characteristics, the survey collected information on four patient-experience domains: (1) understanding of CP; (2) confidence in CP self-management; (3) confidence in healthcare providers' ability to help manage CP; and (4) satisfaction with care received within the healthcare system for CP. Domains were measured on a scale of 0 (worst) to 5 (best). Mean differences in pre-post ratings were assessed by a paired t test. A $p<0.05$ was considered statistically significant.
Results: Between February and August 2016, 130 patients attended the SMA and completed the survey. The majority of patients were ≥50 years of age (69.6%) and 56.2% were female. The most prevalent CP condition was back/neck pain (73.8%), followed by joint/bone pain (53.6%); 63.8% of patients reported >1 CP condition. In a comparison of pre-post responses, patients showed statistically significant increases in confidence in self-managing CP (+0.44; 95% confidence interval [CI]: 0.29-0.59; $P<0.001$) and in their healthcare providers' ability to help manage CP (+0.28; 95% CI: 0.14-0.43; $P<0.001$). No changes were observed in patents' understanding of, or satisfaction with care received for, CP.
Conclusion: In an ambulatory-care setting among patients with various CP conditions, an SMA targeting the risk and benefits of opioids was associated with prompt improvements in patients' confidence in self-managing CP and in their healthcare providers' ability to help manage CP. Such confidence can lay the foundation for increased patient engagement and activation in pain management.

Keywords: Human Subjects Research, Program Evaluation, Communication between Patients and Providers, Chronic Disease, Patient Experience / Satisfaction

P5.10
Comparative Effectiveness of Clinical Intensive Behavior Therapy for Obese Adults

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Background: About one-in-three adults are obese in the U.S., but the delivery of clinical weight loss counseling is infrequent. The Centers for Medicare and Medicaid Services began reimbursing for Intensive Behavior Therapy (IBT) for obese adult beneficiaries in late 2011, but the real-world effectiveness of IBT has not been rigorously evaluated. This study compared weight change over one year between obese adult patients who did and did not receive IBT.
Methods: A retrospective cohort of obese adult Virtual Data Warehouse members from the Marshfield Clinic Health System was assembled. Two groups were compared, including adult patients who had: (1) ≥1 IBT visit, vs. (2) no IBT visits. The comparison group was matched on BMI, age, sex, and healthcare coverage. The primary outcome was body weight over one year. Weight loss surgery patients were excluded.
Results: There were 107 patients exposed to IBT (~1% of those eligible) and 320 in the matched unexposed group. Patients who received IBT were 79% female and 72% elderly, with a mean (SD) baseline BMI of 39.8 (7.4) kg/m2. IBT patients completed a median of five visits over one year, with visits being led predominantly by Registered Dietitians. Visit attendance dropped quickly though, with just 1% of IBT patients completing all 22 allotted visits. Body weight in the matched comparison group remained stable over one year, whereas IBT patients lost 3.9 (8.2) kg ($p<0.001$).
Conclusion: Clinic-based IBT was moderately effective, as participants lost about 4% of their baseline weight over one year, or about one additional BMI unit. As expected, those who did not participate in IBT did not lose weight. But program participation and retention was quite low, as the relatively few patients exposed to IBT also completed very few of their allowable IBT visits, even after accounting for 6-month restrictions on program eligibility. To impact population level obesity, more research is needed on how to attract and engage obese adults in clinical weight management programs.

Keywords: Evaluation Research, Dissemination and Implementation of Innovations, Health Promotion / Prevention / Screening

P5.12
What Factors Facilitate Weight Loss among Medicaid Beneficiaries Participating in the Diabetes Prevention Program?

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Background: The implementation of the Diabetes Prevention Program (DPP) with culturally diverse and low income participants has had varied success. The We Can Prevent Diabetes (WCPD)

study was a pragmatic 3-arm cluster-randomized trial with Medicaid beneficiaries to evaluate the effectiveness of financial incentives on group-delivered DPP participation and weight loss. The purpose of this analysis is to identify participant and programmatic factors associated with 5% weight loss.
Methods: Among Medicaid participants attending at least 4 of the 16 DPP core sessions, we examined factors associated with 5% weight loss at any time during the DPP core session period or a sustained 5% weight loss over the 16 sessions. The latter was determined using a latent class trajectory analysis. Univariate associations with $p<0.2$ were included in multivariable logistic models.
Results: Among the 658 Medicaid beneficiaries in our analysis, 23% met each of the two outcome measures, 62% were 45-64 years old, 72% were women, 82% were not White, 26% were non-English speakers (Spanish, Somali, Hmong), 76% were obese, 18% received DPP program lead by a community member as a lifestyle coach, and 68% were in a financial incentive intervention arm. After adjustment, attending 9 or more sessions (OR 5.7, CI: 2.6-12.7), reporting physical activity 9 or more times (2.9, 1.4-5.9), and being a Non-English speaker (2.0, 1.2-3.7) were associated with achieving 5% weight loss at any time. Only the latter was associated with a sustained 5% weight loss (2.1, 1.3-3.6). After adjustment, allocation to a financial incentive arm was not associated with either of the 5% weight loss metrics.
Conclusion: Session attendance and physical activity reporting may improve successful weight loss during the DPP program. Non-English speaking participants had the most success in achieving a sustained 5% weight loss. This may be due to tailoring the DPP curriculum to the specific culture, and using members of the community as lifestyle coaches.

Keywords: Pragmatic Trials, Diabetes, Health Promotion / Prevention / Screening, Medicaid / SCHIP, Incentives in Health Care

P05.13
Long-term Outcomes of a Cluster-Randomized Trial Testing the Effects Blood Pressure Telemonitoring and Pharmacist Management

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Background: Hypertension is a common condition and leading cause of cardiovascular disease. We previously reported results of a cluster-randomized trial evaluating a home blood pressure (BP) telemonitoring and pharmacist management intervention, with significant reductions in systolic BP (SBP) favoring the intervention arm found over 6, 12, and 18 months and in diastolic BP (DBP) found over 6 and 12 months. This analysis examined the durability of the intervention effect on BP through 54 months of follow-up.
Methods: The Hyperlink trial randomized 16 primary care clinics having 450 study-enrolled patients with uncontrolled hypertension to either Telemonitoring Intervention (TI) or usual care (UC) study arms. BP was measured as the mean of 3 measurements obtained at each research clinic visit. General linear mixed models utilizing a direct likelihood-based ignorable approach for missing data were used to examine change from baseline to 54 months in SBP and DBP.
Results: BP measurements were obtained from 164 (74%) in UC and 162 (71%) of TI patients at the 54 month follow-up visit. For TI patients, baseline SBP was 148.2 mm Hg and 54 month follow-up was 131.2 mm Hg (-17.0 mm Hg, $p<.001$). For UC patients, baseline SBP was 147.7 mm Hg and 54 month follow-up was 131.7 mm Hg (-16.0 mm Hg, $p<.001$). The differential reduction by study arm in SBP from baseline to 54 months was -1.0 (95% CI: -5.4 to 3.4, $p=0.63$). For TI patients, baseline DBP was 84.4 mm Hg and 54 month follow-up was 77.8 (-6.6 mm Hg, $p<.001$). For UC patients, baseline DBP was 85.1 mm Hg and 54 month follow-up was 79.1 mm Hg (-6.0 mm Hg, $p<.001$). The differential reduction by study arm in DBP from baseline to 54 months was -0.6 mm Hg (95% CI: -3.5 to 2.4, $p=0.67$).
Conclusion: Significant BP reductions in the TI arm relative to UC were no longer seen at 54 month follow-up. More work is needed to ascertain the optimal duration and reinforcement that could be used to maintain intervention benefits over a longer period of time.

Keywords: Cardiovascular Disease

P6.01

Suspected Underdiagnosis of Respiratory Syncytial Virus (RSV) in a Large Health System: Early Findings from EHR Data Exploration and Conversations with a Hospitalist

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Background: RSV is a common virus that infects the lungs and breathing passages. Although it manifests as mild, cold-like symptoms in healthy adults and children, RSV can be life-threatening among infants, the elderly and immunocompromised adults. We set out to describe the adult-patient experience with RSV, examining rates of diagnosis within a large health care system, but quickly learned that the project could not be completed without one stakeholder's (a hospitalist) experience with RSV.
Methods: We conducted a retrospective cohort study of hospitalized adults (18+) with a diagnosis of RSV within a large health system from October 1, 2013-June 1, 2016. RSV was identified by evidence of one or more diagnosis codes (ICD-9 codes: 079.6, 466.11, 480.1, and ICD-10 codes: B97.4, J12.1, J21.0) and/or positive laboratory findings for panels including RSV.
Results: We identified 72 cases of diagnosed RSV across 24 Sutter Health hospitals during the study period. RSV patients averaged 74 years (SD=18.6); 47(65%) were female; 47 (65%) were white, 10(14%) were Asian, and the remaining 15(21%) were other minority. Cases of RSV were disproportionate between hospitals across the system; one hospital accounted for 55(76%) cases. A hospitalist at this site confirmed that in 2014, this facility began ordering a new respiratory viral panel (RVP) offered only through the local public health department. This test, not available at other hospitals, screens for influenza and other respiratory infection including RSV.
Conclusion: The clinical features of RSV may be difficult to distinguish from influenza and bacterial respiratory infections. Although there are currently no specific treatments available for RSV, it is important to distinguish between viral and bacterial origins to minimize inappropriate use of antibiotics. The disparate counts of RSV at the single hospital allowed us to recognize under-diagnosis in our system. We began our study with the objective to describe the RSV patient journey, but adapted to describe its patterns of diagnosis in a multi-hospital health system including a pre-post implementation of RVP testing analysis. Our study highlights the impact of engaging subject matter experts as key stakeholders early in the process.

Keywords: Observational Studies, Engagement of Stakeholders, Hospitals, Health Promotion / Prevention / Screening

P6.02

Exploring prevalence of discussions of e-cigarettes use during tobacco cessation counseling and smokers' understanding of e-cigarette use

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Background: E-cigarettes are increasingly popular among smokers who are using these products to reduce or quit smoking cigarettes completely. The purpose of this study is to explore the prevalence of discussions during tobacco cessation counseling at a Midwestern integrated health system's Tobacco Intervention Program (TIP), topics discussed, and smokers' understanding of e-cigarettes use for cessation.
Methods: Two tobacco treatment counselors recorded logs of e-cigarette discussions which occurred during cessation counseling calls, between May and August 2016. We conducted phone interviews with a purposive sample of 17 smokers (ages 29 to 70 years, 16 were female, 6 were African American, 4 were White, and 7 did not indicate their race) within 3 days of counseling sessions. Eleven participants had not discussed e-cigarettes and 6 had discussed e-cigarettes with their counselors. We analyzed interview transcripts and summarized topics discussed, information sources, information needs, and opinions about e-cigarette use for cessation.
Results: Among 460 counseling sessions, 24 (5%) included discussions about e-cigarettes. Ten of these 24 sessions (42%) occurred during initial enrollment and the remainder occurred during follow-up counseling sessions. All discussions about e-cigarettes were initiated by smokers. Of the 6 smokers who discussed e-cigarettes, the topics discussed were current and previous e-cigarette use, side effects, lack of evidence of safety and effectiveness, addictiveness, and counselor's recommendation against using e-cigarettes. Sources of information about e-cigarettes included television, convenience stores or gas stations, word-of-mouth, news/magazines/online articles, and smoke shops. Participants expressed information needs including side effects, efficacy to help quit smoking, and how to use e-cigarettes. They also perceived advantages (more socially acceptable, lack of secondhand smoke) and disadvantages of e-cigarette use (cost, not helpful to quit smoking, potential health risks and other dangers including explosions, addictiveness).
Conclusion: Discussion about e-cigarettes was not common among smokers and tobacco treatment counselors. Smokers undergoing cessation counseling expressed confusion and need for information about e-cigarette use, generally, and the use of e-cigarettes for quitting smoking. Further research is needed to develop tools to improve patient-provider discussions about cessation and e-cigarette use and to increase patients' knowledge about e-cigarette use.

Keywords: Communication between Patients and Providers, Substance Abuse and Addiction, Qualitative Research

P6.03
Evolving Dashboards: Honing Metrics by Engaging Stakeholders

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Background: Project dashboards provide necessary insight to the impact and value of patient-centered programs in a health care system. When aptly constructed, administration can utilize the dashboard to create a positive feedback loop that enables rapid learning and adaptation. Challenges in creating and modifying a dashboard are common, particularly when information and resources are limited. This can lead to misinterpretation of data and staff frustration. We established a partnership between Sutter Health's Research, Development and Dissemination and the case managers at a two-campus hospital in Alameda County, California to reconstruct their organizational dashboard. We describe the process and lessons learned.
Methods: The original dashboard was framed into 4 sections, 3 describing specific initiatives and one addressing secondary outcomes. To evolve the dashboard, we used an iterative and heuristic process, convening several meetings focused on methodically discussing the value of each section and metric. During these conversations, we engaged the stakeholders by soliciting the function of each initiative as well as the merit of each metric. After discussing which metrics were vital, we created a visual report showing trends in the identified data elements. We then presented the new dashboard to a group of stakeholders and elicited feedback.
Results: Preserving much of the earlier framework, modifications were primarily focused on the metrics. We removed all target values and deprecated metrics that were no longer relevant to the program. Some measurements were redefined to more accurately represent program impact goals while other metrics remained unchanged. Feedback was generally positive and produced productive dialogues concerning program aims and future states.
Conclusion: By taking the time to understand the objectives of the program as well as the strategy, we produced a dashboard that enabled our colleagues to make organizational decisions and identify program successes and weaknesses. The evaluation of each metric ensured goal-alignment and justification thereby eliminating confusion about program intentions and limitations. Additionally, visuals helped focus conversations around key aspects and outcomes, thereby enabling stakeholders to communicate advancements in a cogent manner. Though they require time and flexibility, dashboards are instrumental in reporting on the health of system initiatives.

Keywords: Organizations, Health Care Organizations, Clinical Decision Making, Quality Improvement

P7.01

Patient-Provider Communication During Post-treatment Breast Cancer Care: Findings from a Kaiser Permanente Northern California Pilot Project

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Background: Patient-provider communication is essential to delivering high quality cancer care, including post-treatment when survivors have many complex care needs. In this study, we used data collected for quality improvement from a small, feasibility sample to examine patient perceptions of provider communication and inform the development of a new Oncology Survivorship Clinic model.
Methods: As part of a pilot project conducted at Kaiser Permanente Northern California (KPNC), we surveyed 51 breast cancer patients post-treatment. The survey included a communication measure from the 2011 Medical Expenditure Panel Survey (MEPS) Experiences with Cancer survey evaluating provider discussions of: 1) surveillance for recurrence, 2) late or long-term treatment effects, 3) healthy lifestyle behaviors, and 4) emotional or social needs. We also examined reports of the six core functions of patient-centered communication (i.e. managing uncertainty, responding to emotions, making decisions, fostering healing relationships, enabling self-management, and exchanging information) using a measure from the Health Information Trends Survey (HINTS) 4 Cycle 4 survey. Part of the purpose was to evaluate acceptability of a new Oncology Survivorship Clinic utilizing non-physician providers.
Results: The sample included 51 breast cancer patients surveyed in 2016 within six months of treatment completion. All women were stages 0-3. Overall, sizable proportions received detailed communication about surveillance (65%), treatment side effects (46%), emotional needs (41%), and healthy lifestyles (71%) and the majority received patient-centered communication (range: 60-73% based on core function). Particular gaps were noted related to provider communication about treatment side effects (54%), emotional/social needs (59%), managing uncertainty (35%), and responding to emotions (40%).
Conclusion: Our very preliminary findings suggest that the majority of women had positive communication experiences, including with non-physician providers. However, clear communications gaps existed underscoring future avenues for research and care delivery interventions to address the needs of breast cancer patients more comprehensively.

Keywords: Cancer, Communication between Patients and Providers, Quality Improvement

P7.02

Retrieving medical records within FDA's Sentinel distributed network: Lessons learned during a protocol-based assessment involving 13 data partners

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Background: The US Food and Drug Administration's Sentinel system has developed the capability to conduct active safety surveillance of marketed medical products in a large distributed network. Medical record retrieval in such an environment is logistically challenging and resource intensive. We describe lessons learned during a protocol-based assessment of thromboembolic events (TEE) following intravenous immunoglobulin (IGIV) administration, a project that necessitated chart retrieval requests for a large number of patients from thirteen Sentinel data partners.
Methods: The Sentinel IGIV-TEE workgroup requested medical records pertaining to 442 potential post-IGIV TEE cases identified from the Sentinel Distributed Database (SDD). Charts were requested from thirteen different data partners (including four Health Care Systems Research Network members). Six partners were claims-based health plans (CBHPs), and seven were integrated care delivery systems (ICDSs). Dates of medical records spanned March 2006 – February 2013. Records were received and tracked by the Sentinel Operations Center at Harvard Pilgrim Health Care Institute. We report on the retrieval process, chart retrieval rates, and reasons identified by data partners for non-retrieval by data partner type.
Results: The vast majority of cases identified for record retrieval were from CBHPs (88%). Retrieval processes varied by data partner type: four of the seven CBHPs contracted with vendors to conduct record retrieval across their facilities, whereas the ICDSs relied on internal personnel to either electronically pull charts or seek paper records. These differing processes had implications for troubleshooting missing records and information, resulting in diverse strategies for data partner-facility consultation. Rates of retrieval varied by data partner type (64% in CBHPs vs. 94% in ICDSs), as did speed of retrieval and resources. Reasons records were unobtainable fell into three major categories: inability to map SDD records to patient and provider identifiers needed for retrieval, provider refusal to participate due to legal/compliance/HIPPA concerns, and missing information (e.g., no record of patient at facility, charts for the requested service dates were unavailable).
Conclusion: We will describe key lessons learned, broadly applicable to any chart retrieval project in a distributed environment, and include a discussion focused on the pros and cons of working with multiple collaborators with different data environments.

Keywords: Observational Studies, Research Administration, Contracting, and Operations

P7.03
Leveraging the VDW to Support Implementation of Precision Medicine for Oncology at Catholic Health Initiatives (CHI)

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Background: CHI is implementing a pilot program for precision medicine (PM) in oncology. The application to support this program integrates patients' demographic, clinical, treatment, and outcome data with molecular data from tumor testing into a central data store, which is used to inform personalized treatment options and match individuals with on-going clinical trials. We assessed the extent to which the VDW could support the data needed for this initiative.
Methods: The CIRI Data Science team reviewed data requirements for the application with respect to content and format, and compared these to current VDW specifications. We identified data gaps between the application requirements and the VDW. We also identified data gaps within our own organization to support both of these and explored how we might leverage our partnership with the operations group through this initiative to facilitate acquisition of these data for mutual benefit.
Results: Of the 70 required data elements, 42 elements could be mapped to the VDW specifications (60%). We identified data gaps for patient observations such as functional performance scores, drug orders and administration, and narratives for procedures performed, which the VDW does not capture. The VDW also does not contain information on medications dispensed in in-patient settings. Significant gaps in data currently available at CHI to support the VDW and the PM application exist with pharmacy (medications) and infusion data. Results from this gap analysis have informed on-going discussions with the PM operations team about the feasibility of acquiring these data, which would support both applications, and providing the funding through the PM initiative to do so. Further, we are discussing options for acquiring genomics data generated by PM into our data repository to be available for future research.
Conclusion: Our analysis suggests that the VDW can largely support the PM initiative, which would facilitate broad and efficient implementation of PM across multiple facilities. Data gaps that we identified inform potential need and opportunities for expanding the VDW to support PM initiatives. This effort highlights an example of a bi-directional partnership between research and health care operations, which is an essential component for learning health-care systems.

Keywords: Cancer, Information Technology, Virtual Data Warehouse

P7.04
Validation of a prediction model used at Kaiser Permanente Northwest in collaboration with operations

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Background: The LACE risk score is used by Kaiser Permanente Northwest (KPNW) to identify patients at high risk for hospital readmission or mortality. LACE triggers the delivery of Transitions of Care interventions, to reduce unnecessary readmissions. However, LACE was put into practice before it was validated for KP hospitals. This study validated the LACE model in the KPNW patient population using routine electronic medical record data (not research data from the virtual data warehouse) to evaluate the accuracy and applicability of the predictions. The validation was only possible through collaboration with KPNW operations.
Methods: This is a retrospective study of adult patients hospitalized from August 2014 to July 2015 at Sunnyside medical center (KSMC) at KPNW. Only the initial admission was included. The study outcome was readmission to the hospital or death within 30 days of discharge. The C-statistic was compared to the published value (Van Walraven, et al, 2010). We assessed calibration (accuracy) graphically before and after we updated the LACE model with the KSMC-specific intercept.
Results: Of the 9,699 patients, 10.8% experienced the outcome. The C-statistics for KPNW (0.728) was slightly higher than the published value from Ontario hospitals (0.7114). The published LACE score was well calibrated with the KPNW population (the observed versus predicted risks for the low/mid/high risk groups were: 0.042, 0.102, 0.256 versus 0.053, 0.112, 0.234, respectively). The updated LACE model with the KSMC-specific intercept (i.e., probability in the lowest risk patients) resulted in slightly better calibration (the predicted risks for the low/mid/high risk groups were 0.043, 0.106, 0.247, respectively). To target high risk patients for Transitions of Care interventions, KPNW applies a cut-off of 11 or more LACE points, which resulted in a positive predictive value (PPV) pf 25.6%.
Conclusion: The LACE score validated successfully at KPNW's Sunnyside hospital with only a slight under-estimate of risk in high-risk patients. Updating LACE improved the predicted risk modestly (1.3%) for high-risk patients. KP operations will continue to collaborate with colleagues in research to evaluate LACE+ and other predictors of readmission and mortality.

Keywords: Managed Care (Features), Evaluation Research, Health Care Organizations, Hospitals

P7.06
PreManage ED Evaluation in Hospitals of Alameda County

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Background: In medically-underserved markets, frequent utilization of the Emergency Department (ED) for non-urgent reasons suggests inadequate access to ambulatory care and contributes to suboptimal patient outcomes. Hospital-based interventions are challenging to implement because any single hospital has a limited view of a patient's health story. To address this issue, PreManage ED™ (PMED), a data-sharing platform, has been implemented in six hospitals in Alameda County in Northern California, four Sutter facilities and two Alameda Health System facilities. In the initial stage of the evaluation we characterized PMED use and assessed user acceptance.
Methods: In this study, we defined the population to be anyone with at least one hospital visit to a PMED-participating Sutter facility in the past 30 days, and examined patient ED use from May 30th, 2016 to August 28th, 2016 at the six participating hospitals. Using PMED and EHR data, we recorded application usage, and measured volume of high utilizers (defined as 3+ encounters in 30 days at any of the participating facilities).
Results: During the study period, based on EHR, 47,455 patients made 49,453 encounters at the 4 Sutter Health EDs. PMED identified all encounters plus an additional 690 (1.4%) not found in the EHR. From these patients, PMED flagged 4,633 (10%) as high utilizers, and identified 528 (11%) of these as having a care guideline in place at one of the six facilities. Among the three physicians, two case managers, one nurse and four other staff members who completed the questionnaire, at least 80% responded favorably to all questions concerning usefulness, at least 70% responded favorably to questions of ease of use, and at least 70% had a favorable attitude towards PMED.
Conclusion: Data indicate that PMED is successful at alerting providers to high utilizers in the ED, and there is no evidence that any were missed. Further, PMED was able to flag those with a care guideline in place at any facility, thus reducing the chance that extraneous care guidelines be created. Users had high rates of acceptance, which indicates a high chance of success for implementation of interventions relying on PMED.

Keywords: Program Evaluation, Information Technology, Evaluation Research, Health Care Costs / Resource Use, Hospitals, Access to Services, Incentives in Health Care

P8.01
Payer Decision Making for Pharmacogenetic Tests: Preliminary Results:

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Background: Genetic tests are the fastest growing sector of medicine and medical science, yet there is a dearth of research on access to cancer-related pharmacogenetic tests. The objective is to explore payers' views about management strategies for pharmacogenetic tests, and to describe criteria for coverage decisions, policy challenges and strategies used to overcome these challenges.
Methods: We conducted semi-structured interviews with representatives of US private payers. Interviews were recorded and transcribed verbatim. Using a directed qualitative content analysis, two members of the research team performed open coding of the transcripts in an iterative process, building a provisional code book as coding progressed. Each interview transcript was independently read and coded by two members of the study team.
Results: Payers may not have established coverage policies for single gene tests but even without a policy in place, these are generally accessible on a case-by-case basis. For coverage decision making for pharmacogenetic tests, payers generally followed coverage decision making processes originally established for pharmaceuticals. Some realize that the evidence requirements, which are established for pharmaceuticals, are not applicable to pharmacogenetic tests, particularly because the field is advancing rapidly. 'Outcomes based' risk sharing agreements with diagnostic companies are recognized as a possible option to collect evidence and limiting coverage. Some payers are introducing prior authorization requirements for pharmacogenetic tests to better manage utilization because an established coding system for tests is lacking. Another key challenge from payers' perspective is managing the use of and payment for gene panels. Laboratories provide different combination of genes in their panel tests, thus knowing which genes are tested is a challenge. Some payers do not pay for large gene panels.
Conclusion: Single pharmacogenetic tests are generally readily accessible. However, as we move from single gene tests to gene panels, payers have identified challenges, and ways of overcoming those challenges as the field evolves.

Keywords: Health Care Financing / Insurance / Premiums, Genetics and Genomics

P8.02
Patients' views on the use of personal health information and biological samples for biobank research

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Background: Patients' level of knowledge about and acceptance of participating in health research varies. The increasing use of genetics for research and the emerging strategies of biobanking and precision medicine raise questions about the effects of patient education, patient understanding of health research, and informed consent. Whether these factors vary by patient race/ethnicity is an important, but unexplored issue.
Methods: To explore these issues, multilingual videos were developed through an iterative process and were presented to patients in a community-based healthcare system. These videos presented topics relating to the research process, the relationship between health care and health research, consent, security, and oversight. Twenty focus groups were conducted with African American, Chinese, Hispanic, non-Hispanic White, and South Asian patients. Patients viewed the videos and then answered semi-structured questions in the focus group.
Results: Participants generally expressed a willingness to participate in a hypothetical biobank and they acknowledged the benefits of this type of research. However, willingness to participate depended on their trust in the institution, potential users of the data, and potential outcomes of the research.
Conclusion: Institutional oversight and governance structures can encourage trust among patients if they meet key patient expectations. While most patients did not say they needed to know about each study conducted, they wanted to know that their data will help people in the future, either those with similar characteristics or the general public.

Keywords: Research Ethics, Racial/Ethnic Differences in Health and Health Care, Qualitative Research

P8.03
Access and Reimbursement for Cancer-related Pharmacogenetic Tests and Medications

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Background: Genomic tests are the fastest growing sector of medicine and medical science, yet there is a dearth of research on access to cancer-related pharmacogenetic tests and medications.

The objective of this study is to explore views of clinicians about access to pharmacogenetic tests using qualitative methods.
Methods: We conducted semi-structured interviews with a purposeful sample of clinicians who had prescribed medications that should be guided by pharmacogenetic testing. The purpose of the interviews was to explore knowledge of insurance cost-sharing for test, experienced or perceived barriers to access, strategies used for managing costs. Interviews were recorded and transcribed verbatim. Using directed qualitative content analysis, two members of the research team performed iterative open coding of the transcripts. Each interview transcript was independently read and coded by two members of the study team.
Results: Ten interviews were conducted (8 oncologists, 1 nurse practitioner, 1 nurse). Six of the clinicians practiced in an academic hospital setting and four providers practiced in a community setting. Clinicians described logistical and insurance issues relating to ordering genetic tests and medications. They also reported that they ordered pharmacogenetic tests based on medical need with little communication about insurance with patients; they had few perceived and experienced barriers in access to tests but had limited awareness of coverage of tests; process of ordering tests is variable. In comparison, clinicians were much more aware of financial and administrative barriers to access cancer therapies related to pharmacogenetic testing, including burdensome and lengthy insurance approval and reimbursement processes for both patients and providers and substantial out-of-pocket costs.
Conclusion: Currently, ordering pharmacogenetic tests is less complex than ordering cancer therapies, but this is likely to change in the near future as administrative barriers are introduced to manage volume. Better understanding of the implementation of pharmacogenetic tests into community and clinical settings will help inform future implementation strategies for other more complex genomic technologies to improve patient outcomes.

Keywords: Health Care Financing / Insurance / Premiums, Dissemination and Implementation of Innovations

P8.04
Precision Medicine Decisionmaking Tool: Generic Cost-Effectiveness Analysis Models

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Background: Economic evaluation is integral to informed healthcare decisionmaking worldwide however this research is time consuming and expensive to conduct. It is especially needed in the rapidly growing and changing field of precision medicine in a form that is relevant to national and local decisionmakers. Generic economic evaluation models are proposed as a novel approach to address this critical evidence shortage by transparently adapting published country-specific models to make them generalizable by using available research and allowing users to input local values. The purpose of this study is to apply this approach to develop and test a generic pharmacogenomic economic evaluation model.
Methods: A generic cost-effectiveness model case example was developed to evaluate routine genetic testing in an adult patient population to prevent adverse drug reactions using a published country-specific model. A multi-disciplinary international team used a consensus approach to comprehensively review and modify the country-specific model to incorporate generalizable assumptions and parameter values based on evidence reviews and user-provided input values to reflect local conditions. The new generic model was transparently documented, tested and validated using input values and models from multiple countries to compare the cost-effectiveness results.
Results: Generic model base case and probabilistic sensitivity analysis cost-effectiveness results were estimated for implementing a pharmacogenomic test versus two other strategies without the test for multiple countries using country-specific input values. These results were compared to country-specific model results for the same input values. The incremental cost effectiveness ratios (ICERs) for the generic and country-specific models for 3 countries and 3 subpopulations in one country were consistent in terms of whether the pharmacogenomic test strategy was cost-effective at the country-specific threshold value. Differences between the generic and country-specific model results were largely explained by differences in model structure and assumptions.
Conclusion: A generic pharmacogenomic cost-effectiveness model enabling use of local input values is feasible and can offer an efficient and timely value-based decisionmaking tool. Implementing this approach demonstrates that cost-effectiveness analyses can be rapidly performed without extensive training in decision modeling to provide useful evidence for decisionmaking and facilitate understanding about what conditions can meet cost-effectiveness thresholds.

Keywords: Genetics and Genomics, Economic Studies, Technology Assessment

P8.06
HCSRN Twin Cohort and its Potential Utility

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Background: Family-based studies have historically been considered a powerful strategy when understanding the etiologies of human disease, especially those influenced by genetics. A gold standard in family-based study design includes twin studies due to the unique genetic relationships between twin siblings, but these unique familial relationships are relatively rare and difficult to recruit. Here we demonstrate electronic health record (EHR) systems across multiple HCSRN sites can identify twin families. We further show the utility of such twin cohorts in research using twins identified in Marshfield Clinic's EHR.

Methods: Twins were predicted by searching for patients who shared a common birthdate and last name along with a common home address, contact information, or billing account. The twin prediction algorithm was applied to four different HCSRN sites including Marshfield Clinic, Group Health Cooperative, Geisinger Health System, and Meyers Primary Care Institute. In Marshfield Clinic twins, clinical phenotypes were defined by diagnostic ICD9 coding. For each phenotype, a measure of familial aggregation and relative risk (RR) was calculated by assessing disease concordance in twin families. To further assess potential genetic etiologies, we compared familial aggregation in opposite-sex twins (dizygotic twins) and same-sex twins (enriched for monozygotic twins).
Results: A total of 21,699 families of twins (43,398 individuals) were identified across four HCSRN sites including 8,242 families of twins from Marshfield Clinic's EHR. Of the 5,598 phenotypes assessed by familial aggregation analysis, 1,222 phenotypes were statistically significant ($p<8.9E-6$). When simply measuring relative risks across all diseases, 91% of phenotypes had $RR>1$. There was a 4.2 fold enrichment of disease concordance in same-sex twins compared to opposite-sex twins for phenotypes with the largest RRs. Many of these phenotypes were likely influenced by genetic factors.
Conclusion: This study has generated one of the world's largest cohorts of twins. Unique to this population is the linkage to extensive phenotypic data through an electronic health record across multiple healthcare institutions. More broadly, with a significant proportion of diseases aggregating in families of twins, these results may emphasize the significant benefit of incorporating family data when predicting, preventing, and treating many diseases for the advancement of precision medicine.

Keywords: Genetics and Genomics, Epidemiology

P9.01
Interactive Visualization of a Patient's Electronic Health Information to Assist Manual Chart Review using Tableau

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Background: Identification of many important health conditions requires synthesis of subtle clinical observations diffusely recorded in electronic health record (EHR) notes, making manual chart review the only viable method of collecting such information. Clinical documentation of problem use of prescription opioids, including abuse and addiction, is an example. A research project we conducted required determining whether problem opioid use was documented in the charts of 2,000 patients receiving chronic opioid therapy during a nine-year observation period. To enhance thoroughness and efficiency, we provided chart abstractors interactive graphical summaries of selected information from each patient's EHR as an abstraction aid.
Methods: We used pilot chart reviews and expert opinion to identify four types of information considered useful for identifying clinical documentation of problem opioid use: 1) the timing, type, and days' supply of opioid fills, 3) encounters, 3) diagnoses including behavioral health, substance abuse, and chronic pain conditions, and 4) mentions in clinical notes of terms related to problem opioid use. We obtained structured data from the virtual data warehouse. We used natural language processing (NLP) to extract information from clinical notes. We created longitudinal graphical displays of each content area using Tableau® (www.Tableau.com), a business intelligence software product that simplifies the creation of graphical representations and real-time exploration of complex data. Graphics were juxtaposed on "dashboards" with shared time scales and drillable details (e.g., details of medications fill, text surrounding NLP-extracted terms) facilitating a visual synthesis of multiple types of potentially relevant information.
Results: Five experienced chart abstractors used the interactive graphics on one screen and the Epic® EHR interface on a second screen to conduct each chart review. Abstractors reported that the graphics facilitated efficiency through more rapid detection of periods of care where problem opioid use may be documented (e.g., ER encounters coinciding with early opioid refills). Particularly valuable was the ability to "see the larger picture" while also being able to drill into the details of specific events.
Conclusion: Graphical visualization of information from EHRs can assist manual abstraction of health conditions when determinations about the presence of those conditions require synthesis of diffusely recorded content in voluminous charts.

Keywords: Information Technology, Substance Abuse and Addiction, Natural Language Processing

P9.03
Developing and validating a Kaiser Permanente EHR data transfer to external research partner using software designed for health data interoperability

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Background: Chronic obstructive pulmonary disease (COPD) affects over 12 million Americans, is responsible for 800,000 hospitalizations each year, and is America's 3rd leading cause of death. The continuing lag between clinical practice and treatment makes COPD ripe for patient-centered outcomes research. The COPD Foundation's PCORnet funded COPD Patient Powered Research Network (COPDPPRN) created a COPD research repository of >5,000 participants. 346 of these are represented in Kaiser's PCORnet PORTAL database and in the COPD Outcomes-based Network for Clinical and Effectiveness Translation (CONCERT). Our objective is to develop and validate a scalable methodology for linking and sharing consented patients' comprehensive EHR data across research data partners.
Methods: A sub-database containing the EHR data for the subset of COPD PPRN-consented PORTAL patients can be accessed via a RESTful API developed by Kaiser. Utilizing the Corepoint Integration Engine to manage authenticated communication, linkage is verified and data securely transferred to a DatStat shell at COPDPPRN. To validate, the dataset will be generated at DatStat to compare to Kaiser CONCERT EHR data as Gold Standard. Validation includes data accuracy/integrity and identifies potential organizational/systematic/technical errors made during transfer.
Results: Using the PCORnet Common Data Model structure, we populated a sub-database with COPDPPRN-consented CONCERT patients' EHR data. Kaiser and DatStat built API's to provide secure access to the data using Corepoint technology. The API, called via a secure HTTPS web request, utilizes multi-factor authentication. Upon validation of the client credentials and existence of the requested data, the API returns the participant's data in encrypted XML format. Corepoint maintains the private key to decrypt the XML data and transfer to DatStat. Data transfers are scheduled and validation will be completed by early 2017. Report on the preliminary results is planned for presentation at HCSRN 2017.
Conclusion: This work is the first step towards creating a fully functional, scalable system for linking patient data across sources in the PCORnet enterprise to enhance PPRN data for research. Once the API is tested and validated it can be adapted to access EHR data across the PCORnet partners.

Keywords: Technology Adoption and Diffusion, Information Technology, Virtual Data Warehouse, Technology Assessment

P9.04
Population Insight Tool: A Novel Visual Interactive Query Interface to Virtual Data Warehouse (VDW)

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Background: In 2013, KPNC developed a VDW query tool to enable clinicians and investigators to conduct rapid, on-line simple analyses of key VDW variables without requiring knowledge of SQL or other programming languages. However, the tool's usability has been limited by the user interface: results were returned in a tabular format which required the user to take time to study the results (or pre-process them) before making interpretations or gathering insights. The KPMAS and KPNC team collaborated to overcome this barrier to usability with the design of Population Insight Tool. Our goals were to: 1) Explore new ways to use technology to accelerate users' abilities to query the VDW; and 2) Develop a user-friendly approach to enhance users' abilities to sift through the results for insights.
Methods: Our main challenge was how to handle changes to the output views based on impromptu changes to the user queries. No "off-the-shelf" business intelligence tools (like Tableau) could be used, because they all required prior knowledge of user queries to pre-build output views - so we had to design our own solution. Front end web development framework was used to build a user-friendly query page with drag-and-drop and search-by-keywords features to build queries. The insight tool system architecture was set up to leverage KPNC query engine to query the KPMAS VDW Teradata database and return results. New programs were designed to process the result data and automatically generate a customized dashboard with interactive visuals.
Results: For the clinician/ investigator query 'Show patient cohort with diagnosis of multiple sclerosis,' the insight tool shows results stratified by demographics, along with other user selected query items. Users can directly interact with data to rapidly conduct more detailed analyses and gather insight about – specific subgroups such as female black, non-hispanic, 21-35 age-group cohort.
Conclusion: The insight tool was designed to empower clinicians/investigator to query VDW data directly. It is built to give more flexibility for data analysis with faster access to results in an easy to understand format. It also offers feature to drill down to more effectively help the user understand nuances in the data.

Keywords: Information Technology, Virtual Data Warehouse

P9.05
Early Detection of Heart Failure Using Electronic Health Records: Practical Implications for Time before Diagnosis, Data Diversity, Data Quantity and Data Density

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Background: Using electronic health records (EHR) data to predict events and onset of diseases is increasingly common. Relatively little is known, though, about the tradeoffs between data requirements and model utility.
Methods: We examined the performance of machine learning models trained to detect pre-diagnostic heart failure (HF) in primary care patients using longitudinal EHR data. Model performance was assessed in relation to data requirements defined by: the prediction window length (time before clinical diagnosis), the observation window length (duration of observation prior to prediction window), the number of different data domains (data diversity), the number of patient records in the training data set (data quantity) and the density of patient encounters (data density). A total of 1,684 incident HF cases and 13,525 gender, age-category, and clinic matched controls were used for modeling.
Results: Model performance improved as: 1) the prediction window length decreases, especially when less than 2 years; 2) the observation window length increases but then levels off after 2 years; 3) the training data set size increases but then levels off after 4000 patients; 4) more diverse data types are used, but, in order, the combination of diagnosis, medication order, and hospitalization data were most important; and 5) data were confined to patients who had 10 or more phone or face-to-face encounters in two years.
Conclusion: These empirical findings suggest possible guidelines for the minimum amount and type of data needed to train effective disease onset predictive models using longitudinal EHR data.

Keywords: Cardiovascular Disease, Observational Studies, Primary Care, Chronic Disease

P9.06
Deafening Silence: When Is Data That's Not There, Missing?

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Background: The VDW group has done good work describing subpopulations with known-compromised data capture. This information is now programmatically available to projects in the form of enrollment variables, and has been evaluated once thus far--

largely favorably. But that work has been largely descriptive--data rates have been calculated and evaluated against the weak criterion that rates in the known-compromised group be graphically distinguishable from the rest. A next step for this work is to develop informed expectations about what those rates should be, so we can evaluate capture against those benchmarks. This poster describes one small step in this direction.
Methods: I developed a crude model predicting the number of Ambulatory Visits a given enrollee should have on the basis of age and sex. I then used this model to generate predicted visit counts for several groups of enrollees and compared them to the observed counts. I gathered annual AV count data on a cohort of approximately 200 thousand people enrolled in 2013 at Group Health, whose data capture was most sure. Like much count data, these counts are incredibly skewed. Rather than attempt a sophisticated statistical model, I decided to use median counts by sex and age category. This should generate very conservative predictions, as it basically ignores visits by the numerous "frequent flyer" patients whose counts are well above the median. I then used that model to make predictions of the total number of visits for each of several groups of enrollees in each of the 48 months between 2012 and 2015, and calculated the actual AV counts for comparison.
Results: In four of the six groups evaluated, predictions were indeed substantial underestimates of the observed number of AVs. In two smaller groups however, predictions actually overestimated the total number of AVs. Given the modest nature of the predictions, these two groups bear further investigation for sufficiency of data capture.
Conclusion: While my results are unfortunately ambiguous, the work does demonstrate the value of empirically developing a benchmark against which we can evaluate our data capture. Doing so can help focus our attention in data quality improvement efforts.

Keywords: Information Technology, Virtual Data Warehouse

P9.08
Crusade for Cancer Data: How a Non-SEER Site Populated the VDW Tumor Table

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Background: The VDW tumor table is a valuable data resource available to Cancer Research Network (CRN) researchers to examine the feasibility of potential projects or to conduct research. The Surveillance, Epidemiology and End-Results (SEER) registry provides timely and efficient data for VDW tumor tables. HealthPartners Institute (HPI) is a non-SEER site that has developed alternative approaches (claims-based algorithms, medical record review) to obtain tumor data and participate in cancer-related research. These approaches can identify false positive cases, be time-consuming and costly.
Methods: Over the past 15 years, HPI has undertaken numerous activities to identify a viable electronic data source to populate the VDW tumor table and thereby more readily participate in multi-site studies within the CRN. These activities included two internally-funded capacity-building projects. The first, conducted in 2009, examined the ability to connect with the population-based cancer registry, the Minnesota Cancer Surveillance System (MCSS), maintained by the Minnesota Department of Health (MDH), to identify cancer cases with specific diagnostic and treatment criteria preparatory to research. In 2011, our second project explored linking with the Electronic Registry System (ERS) at HealthPartners-owned hospital, Regions. More recently, HP increased its tumor registry case ascertainment with the inclusion of care centers in Eastern Minnesota and Western Wisconsin, as well as the merging of another health system, Park Nicollet.
Results: The 2009 feasibility project demonstrated that MDH was able to link 79% of cases identified by HP claims data (non-matches occurred from misclassification by HP-created algorithms, patients not living in Minnesota, or patients with cancers different from those identified by HP records). Concordance for determining eligibility (stage, date of diagnosis) was high, but not 100%. The 2011 feasibility project demonstrated that HPI programmers can access Regions cancer registry data directly via the ERS similar to other data sources (e.g., Clarity, EPIC) through procurement of a software license and training. The project programmer extracted registry cases from ERS, mapped data elements to variables outlined in the VDW tumor tables, and performed quality assurance checks provided by the VDW tumor work group. Thus, ERS data is currently our electronic source for the VDW tumor table. Following the expansion of HealthPartners care network to include Lakeview Hospital, three Cancer Centers of Western Wisconsin (CCWW) sites (Westfields Hospital and Clinic, Amery Hospital and clinic, and Hudson Hospital and Clinic), and the 2014 merger of HealthPartners and Park Nicollet organizations, HPI is currently extracting tumor data from the ERS at these sites and Park Nicollet's owned hospital, Methodist. Ongoing efforts to enhance the HP tumor file includes obtaining any available tumor information from MDH for all HP patients and members.
Conclusion: After time and vigorous exploration, HPI's tumor data is part of the Cancer Counter. More recent activities have enriched this data. HPI is in a better position to not only conduct internal cancer research, but also to participate in multi-site studies. A visual timeline of the activities undertaken to identify and connect with tumor data sources, as well as the challenges, successes, and proposed future work will be presented.

Keywords: Cancer, Virtual Data Warehouse

P10.01
Factors Associated with Participations and Goals Achievement in an Employee Wellness Program Offering Biometric Screenings and Premium Discounts

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Background: Since 2012, Geisinger Health System (GHS) has redesigned its employee wellness program MyHealth Rewards (MHR) by requiring biometric screenings and goal achievements for blood pressure, body mass index, glucose and cholesterol levels to be eligible for premium discount in subsequent year. The objective of this study is to determine what baseline employee characteristics were associated with MHR participations and goals achievements.
Methods: Claims data from 2011 to 2015 were obtained from GHP, restricting to continuously enrolled members. 4 mutually exclusive cohorts were identified: GHS employees who met goals in all years (Group 1; N=2842); met goals some years (Group 2; N=3999); never joined MHR (Group 3; N=4398); and non-GHS employees (N=24061). A multi-nominal logit model was used to estimate the probability of being in one of the groups as a function of demographics, chronic conditions, and utilization at the baseline (2011).
Results: Compared with non-GHS employees, female employees were less likely to never participate (Group 3; OR 0.61, p<0.01) and more likely to meet goals in all years (Group 1; OR 2.7, p<0.001). Employees with more chronic conditions or above 45 at the baseline were less likely to be in Group 1 (OR <0.08, p<0.01). Specialist visits at the baseline was associated with higher likelihood of being in Group 1 (OR 1.28, p<0.01), but ED visits were associated with the opposite (OR 0.77, p<0.01).
Conclusion: Employees' pre-program baseline characteristics predict the employee participation and goal achievement patterns in subsequent years. Specifically, there was a self-selection of employees who were female, younger, and healthier prior to the program implementation. This suggests that employees' baseline characteristics should be taken into account in designing and evaluating similarly designed employee wellness programs.

Keywords: Health Care Financing / Insurance / Premiums, Program Evaluation, Demographics, Social Determinants of Health, Complex Disease Management / Multiple Chronic Conditions, Health Promotion / Prevention / Screening, Incentives in Health Care

P10.02
Impact of Employee Wellness Program on Health Outcome: A Propensity Score Matched Analysis

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Background: Since 2012, Geisinger Health Plan (GHP) has redesigned its employee wellness program MyHealth Rewards (MHR) by requiring biometric screenings and goal achievements for blood pressure, body mass index, glucose and cholesterol levels to be eligible for premium discount in subsequent year. This study is designed to evaluate the impact of MHR on stroke and myocardial infarction (MI).
Methods: Claims data from 2011 to 2015 were retrieved from GHP, restricting to continuously enrolled members. 4 mutually exclusive cohorts were identified: GHS employees who met goals (Group1); met goals some years (Group 2); never joined MHR (Group 3); and non-GHS employees (Group 4). After one-to-one propensity score matching (PSM) was used to balance the baseline characteristics (e.g. sex, age, plan type, chronic condition, and utilizations), 11,239 GHS employees (Group 1, 2842; Group2, 3999; Group 3, 4398) and matched non-GHS employees of equal numbers were included for analyses. Kaplan-Meier method and Cox proportional hazards models were used to estimate the difference in time to first stroke or MI between GHS and non-GHS employees.
Results: After one-to-one PSM, both GHS and non-GHS cohorts had similar baseline characteristics; yet, GHS employees in Groups 1 and 2 had a consistently higher probability of an event-free outcome at each time period since 2011 than the non-GHS employees, both in terms of stroke and MI. The differences were not statistically significant, however. The estimated hazard ratios associated with the GHS employee status across all subgroups were 0.75 (P=0.14) for stroke and 0.91 (P=0.39) for MI. In contrast, Group 3 (never enrolled) has higher risk of MI (HR 1.18, P=0.30) but lower risk of stroke (HR 0.68, P=0.25).
Conclusion: Although the estimated MHR effects were not statistically significant, the results are consistent with the expectation that MHR may help prevent adverse health outcomes. This expectation is further supported by a separate analysis showing long-term cost of care savings associated with MHR.

Keywords: Health Care Financing / Insurance / Premiums, Program Evaluation, Demographics, Complex Disease Management / Multiple Chronic Conditions, Health Promotion / Prevention / Screening, Incentives in Health Care

P10.03
Impact of a Biometric Screening and Premium Incentive-Based Employee Wellness Program on Cost of Care and Utilization

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Background: Since 2012, Geisinger Health System (GHS), in collaboration with Geisinger Health Plan (GHP), has redesigned its employee wellness program MyHealth Rewards (MHR) by requiring biometric screenings and achievement of a set of pre-defined goals for blood pressure, body mass index, glucose and cholesterol levels to be eligible for premium discounts in the subsequent year. GHS employees can voluntarily choose to enroll in MHR in a given year, and to qualify for the premium discounts, they are required to meet all the biometric goals prior to November of the same year.

Methods: This study evaluates the impact of MHR on the employee costs of care and utilizations. A difference-in-differences approach using a generalized linear model was used to estimate the observed and expected values in terms of per-member-per-year (PMPY) total medical allowed amounts and healthcare utilization. The intervention group consisted of GHS employees (N= 11, 239) and the comparison group consisted of non-GHS employees (N= 24, 061) who remained GHP commercial members throughout the study period (2011 – 2015) and did not switch between the two groups. 2011 was defined as the pre-intervention period.
Results: For medical costs excluding prescription drugs, there were no cost savings PMPY in 2012 and only a minor cost saving of $230 (5.0%; p=0.183) PMPY in 2013. In 2014 and 2015, however, there were significant cost savings of $412 (8.4%; p=0.026) and $480 (8.8%; p= 0.024) PMPY respectively. These savings were driven by reductions in outpatient costs, which increased from $112 (5.8%) to $232 (9.0%) in 2014 and 2015 (p=0.1).
Conclusion: A similarly designed employee wellness program that provides premium discounts for meeting a pre-defined set of biometric goals may reduce long-term cost of care among the employee population.

Keywords: Health Care Financing / Insurance / Premiums, Financial Analysis, Evaluation Research, Health Care Costs / Resource Use, Economic Studies, Health Promotion / Prevention / Screening, Incentives in Health Care

P10.04
"Apple or PC:" Creating a Patient-Centered Tool to Help Medicare Beneficiaries Choose Prescription Drug Plans

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Background: Choosing a Medicare Part D prescription drug plan is complicated; there are many plans to choose from and the appropriateness of the coverage varies depending on medication needs and patient preferences. It's been well documented that Medicare beneficiaries report frustration with choosing a prescription plan due to the large number of options and, in focus group research, we found that many older adults expressed a desire for expert guidance. We designed a patient-centered online Part D plan selection tool (CHOICE) to simplify their choice process and provide personalized, expert recommendations. In this study, we examined patient use of the new tool and the existing decision tool available at Medicare.gov.
Methods: This ethnographic comparative usability study engaged 44 patients during the 2016 Open Enrollment period (October 15 – December 7, 2015). Participants were observed as they chose their drug plan using Medicare.gov and one of three versions of CHOICE. The versions varied in the amount of expert guidance provided on drug plans. The participants completed an exit survey regarding their experience. Descriptive statistics were used to analyze the survey data. The observations were video recorded and field notes were analyzed thematically.
Results: One usability tester likened CHOICE as an Apple product and Medicare.gov a PC product. User survey results suggest that the time-on-task was much shorter when using CHOICE. Participants were significantly more satisfied with the process of choosing a Part D drug plan using CHOICE (44%) than with using the Medicare.gov (14%); 46% of participants strongly agreed that they understood the information in CHOICE and 45% strongly agreed that CHOICE was easy to use compared to 20% and 16%, respectively when using Medicare.gov ($p<0.05$). Participants randomized to two arms of CHOICE with increasing levels of expert guidance were more likely to choose a drug plan other than their current plan than those using Medicare.gov ($p<0.15$).
Conclusion: Many user-centered features of CHOICE improved patient experience and enabled them to choose plans more consistent with expert recommendations. We are mounting a large scale 3-arm randomized controlled trial in the 2017 Open Enrollment period to test CHOICE.

Keywords: Ethnography, Observational Studies, Information Technology, Evaluation Research, Qualitative Research, Medicare, Health Care Costs / Resource Use, Technology Assessment, Patient Experience / Satisfaction

P11.01
Adherence and Persistence with Therapy Among Newly Prescribed Fibromyalgia Patients in Israel

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Background: Fibromyalgia (FM) is a chronic debilitating disorder affecting over 4% and ~1.5% of the female and male adult population worldwide, respectively. The study aimed to assess one-year persistence and adherence with therapy among newly prescribed FM patients and to identify factors associated with therapy discontinuation.
Methods: Included were adult members of Maccabi Healthcare Services, a 2-million member health maintenance organization in Israel, diagnosed with FM between 2008 and 2011. Persistence and adherence with anti-convulsants and anti-depressants were analyzed among newly prescribed FM patients, by comparing those with ≥2 medication dispenses vs. one or none and by examining time to treatment discontinuation (≥120 days) and proportion of days covered (PDC) with medication during one year from first dispense. Logistic regression models were constructed for multivariable analyses.
Results: The majority of 3,932 eligible FM patients were female (90%) and 41.2% were already prescribed FM medications prior diagnosis. Of the remaining 2312 patients, 56.1% were issued a prescription, 45.0% had at least one medication dispensed in the year following diagnosis and only 28.8% had at least one additional dispense within a year from the first dispense. One-year treatment discontinuation was highest for tricyclic antidepressants (91.0%) and lowest for SSRI/SNRI antidepressants (73.7%). In multivariate analysis having ≥2 dispensed FM medications vs. one or none was associated with baseline anxiety and depression (OR=1.86 95% CI: 1.33-2.60, p<0.001) and with migraines (OR=1.34, 95% CI: 1.03-1.73). Half of the patients (50.9%) had <20% of days covered by any medication during the year and only 11.6% were adherent (PDC>=80%). Socioeconomic status was the only factor associated with having PDC>=80%: 7.1% vs. 14.4% were adherent in the lowest and highest SES quintiles respectively, p-for-trend=0.017.
Conclusion: Among newly prescribed FM patients, use of FM medications is remarkably low, possibly related to high cost, low effectiveness and/or intolerability. Additional research is required to investigate whether these patients utilize non-pharmacological therapies and to what extent they are effective. Nonetheless, it is important to endorse adherence intervention initiatives in order to lower the burden and costs for patients and providers alike and to improve the quality of life of the patients.

Keywords: Clinical Practice Patterns / Guidelines, Chronic Disease, Health Care Costs / Resource Use, Pharmaceuticals: Prescribing, Use, Costs

P11.02
Do Preventive Visits among Seniors Lead to Better Completion of Recommended Preventive Services?

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Background: Under the Affordable Care Act, annual preventive visit became fully covered by Medicare. We assessed whether the use of preventive visit, as compared to frequent use of routine non-preventive primary care visit, is associated with higher completion rates of recommended preventive-care services.
Methods: Primary-care patients (aged 65-85) in a large, mixed-payer ambulatory-care organization between 2011 and 2014 were identified (N=184,576). We examined preventive-care services recommended by United States Preventive Services Task Force guidelines or the National Committee for Quality Assurance. Services were categorized as: 1) “Preventive Screening”: colorectal cancer screening, breast cancer screening; 2) “Management of Chronic Conditions”: annual monitoring for patients on persistent medications (ACE Inhibitors/ARBs or diuretics), coordinated diabetes care; and 3) “Preventive Counseling”: smoking cessation counseling, discussion of end-of-life care planning. We estimated the likelihood of completing each service by preventive visit status (yes/no) and the frequency of non-preventive primary-care visits. We used a mixed-effect multivariate logistic regression, controlling for patient demographic and clinical characteristics and provider characteristics, with patient random effects to take into account clustering across multiple observations per patient. Odds ratios (OR) were generated. A statistical significance level of 0.01 was used.
Results: Seniors who had a preventive visit, versus those that did not, were more likely to have completed recommended services for “Preventive Screening” (OR: 1.77-1.85), “Management of Chronic Conditions” (OR: 1.32-1.48), and “Preventive Counseling” (OR: 3.04-3.95). The likelihood of completing preventive services increased with the frequency of non-preventive primary-care visits for some services, but to a much smaller degree; for one (OR: 1.21-1.25), two (OR: 1.10-1.95), three (OR: 1.23-2.29), and four or more (OR: 1.29-2.92) versus no non-preventive visit. Predicted probability of completing “discussion of end-of-life planning”, for example, was larger with one preventive visit (without non-preventive visit) (31.12%) than with 4+ non-preventive primary-care visits (without preventive visit) (21.95%).
Conclusion: Seniors with preventive visits were more likely to compete recommended preventive services those who make frequent non-preventive visits. This was particularly prominent for “Preventive Counseling” services which are time-consuming and thus difficult to be handled during routine non-preventive visits. Annual preventive visit may be necessary for improved preventive care for seniors.

Keywords: End-of-Life Care / Decisions, Cardiovascular Disease, Aging/Elderly/Geriatrics, Observational Studies, Diabetes, Health Policy / Politics / Law /Regulation, Chronic Disease, Health Care Costs / Resource Use, Health Promotion / Prevention / Screening

P11.03

Emergency Department Use in a U.S. Healthcare System, Before and After the Implementation of the Coverage Provisions of the Affordable Care Act

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Background: Overcrowding of hospital emergency departments (EDs) presents a major public health issue across the U.S. Overcrowding has been linked to decline in quality of care and patient satisfaction, decreased revenue, and increased patient mortality. In January, 2014, the full implementation of the Affordable Care Act (ACA) extended health coverage to 32 million Americans. The literature has subsequently reported a post-ACA rise in ED utilization, but early analysis of two hospitals in the Sutter Health (SH) system demonstrated a delayed effect. We sought to characterize the longitudinal changes in ED utilization at 21 EDs across SH before and after ACA.
Methods: We reviewed demographic and hospital accounts data from the California Office of Statewide Health Planning and Development (OSHPD) for all 21 SH EDs throughout Northern California. We compared utilization and examined trends over time, from 2010-2015. We categorized 5 types of trends over time as follows: NC=no change, CI=constant increasing slope, CD=constant decreasing slope, DI=delayed effect until 2014 with increase thereafter, and DD=delayed effect until 2014 with decrease thereafter.
Results: From January, 2010- December, 2015, across the system 15 (71%) EDs followed a DI pattern; 4 (19%) EDs CI; 1 NC; and 1 was unclassified. For Medicaid patients, 15 (71%) EDs followed a DI pattern. For all hospitals, self-pay patients followed DD patterns of utilization. Use by Medicare patients primarily followed an NC pattern: 17 (81%). Overall utilization increased by 20% during the study period. This was driven by a 6% increase in the first 4 years followed by 12% increase for the last 2 years of the study period.
Conclusion: ED use across the Sutter system increased after the implementation of the ACA. The escalation in annual ED visits was driven by a sharp increase after the expansion (full implementation). In fact, utilization increased four times faster in the two years post-full-implementation than in the first four years of the initial implementation, and was attributable to a shift in uninsured patients (self-pay) gaining Medicaid or commercial insurance coverage. Further research is needed to determine how these changes affect costs and the possible implications for SH EDs.

Keywords: Ambulatory/Outpatient Care, Health Care Costs / Resource Use, Hospitals, Access to Services

P11.04

Correlates of High Performance after Implementing Lean Redesigns in Primary Care

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Background: This mixed-methods study leverages activities of a large, ambulatory delivery system that used Lean techniques to redesign primary care workflows. Though Lean has been shown to improve quality and reduce costs, there are no studies examining organizational or provider characteristics associated with Lean improvements. We describe contextual features of primary care departments that demonstrated greatest performance improvements after implementing Lean redesigns.
Methods: We identified departments with highest post-Lean improvements on performance metrics including: efficiency, productivity, patient satisfaction, and clinical quality. Changes in each metric were based on segmented regressions that modeled: (1) immediate change following Lean implementation; and (2) gradual change over time. Departments were identified as high performing if either of these charges were positive and statistically significant, with no decreases in other metrics. We examined bivariate associations between high performing departments and contextual variables gathered from a survey of 860 physicians and staff, with responses aggregated to the department level. Findings were triangulated with qualitative data gathered from nearly 200 interviews and focus groups with physicians, staff and organizational leaders.
Results: High performance was associated with a high perceived history of change, as compared with low change (29.5% vs. 18.9%, $p<0.05$). High-performing departments were also more likely to have lower levels of provider burnout, compared to those with higher burnout (30.8 vs. 19%, $p<0.05$). These findings are consistent with qualitative findings describing Lean changes as supporting improved care delivery: “We want to be getting our work done in a good clip and taking care of our patients…Lean gave us the framework to improve that.” While burnout was prevalent, hope was expressed that Lean redesigns may assist with workload: “Just grinding out patients…and trying to keep up with documenting…volume of e-messages, phone calls, labs…it’s just daunting. It feels like emptying the ocean with a teaspoon; it’s nonstop and to think, ‘oh, I might have help’…”
Conclusion: Perceptions of change and provider burnout were associated with changes in performance metrics. Findings suggest that Lean redesigns may have a dual effect on performance by not only altering work processes, but potentially ameliorating burnout and allowing providers to provide more effective patient care.

Keywords: Organizations, Observational Studies, Primary Care, Ambulatory/Outpatient Care, Qualitative Research, Health Care Organizations, Quality Improvement

P11.05
Sustainment of Lean Redesigns in Primary Care Clinics

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Background: While Lean is rapidly increasing in popularity within the healthcare sector, most studies to date focus on discrete and narrow uses of Lean techniques to solve isolated problems. In this study, we examine the implementation and sustainment of transformative, Lean workflow redesigns nearly five years after being introduced in all primary care clinics of a large, ambulatory care delivery system.
Methods: Lean redesigns were implemented in phases across 17 clinic locations of the delivery system—first in 1 pilot site, then in 3 "beta" sites, and finally all remaining "gamma" clinic sites. Our mixed-methods analysis was guided by the Consolidated Framework for Implementation Research modified for process redesign (CFIR-PR). Findings are based on 57 in-depth interviews with physicians, staff and clinic leaders, and survey responses from 860 primary care physicians and staff (74.8% response rate).
Results: We found that clinics' initial approach to implementing Lean redesigns was critical to later sustainment. The pilot site experienced greatest successes, with diminishing results observed in gamma clinics. Facilitators of sustainment included the presence of skilled and charismatic Lean change agents, open/democratic leader engagement with frontline staff and physicians, and simple work designs that were easily adopted and maintained. Despite initial resistance, the most sustained and widely appreciated Lean changes included co-location of medical assistant-physician care teams, and "5S" reorganization and standardization of exam room supplies. According to surveys on specific workflow redesigns, care teams reported using daily huddles most of the time to carry out their work, and agenda setting by medical assistants for the majority of patient visits.
Conclusion: This study highlights areas where leaders can focus their efforts to enhance successful Lean change initiatives. Program implementers may find it easier to introduce Lean in phases rather than at a single time point. However, it is critical for sustainment that at every phase, frontline physician and staff are equally engaged in the design and implementation of new work designs.

Keywords: Organizations, Observational Studies, Primary Care, Ambulatory/Outpatient Care, Qualitative Research, Health Care Organizations, Quality Improvement

P11.06
Provider Perspectives on Behavioral Health Navigation Program for Adolescents

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Background: This research evaluation is for an adolescent behavioral health (ABH) quality improvement project within a multi-specialty healthcare delivery system. Approximately 20% of United States adolescents have a mental health condition, thus underscoring behavioral health (BH) needs of this population. Best practices call for early detection of conditions by primary care providers (PCPs) and coordinated care aimed at managing conditions. Results from baseline PCP surveys and interviews showed that while confident about identifying ABH needs, PCPs face challenges in providing necessary and appropriate treatment for their patients. In an effort to support PCPs and provide improved quality of BH care in primary care, a navigation program was developed to facilitate referrals from PCPs to BH specialists for adolescents. We asked PCPs about their experience with the program.
Methods: Pediatric and Family Medicine PCPs with access to the ABH navigation program were surveyed and interviewed.
Results: Over 3,400 referrals have been made to the navigation program to date. Of 150 PCPs surveyed, 106 (70.7%) stated that they have used the navigation program. Their reasons for use include: for help with finding BH providers who accept patients' insurance (96.2%); to ensure patients receive timely BH care (83.0%); and for help with determining appropriate type of BH provider or care for patients (42.6%). 87.7% of PCPs believed that navigation has enhanced their clinical care. Additionally, PCPs rated the program positively on: the referral process to navigation (90.6%), communication with navigators (87.7%), overall experience with navigation (89.6%). However, PCPs commented through surveys and interviews that the navigation program could be improved. Some PCPs prefer having more feedback from navigators regarding patient referral status. Most noticeably, PCPs are concerned about delayed response time. They recognize that increasing demand for the program may be causing a slowdown; still, PCPs would like for navigators to process their referrals in a more timely manner.
Conclusion: Support needed by PCPs is evidenced by the demand of this behavioral health navigation program. PCPs indicated that the program is a valuable service and offered suggestions for improvement. We will use their feedback to further refine our program to support PCPs and their adolescent patients.

Keywords: Child and Adolescent Health, Survey Research and Methods, Primary Care, Behavioral and Mental Health, Evaluation Research, Qualitative Research, Quality Improvement

P11.07
Evaluating Unwarranted Variation in Treatment Patterns Using Unblinded Data

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Background: Unwarranted practice variation is an issue for most healthcare systems and is sometimes caused by external factors. We examined the peer-group Variation Reduction program (VR), where clinicians are shown data about their treatment patterns alongside other clinicians, and they are usually surprised by the variation. The information drives a desire to understand the variation in how they care for their patients, and can lead to a change in clinician behavior. We sought to evaluate VR projects aimed at, reducing brand name prescribing, and increasing appropriate documentation of end-of-life (EOL) wishes in a large integrated healthcare system.
Methods: In this physician-controlled process, providers review and discuss data, in a safe environment ruled by principles that confirm confidentiality, safety, and group control. Verbal consent of all group members is required for each VR step, including topic selection and discussion of relevant data. For analyzing projects, we chose a pre-post parallel design. Providers having at least 12 months of data prior to the VR program, and 3 months of data after VR program are included in the analysis. Control group was comprised of clinicians not involved in the VR program who had enough data for the selected projects. Orders in the 3-months after the VR program were compared to the 12-months before the VR program for the intervention and control physicians. Repeated measures within clinicians were modeled using generalized estimating equations (GEE). Standard errors were estimated using non-parametric bootstrap with 1000 iterations, and 95% CIs are reported.
Results: Post-intervention, accounting for the 12-month pre-period, physicians in the intervention group prescribed generics for corticosteroids and nasal steroids significantly more than physicians in the control group, and EOL wishes were documented more frequently in the intervention group: 9.4% (CI: 5.4%-14.3%) corticosteroids; 3.2% (CI: 1.8%-4.6%) nasal steroids; 0.5% (CI: 0.2%-0.8%) documenting EOL wishes.
Conclusion: For all three projects presented, the VR intervention was associated with a reduction in variation in the practices. These results indicate that clinician behavior can be changed with a peer-group process, without the need for additional incentives.

Keywords: Program Evaluation, Quality of Care, Evaluation Research, Health Care Organizations, Communication of Research Findings, Quality Improvement

P11.08
Risk of major gastrointestinal bleeding among dabigatran users- population based new user self controlled study

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Background: Dabigatran is an oral anticoagulant approved for stroke prevention among patients with atrial fibrillation. Our objective was to evaluate the real world risk of major gastrointestinal bleeding among dabigatran users.
Methods: We adopted a new-user self-controlled case series design to reduce confounding by indication. We sampled 1215 eligible participants who were continuous adult commercial users in a large administrative claims database between July 1, 2010 and March 31, 2012 with use of dabigatran and at least one major gastrointestinal bleeding episode. We used a conditional Poisson regression to estimate incidence rate ratios after adjusting for various confounders.
Results: The population consisted of 64.49% of male and 61.81% elderly patients (i.e. equal to or greater than age 65). After adjustment for time-variant confounders including bleeding-related comorbidities and concomitant medication use, compared with the non-exposed period , the incidence rate of major gastrointestinal bleeding was 13% higher during dabigatran risk period (95% CI 0.99, 1.27). There was no significant difference between periods of dabigatran and warfarin use (IRR=1.02, 95% CI 0.77-1.34).
Conclusion: This study should help the clinicians prescribe the appropriate anticoagulant for patients together with other studies on the efficacy, effectiveness and safety of anticoagulant.

Keywords: Cardiovascular Disease, Observational Studies, Patient Safety, Epidemiology, Pharmaceuticals: Prescribing, Use, Costs

P11.09
Development of an Algorithm to Prospectively Identify Palliative Care-Eligible Patients from the Electronic Health Record

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Background: For referral-based health care programs, enrollment is usually triggered by a negative health event. This can mean that referral occurs late in the course of illness, even if patients would have benefited from earlier enrollment. In addition, a referral-based model gives little information about the total number of patients in

need, and provides no opportunity for outreach to better-serve potentially eligible patients. The ability to prospectively identify appropriate patients using data from the electronic health record (EHR) presents a possible answer to these challenges. We present an evaluation of an EHR-based prospective identification method focused on palliative care-eligible patients.
Methods: Sutter Health is a health system in northern CA with 24 hospitals, more than 5000 physicians, and an embedded home health and hospice organization. Using Medicare fee-for-service (FFS) claims data from our decedents from 2009-2014, we created a preliminary algorithm to identify patients who were eligible for a palliative care program. We then validated this identification system against a cohort of enrolled patients. Work is currently underway to generalize this algorithm using data from Sutter Health's EHR, Epic, to prospectively identify palliative-care-appropriate patients. We plan to update our current results and perform a more rigorous analysis with access to both referral and enrollment data. We are also incorporating clinician chart reviews to identify false positives.
Results: Use of this algorithmic approach on a retrospective cohort of deceased Medicare FFS palliative care enrollees resulted in identification of 93% of enrolled patients, though it was not possible to determine the number of patients identified who were not appropriate. The expanded, EHR-based analysis will supplement this gap and also provide a more comprehensive view of algorithm performance.
Conclusion: Prospective identification of palliative-care-eligible patients from the wealth of EHR data presents an important opportunity to use data to better serve our patients. An effective identification system could also be an important tool for clinicians and managers in identifying underserved populations, allocating program resources, and planning for program growth.

Keywords: Information Technology, Palliative Care, Dissemination and Implementation of Innovations

P11.10
Fidelity Evaluation of a Care Coordination Solution for Integrative Medicine: Usage and User Acceptance

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Background: Care coordination is an important aspect of patient care, especially for integrative health, which includes many types of providers on a care team. We developed and piloted an application (Trellis) designed to improve care coordination for patients at the Institute for Health and Healing (IHH); an integrative medicine specialty care clinic in San Francisco, California. Trellis is built to improve transparency, awareness and communication between care-team members. We evaluated the usage and user acceptance of Trellis to determine whether we should continue the dissemination process by creating the next version.
Methods: We implemented Trellis and trained the 32 members of the care-team staff. We measured usage by counting active sessions, and number of times each feature was accessed. We stratified by provider modality and role, and because most of the practitioners are part-time employees, we weighted usage estimates by hours worked per week. We held a focus group to measure user acceptance. When we identified low usage we made changes to the application and workflow to improve utilization.
Results: Through July, 2016, Trellis has impacted care for 383 (27%) of patients with encounters at IHH. Overall 43% of the usage can be attributed to Medical Practitioner, 20% to Allied Health Practitioners and 37% to Administrative staff. Trellis usage evaluation identified 4 super-users and 7 under-users. Changes to the system, including training, bug fixes and onsite support resulted in the better short-term usage, but not long-term. Trellis helped to track referrals; 72% practitioners refer to themselves and about 28% to specialists of other modalities. Focus groups identified barriers such as culture, workstation set-up, and uncertainty about over all purpose.
Conclusion: Trellis adoption was low, only used for one fourth of the patient encounters, but there was enthusiasm for future versions and future use. Weekly usage combined with focus group data indicated that the enthusiasms to use the application could not be maintained over time due to cultural barriers. With this early evaluation, we have provided a foundation of information on which to design future versions of the application.

Keywords: Program Evaluation, Referrals and Referral Networks, Quality of Care, Evaluation Research, Research Administration, Contracting, and Operations, Dissemination and Implementation of Innovations, Patient Experience / Satisfaction

P12.01
Prevalence of Social Determinants of Health (SDOH) in a Large Non-Safety Net Health Plan Membership

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Background: Health plans are exploring how to assess and address SDOHs in their socioeconomically diverse memberships. We used survey data to examine prevalence of SDOHs among adults in Kaiser Permanente Northern California (KPNC).
Methods: SDOH prevalence among members aged 25-79 was estimated using pooled weighted data from 2011 and 2014 Member Health Surveys (n>22,000). SDOHs included: educational attainment, income, financial worry, reduced medical care/medication use/fruit and vegetable consumption due to cost, chronic stress, caregiver responsibilities, life satisfaction, harassment/discrimination, concern about neighborhood violence, preventive dental care, health beliefs, and ability to use the internet. Estimates were made for ages 25-64 (NS) and 65-79 (S) and evaluated for sex and race/ethnic differences.
Results: Overall 19% (18% of NS, 27% of S) had low educational attainment (<=high school graduate), and 49% (51% of NS, 41% of S) were college graduates. About 9% (7% of NS, 21% of S) had a household income (HHI) of <= $25,000 and 15% (13% of NS, 35% of senior women, 20% of senior men) an HHI <=$35,000. In the past year due to cost,13% (15% of NS, 6% of S) had forgone or delayed medical care, 7% (no age difference) had used less medication, and 9% had consumed less fruit/vegetables than they would have; 28% (31% of NS, 15% of S) had worried a great deal about their financial situation; 6% (7% of NS, 3% of S) had worried about neighborhood violence; 17% (23% of NS women, 16% of NS men, 6% of S) experienced chronic high stress; 20% had no preventive dental care; and among those aged 45-79, 32% of women and 21% of men were unpaid caregivers for an ill or disabled relative. Only 36% (33% of NS, 48% of S) felt very satisfied with their life. About 14% do not believe health habits/lifestyle can greatly affect their health and 16% do not believe the same for emotional troubles/stress. Ability to use the internet was high (98% of NS, 84% of S), but lower among lower income adults. Significant race/ethnic disparities were observed for some SDOHs
Conclusion: SDOHs are prevalent in socioeconomically diverse (non-safety net) health plan memberships.

Keywords: Aging/Elderly/Geriatrics, Survey Research and Methods, Demographics, Racial/Ethnic Differences in Health and Health Care, Social Determinants of Health, Dental Care, Health Promotion / Prevention / Screening

P12.02
Racial/Ethnic Disparities in Completion of the Routine Immunization Series by Age Two

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Background: Background:/Aims: Immunization is the most effective clinical preventive service for children. While a large body of literature exists on racial disparities in health, data on immunization disparities is limited and the results are varied. Goals of this study were to evaluate whether racial/ethnic disparities in immunization completion rates by age 2 years remain after adjusting for other factors, And to explore potential system-level factors that may be contributing to the disparity.
Methods: Methods: This was a retrospective cohort study which included clinic patients who had their second birthday between January 1, 2009 and December 31, 2013, and who had at least one primary care visit to a clinic within the 6 months before their second birthday. A full cohort and a mother matched nested cohort with more granular race data and additional factors were both analyzed. Vaccines were identified using the electronic health record. The primary outcome was completion of the infant immunization schedule by 2 years of age. Logistic regression was used to evaluate associations.
Results: Results: The full cohort included 23,601 subjects of which 10,125 (43%) were non-White. At age 24 months the non-White patients had a completion rate of 75% and the White patients had a completion rate of 79%. After adjustment, non-White patients were less likely to be vaccinated (OR: 0.89, 95%CI: .83-.94). Rates were significantly improved by more clinic visits, well child visits and white race. The nested mother matched cohort included 9,066 subjects of which 3,324 (37%) were non-White. The completion rates varied from 76.9% for East African origin to 83.3% for White. After adjustment of other factors, only in the East African origin group (primarily Somali) was the rate significantly lower than the White group (0.53, 0.4-0.70). Other characteristics that were associated with improved completion were greater number of visits, having a well-child visit and more total months with insurance.
Conclusion: Conclusion: We observed modest disparities in vaccine series completion by age 2. These results suggest two strategies for decreasing the disparity in completion: outreach to schedule well child visits and structural changes in insurance to make continuous coverage more likely.

Keywords: Child and Adolescent Health, Observational Studies, Primary Care, Racial/Ethnic Differences in Health and Health Care, Access to Services, Health Promotion / Prevention / Screening

P13.01

Lessons Learned in Developing and Implementing the ED-PACT Tool: An Innovation Supporting Communication of Care Needs after Emergency Department Visits

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Background: Communication failures between providers represent a threat to patient safety. Despite the importance of timely receipt of recommended post-Emergency Department (ED) care, up to two-thirds of patients discharged from EDs do not receive recommended post-ED care. The ED-PACT Tool uses the electronic health record to send messages from Veterans Health Administration (VA) ED providers to nurse care managers of patients' VA Patient-aligned Care Team (PACT), when patients are discharged home from the ED with an urgent or specific follow-up need. We developed, piloted, and formatively evaluated the spread of this tool at VA's Greater Los Angeles Healthcare System (VAGLAHS).
Methods: Before implementation, we assessed readiness to participate in the innovation with leadership interviews and nurse care manager questionnaires. During deployment, we used audit and feedback to monitor adherence with correct use of the tool. We logged all user feedback, tracked all failures (i.e., PACT nurse not acting on message) and their causes, and used run charts to assess for weekly variations in failures. We audited a random sample of 150 messages to capture types of care needs for which messages were sent. We interviewed leaders in three clinics about perceptions of usability and value, and implementation facilitators and barriers.
Results: Between November 1, 2015 and May 31, 2016, the ED-PACT Tool was used to send 1350 messages from the VAGLAHS ED to 35 PACT teamlets, across five primary care clinics. Care needs included: symptom recheck (55%); care coordination (16%); wound care (5%); medication adjustment (5%); laboratory recheck (5%); radiology follow-up (3%); and blood pressure recheck (3%). On average, nurses successfully acted on 91% of messages (weekly range, 72% - 100%). Reasons for failure included human error, staffing shortages and technical errors. Interviews with clinic leaders revealed that the ED-PACT Tool is perceived to provide substantial benefit for coordinating post-ED care by effectively communicating with patients' PACT nurses. Leaders also reported nurse training and "buy-in" facilitated implementation, while insufficient staff posed a barrier.
Conclusion: The ED-PACT Tool facilitates communication between providers during a vulnerable care transition. Deployment of similar tools should include attention to the organizational, human and technical factors revealed by our evaluation.

Keywords: Technology Adoption and Diffusion, VA Health System, Dissemination and Implementation of Innovations, Technology Assessment, Quality Improvement

P13.02

Two Models for Improving Colorectal Cancer Screening Rates in Health Plan Populations

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Background: Screening decreases colorectal cancer (CRC) incidence and mortality by 30-60%, however, CRC screening rates remain low among minorities and low-income individuals. No available data shows the effectiveness of a direct-mail program initiated by health insurance plans that serve these populations. The BeneFIT study supports two health plans implementing a program that mails fecal immunochemical tests (FIT) to patients' homes.
Methods: We present the implementation models and decision factors about participating in BeneFIT. BeneFIT involves two health plans: one in a single state with ~250,000 enrollees, another in multiple states with several million enrollees. These health plans are using two distinct models to implement BeneFIT.
Results: One health plan is using a collaborative model. A vendor centrally mails the FIT kits and reminder letters; completed FITs are returned to the clinic, where labs are ordered. This model reduces staff burden while still enabling clinics to use their standard lab, follow-up, and referral processes. Early implementation challenges have been logistical issues for the smaller clinics; lab vendors needing to provide free kits (claims pay for processing of completed FITs); and data issues with patient-clinic assignment lists. The other health plan is using a centralized model. A vendor orders and mails the FITs, and conducts reminder calls; a central lab receives completed FITs and sends results to the vendor, which notifies the patient-assigned clinic. The plan uses its care coordinators to follow-up positive FITs. The model has economics of scale for administration and plan-based follow-up of FIT results. Challenges to implementation have been incomplete prior CRC screening data and possible redundancy of screening. Baseline qualitative interviews with the health plans identified motivations to participate including increasing patient education, the possibility to improve screening rates and health outcomes, and the opportunity to translate a promising approach to an underserved population and formally evaluate the results. Factors that could affect future health plan decisions to maintain the direct mail approach include return rates, staff and resource requirements, and provider/patient satisfaction with the BeneFIT program.
Conclusion: Weighing the successes and challenges in these two plans will help decision makers choose between outreach strategies for CRC screening.

Keywords: Cancer, Qualitative Research, Health Care Organizations, Dissemination and Implementation of Innovations, Comparative Health Systems, Health Promotion / Prevention / Screening

P13.03
Implementing a program to encourage patients to report breakdowns in care: do we really want to know?

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Background: Patients and family members have critical insights into care experiences, including information about adverse events. However, many patients are reluctant to speak up when they suspect a breakdown in communication or medical care. We therefore designed the We Want to Know (WWTK) program to encourage patients to speak up about concerns, and to enable an effective response when they do. In preparation for widespread implementation of the program in a large healthcare system, we sought to identify the multi-level barriers and facilitators to full-scale implementation of the program.
Methods: We conducted semi-structured interviews with hospital leaders and unit leaders at two pilot hospitals, as well as system-level leaders. Interviews focused on 1) perceived value and potential benefits of the program, 2) barriers to implementation, and 3) strategies for overcoming barriers and achieving system-wide implementation.
Results: Preliminary analysis of the interviews revealed facilitators and barriers unique to each stakeholder level with regards to implementation of the WWTK program. Unit and hospital leaders appreciated the value of a WWTK specialist who was not part of the care team to conduct active outreach with patients and assist with problem resolution, but were concerned about resource constraints and difficulties addressing problems in the absence of a WWTK specialist. Hospital leaders found the detailed and timely feedback elicited by the WWTK specialist to be useful, but raised concerns about overlap with similar activities to elicit patient perspectives. System leaders were supportive of the program, and deemed it consistent with organizational values and goals, but reiterated resource constraints especially with regards to competing initiatives. Ultimately, system leaders identified an opportunity to integrate WWTK into a current, high priority initiative which will be implemented throughout the system.
Conclusion: Efforts to achieve system-wide implementation of a program to encourage patients to speak up about breakdowns in care and respond to the concerns raised by patients will need to consider both the benefits and barriers noted by multiple levels of stakeholders. Integrating the program into an existing initiative may overcome a major barrier to system-wide implementation; additional efforts are needed to address unit- and hospital-level barriers.

Keywords: Program Evaluation, Communication between Patients and Providers, Hospitals, Dissemination and Implementation of Innovations, Patient Experience / Satisfaction, Patient Safety, Quality Improvement

P13.04
Implementation of a New Kiosk Technology for Blood Pressure Management in a Community-Based Primary Care Clinic

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Background: Asking patients to measure their own vital signs using a self-service validated blood pressure (BP) kiosk in clinic has the potential to increase patient awareness of their BP control, and free up medical assistant (MA) time for other activities. To evaluate BP kiosk acceptability, usability, and impact on workflow of patient BP self-measurement in a primary care clinic waiting room.
Methods: A primary care clinic in eastern Washington placed 2 validated BP kiosks in the waiting room. Patients were asked to take their own BP and print out the results at the start of their clinic visit. Mixed method assessments included early (2-month) and later (8-month) qualitative and quantitative descriptive assessments of kiosk implementation via meetings with clinic leaders, focus groups with clinic staff and providers, observations of kiosk users, and in-clinic surveys of adult kiosk users.
Results: Of the roughly 400 BPs/week on the kiosk 34% were stage 1 hypertension, 13% stage 2 or higher. Patient surveys revealed that most patients were comfortable using the BP kiosk (82% at 2 months and 87% at 8 months) and most thought it was accurate or more accurate than medical assistant measurements (81% at both time points). Initial provider concerns included accuracy, but most were confident after a discussion with the study team and use. Patients and providers saw many benefits: easier BP rechecks at the same and follow-up visits, increased patient engagement, and savings of MA time (1 minute 30 seconds per visit) allowing them to do other tasks. The clinic addressed early concerns such as infection (sanitary wipes), instructions (simplification), and lack of personal touch (stationing a receptionist in the waiting room). Most patients (86%) were in favor of the clinic continuing to use the BP kiosks. Remaining challenges include kiosk privacy (possibly moving one kiosk to the exam room area) and accommodating differently sized and able patients.
Conclusion: Providers, staff, and patients adapted to use of a self-service kiosk, providing opportunities for deploying saved MA time for other patient care activities. The clinic decided to keep the self-service BP kiosk after the pilot period.

Keywords: Technology Adoption and Diffusion, Primary Care, Qualitative Research, Technology Assessment

P13.05
Designing for Impact: Multidisciplinary Program to Identify Novel Interventions in Support of Recovery after Major Cancer Surgery

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Background: Cancer surgery is complex and is associated with significant patient morbidity, yet few resources exist to prepare patients for the complications and challenges that may follow surgery. Bladder and colorectal cancer patients who receive urinary or intestinal diversions face numerous issues that predispose them to high rates of distress and complication.
Methods: After preliminary ethnographic research to identify design challenges, we held a user-centered design (UCD) workshop as a step toward developing patient- and caregiver-centered interventions to support preparation for and recovery after complex cancer surgery. We used standard UCD methods and guiding principles during the workshop, focusing on innovative and broad scope thinking. The workshop, held in late 2014, was attended by 3 colorectal/oncologic surgeons, 3 urologic surgeons, 5 ostomy nurses, 4 patients and caregivers, and 3 experienced UCD facilitators. Concepts that emerged from brainstorming sessions were visually represented on storyboards and voted on by the group. Highly scored concepts were further developed in small group prototyping sessions and then presented to the entire group for review. All materials created were collected, discussions were recorded and data were later analyzed to identify opportunities for intervention.
Results: Analysis revealed that needed educational information and resources about the surgery and recovery are generally inadequate, and that design solutions should focus on the goal of enhancing appropriate self-care during the recovery period. Four opportunity areas toward this goal were identified: 1) developing multi-media patient education material available prior to surgery; 2) developing personalized discharge assessment and care plans; 3) creating a follow up care tool that combines educational resources, self-management assistance and symptom monitoring capabilities; and 4) developing telehealth platforms to aid patients who cannot return to formal care settings easily.
Conclusion: Diverse stakeholders concluded that research and practice improvement should prioritize the development of education and communication pathways before surgery and post-operative communication interventions, all aimed at improving appropriate self-care during recovery.

Keywords: Cancer, Ethnography, Acute Inpatient Care, Communication between Patients and Providers, Engagement of Stakeholders

P13.06
Fidelity Evaluation of RD&D's Cardio-metabolic Solution, CM-SHARE: Usage and User Acceptance

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Background: For implementation of an optional-use population health management (PHM) tool for providers, several factors affect adoption and contribute to continued use. We evaluated providers' fidelity to a PHM tool in a cohort of primary care patients with cardio-metabolic (CM) conditions (diabetes, hypertension, dyslipidemia).
Methods: We implemented a CM eHealth management tool (CM-SHARE) at two primary care clinics in a large healthcare system in Northern California. The tool was designed to improve visit preparation, and patient engagement. Quantitative data were procured from electronic health records (EHR) and from the app. Qualitative data were obtained from user feedback interviews. CM patient encounters were matched to CM-SHARE launches and practice characteristics were recorded for each clinician.
Results: Out of 6,184 scheduled encounters in the study period, 4,952 (80%) were made by CM patients, for whom CM-SHARE was launched 26% of the time. Of the CM patients with encounters, 692 (14%) had a CM condition as the primary diagnosis for the visit. Usage for this group was higher (42%). Launch rates varied by practice type: scribe model (team-based), 57% usage; traditional model (providers working alone), 21% usage. Usage dropped significantly from early morning to pre-lunch (30% to 22%, $P<0.01$)) and from mid-afternoon to evening (28% to 20%, $P<0.01$). Providers reported using CM-SHARE for patients with: CM history; borderline lab values; weight issues; and multiple medications or labs. Other reported factors affecting usage included: lack of reminders to launch, inability to place orders or write notes, and toggling between the EHR and CM-SHARE on one screen. Providers used graphs (42%), trends (11%) and progress notes (8%) for patient education.
Conclusion: CM-SHARE was launched a quarter of the time for CM patients and more than 40% of the time for CM-specific visits. Providers working alone were less likely to use CH-SHARE. Providers appear to fall behind on their schedule and "catch up" during the lunch break. Providers reported spending less time navigating the EHR for graphs. Simple visuals improved patient understanding and patient-provider conversation. Overall, providers were engaged in the process and enthusiastic about future releases.

Keywords: Cardiovascular Disease, Program Evaluation, Communication between Patients and Providers, Evaluation Research, Diabetes, Qualitative Research, Dissemination and Implementation of Innovations, Quality Improvement

P13.07
Building a Learning Health Care Organization: External Facilitation Tailors Support to the Learning Capacity of Primary Care Settings

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Background: Organizational theory describes facilitation as an absorptive capacity meta-routine that enhances an organizations ability to acquire and apply new knowledge to improve performance. Tailoring of the facilitation to the individual practice setting has been hypothesized as one mechanism that explains its effectiveness. Here we describe tailoring of conversations by facilitators to the absorptive capacity of primary care practices for the purpose of expanding their quality improvement (QI) ability.
Methods: The Healthy Hearts Northwest study is testing strategies to build QI ability within 203 independent smaller primary care practices across Washington, Oregon and Idaho. Practice facilitators conduct quarterly in-person visits and monthly phone calls in between visits. During the initial visit, the facilitator meets with the practice team to develop consensus responses to 20 questions about QI capacity in 7 domains: embedding clinical evidence, using data, establishing a QI process, population management, defining team roles, self-management support, and community resources. Facilitators document the number and type of topics discussed after each contact with the practice. Here we examined the association between QICA results and the number and type of topics discussed. We also draw on the notes generated by the facilitators after every encounter with a practice and focus group data from facilitators.
Results: The mean QICA score was 6.52 (SD 1.45, range 3.3 to 10.8) Total topics discussed ranged from zero to 26 with a mean of 5.39 (SD 5.08) Total QICA score was correlated with number of topics discussed. ($p < 0.01$) The number of health information technology topics discussed correlated with practice capacity to use data; the number of QI topics discussed correlated with capacity regarding team roles and functions. Comments from facilitators suggest that the QICA discussion was valuable by providing consensus on current state of QI within the practice, prioritizing next steps to build QI capacity, creating buy-in among team members, and developing a common vision.
Conclusion: External facilitators tailor their level of effort and the content discussed with individual practices to their current level of absorptive/learning capacity. Tailoring support explains how external facilitation can build learning capacity for improvement within a healthcare organization.

Keywords: Primary Care, Health Care Organizations, Quality Improvement

P13.08
Improving reliability of scheduling post-acute follow-up care, implementing one element of Project RED

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Background: The NEJM reports that one-in-five discharged Medicare patients is readmitted to a hospital within 30 days. Readmissions are costly to hospitals, and are a major disruption to a patient's life, creating financial and emotional strain. Project Re-Engineered Discharge (RED), a nationally recognized program to reduce preventable hospital readmissions, was implemented at Sutter Health's California Pacific Medical Center (CPMC) beginning in late 2013. The most challenging of the 12 components of the intervention is the coordination and timely completion of follow-up care with a primary-care physician (PCP) after hospital discharge.
Methods: To assure that each patient going home from the hospital would have a post-acute appointment scheduled - we developed a Discharge Planner, a web-based software application to support the required multi-step, multi-disciplinary workflow. We then piloted the tool in a single unit at CPMC. We measured fidelity by monitoring whether case managers were launching the application and recorded the proportion of patients with appointments scheduled at the time of discharge. We used patient Electronic Health Records (EHR) to measure the proportion of patients who attended follow-up appointments post-discharge. Finally, we used provider surveys to determine user acceptability.
Results: The app was opened an average of 40 times/day for a single hospital unit during business hours, and <5 times/day on weekends. Follow-up appointment scheduling increased from < 20% during the 4 months "pre-go-live" to >50% during the 5-month "post-go-live" period. Only 20-30% of patients kept their scheduled appointments throughout the study period, with no change during the "post-go-live" period. User acceptance scores were highly favorable (on a scale from 1-100, average scores were 73 overall, and 87 among those case managers who rely most heavily on the application).
Conclusion: The application was highly successful at accomplishing its primary goal, scheduling follow up appointments, and it has been accepted into the workflow, however patients still do not appear to be keeping their follow up appointments. Our next step is to uncover strategies to better measure kept appointments and to identify factors that prevent patients from keeping their appointments.

Keywords: Quality of Care, Hospitals, Dissemination and Implementation of Innovations, Access to Services, Technology Assessment, Patient Experience / Satisfaction

P13.09
Geisinger's Use of Clinical CarePaths: Impact of a Psoriasis CarePath on Process, Clinical and Economic Outcomes

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Background: CarePaths are evidence-based integrative care processes that seek to treat patients with complex diseases in a standardized manner. Herein we describe the development and implementation of the CarePath for psoriasis and present preliminary economic and clinical outcomes of this streamlined process.
Methods: The CarePath for psoriasis was developed through a five step process involving population identification, care algorithm development (synchronized to coverage determinations), IT development, patient-family engagement and outcome monitoring utilizing input from our integrative delivery network of patients, providers and payers. Over the course of 12 months, the multidisciplinary team developed standardized data elements within the electronic health record (Epic) and a psoriasis specific performance dashboard to assure consistent population targeting, outcome monitoring, and provider compliance tracking. Monitoring within the build allows for evaluations of the adoption of the CarePath including body surface area (BSA) tracking and completion, inclusion of psoriasis on the patient's problem list, utilization of nonpharmacological options (e.g. light therapy) and drug therapies used. A simple cost-avoidance model of selecting light therapy over alternative biologic therapy was employed to calculate savings.
Results: Adoption of the psoriasis CarePath has steadily increased since launched in July 2015. Inclusion of psoriasis in the problem list of affected patients steadily increased in the 12 months post CarePath launch. Tracking of BSA measurements increased from 41.7% to 76.3% over the same time period. A total of 72 patients initiated light therapy since CarePath implementation, 61 who were biologic candidates, 11 switching from biologics. With an estimated six-year single patient cost of $2,200 for one ultraviolet light or $294,000 for formulary biologic alternatives , the Geisinger psoriasis CarePath is estimated to save $21,009,600 ($3,501,600/year).
Conclusion: Through the psoriasis CarePath, we have been able to standardize the care of patients across the Geisinger Health System by providing patient-focused, evidence-based care at substantial cost savings. Lessons gleaned through the early success of the psoriasis CarePath are being applied to CarePath construction for rheumatoid arthritis, heart failure, pulmonary hypertension and other diseased.

Keywords: Quality of Care, Managed Care (Features), Ambulatory/Outpatient Care, Clinical Practice Patterns / Guidelines, Engagement of Stakeholders, Clinical Decision Making, Health Care Costs / Resource Use, Dissemination and Implementation of Innovations, Quality Improvement, Pharmaceuticals: Prescribing, Use, Costs

P13.10
Using Novel Multi-Modal Reminders for a Direct-Mail Fecal Testing Program: Findings From STOP CRC

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Background: Evidence shows that reminders can improve rates of patient adherence to completion of cancer screening tests. Less is known about the efficacy of reminders in relation to direct-mail fecal testing programs. As part of the Strategies and Opportunities to STOP Colon Cancer in Priority Populations (STOP CRC) study, we sought to compare the effectiveness of multi-modal reminders for a direct-mail fecal testing program.
Methods: We tested screening reminders in four clinics at Seamar, a community health center in Washington State. Adults ages 50 – 75 who had a primary care visit in the previous year and were not up-to-date with colorectal cancer screening, received an informational letter and fecal immunochemical test (FIT) kit by mail. Patients who did not return their FIT kits within 3 weeks were sent a message through the patient portal or randomized to receive (1) a reminder letter; (2) three automated phone calls; (3) three text messages; (4) a live phone call; (5) a text message and a live phone call; (6) a reminder letter and a live phone call; or (7) an automated and live phone call. We recorded rates of screening completion and rates of patients reached by reminder.
Results: Among initial analysis of the data, reach was highest for the combined strategies automated and live phone call (27%). For the single-modal reminder strategies, reach was highest for live phone call (30%) and lowest for text message (13%). We are currently receiving data on the last clinics. Final results will be presented in the poster.
Conclusion: To date, in the FQHC setting, automated and live phone call reminders to a direct-mail fecal testing program substantially increase colorectal cancer screening rates.

Keywords: Cancer, Pragmatic Trials, Dissemination and Implementation of Innovations, Health Promotion / Prevention / Screening

P14.01

Using Natural Language Processing to Enable Quality Improvement and Future Research for Patients at Risk of Suicide

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Background: Policy research demonstrates that lethal means restriction is an effective strategy for preventing suicide. This evidence has informed national suicide prevention recommendations for medical/behavioral providers to assess patient access to lethal means. The clinical uptake and effectiveness of this practice is unknown. Behavioral health providers document means assessment and restriction counseling in progress notes, but not in structured form for easy extraction. We developed a natural language processing (NLP) query to identify lethal means assessment and restriction counseling within semi-structured clinical notes.
Methods: A total cohort of 11,259 adult KPCO patients who had either a suicide attempt or positive suicide item on the PHQ9 depression measure from 2010- 2015. To identify key terms for the NLP query we used manual chart review and text mining. All encounters for one month following index event (attempt or ideation) were reviewed for 100 patients. Using manual chart review as the gold standard, supervised text mining identified terminology indicating evidence of means documentation. Text mining, clinical consultation, and chart review results informed query criteria that were implemented using open source NLTK Python package for NLP. The query was tested and modified throughout three iterations. Negative/positive hits were analyzed on stratified random samples of 40 charts/round. The final query was validated using manual review on a hold-out sample of 200 charts.
Results: We will present a description of the final query including terms/phrases used, qualifiers, stop words, and synonyms. Sensitivity, specificity, and positive/negative predictive values for assessment of lethal means and means restriction counseling will be reported on the development and hold out samples from the final query.
Conclusion: The query will allow us to identify the proportion of high risk patients who receive recommended assessment of lethal means following suicide attempts/ideation. This query could be used for operational quality improvement or to inform future research on the effectiveness of lethal means assessment/counseling to restrict means in preventing suicide outcomes. Detailed specifications on the methods used to create this NLP query will be made available as a resource for other systems.

Keywords: Behavioral and Mental Health, Clinical Practice Patterns / Guidelines, Natural Language Processing, Quality Improvement

P14.02

Alcohol Misuse among Formerly Deployed U.S. Service Members seen Non-VA Facilities: Results: from the Veterans' Cohort Study

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Background: Since reports suggest that alcohol misuse is a health problem among U.S. military personnel, our objective was to assess the prevalence of alcohol-use disorders among formerly deployed service members seen Non-VA healthcare facilities. Because research also suggested higher alcohol abuse among Vietnam veterans, our hypothesis was that Vietnam veterans would have a higher prevalence of alcohol misuse than deployed veterans from the other service eras.
Methods: We surveyed a random sample of veterans who were patients in a large non-VA multi-hospital system located in Central and Northeastern Pennsylvania to assess their mental health and substance use. The study included veterans from four service eras: Vietnam, Gulf War, Global War on Terror, and other veterans.
Results: Of 1,289 veterans surveyed (response rate ~ 60%), 53.6 were from the Vietnam era, 95.0% were male, 54.5% were 65+ years old, 95.7% were white race, and 26.9% were recent National Guard or Reserve veterans. Based on the AUDIT-C and the CAGE instruments, the prevalence of alcohol misuse was 27.3% and 14.1%, respectively, compared to only 8.7% for current PTSD and 8.8% for current depression. Altogether, 25.8% reported using alcohol to cope post-deployment and 21.0% reported heavy drinking in the past year. Bivariate analyses indicated that alcohol misuse was more common among those who were older, Vietnam veterans, higher income veterans, and those who had a history of cigarette smoking (p-values < 0.05). However, multivariable analyses (MVA) that adjusted for gender, education, combat exposure, life stressors, and social support, found no significant differences for alcohol misuse or abuse by the different veteran groups. The best predictors of current alcohol misuse in MVA was having used alcohol to cope post deployment (OR=2.99, p<0.001) and younger age (OR=0.97, p<0.001).
Conclusion: Our analyses suggest that while deployed Vietnam service members had a higher prevalence of alcohol misuse, when the data were adjusted for demographic factors and potential confounders, there were no significant differences between the veteran groups. Further research that examines the high prevalence of alcohol misuse among veterans and the adverse impact of using of alcohol to cope post deployment is planned.

Keywords: Observational Studies, Survey Research and Methods, Behavioral and Mental Health, Substance Abuse and Addiction, Epidemiology

P14.03
Differences in Adult PHQ9 Administration at KP Northwest by Demographic and Census Factors

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Background: The Patient Health Questionnaire (PHQ9) is a depression screener which scores each of the nine DSM-IV depression criteria from the original PRIME-MD. With the increased administration and electronic capture of data from the PHQ9 instrument, it has added research value to its existing usefulness as a clinical evaluation tool. Recent inclusion in the HCSRN VDW (Health Care Systems Research Network, Virtual Data Warehouse) means that researchers can look at PHQ9 data in the context of other important patient health and demographic factors.
Methods: We interrogated the KPNW VDW for demographic, diagnosis, enrollment, PHQ9 and Census data for the years 2014-2015. Age, gender and race/ethnicity were combined with Census education and income, PHQ9 dates and ICD9/10 depression diagnoses. Within the sampling frame of all adults 18-90 years old with any KPNW enrollment in 2014 and 2015, we compared four groups: among patients with a PHQ9 screening in those years, those (a) with and (b) without one or more clinical depression diagnoses; and among patients without a PHQ9 screening, those (c) with and (d) without one or more depression diagnoses.
Results: Patients completing the PHQ9 differed in several ways from adults who did not complete the PHQ9. The PHQ9 group was older (mean age 49.7 vs 45.9), more often female (64.6 vs 49.4%) and Non-Hispanic White (82.1 vs 66.7%). A notably lower percentage of PHQ9 screened patients were Non-Hispanic Asian (2.4% vs 4.7% with no screening). As expected, the PHQ9 group was demographically similar to the group with the depression diagnoses, with some minor differences on gender. Patients with a depression diagnosis and a PHQ9 administration were slightly more often female compared to those without a PHQ9 (69.9 vs 66.9%). Census comparisons indicate that patients with a depression diagnosis and a PHQ9 lived in areas with slightly lower educational attainment vs. patients with a depression diagnosis only (28% of adults in their census area had a Bachelor's degree vs. 31% without, respectively). No differences were observed on income.
Conclusion: The PHQ9 is differentially administered among adult patients at KPNW. But the administration does follow the demographic spectrum of depression.

Keywords: Information Technology, Demographics, Behavioral and Mental Health, Clinical Practice Patterns / Guidelines, Virtual Data Warehouse, Racial/Ethnic Differences in Health and Health Care, Social Determinants of Health, Access to Services, Patient Reported Outcomes / Functional Status, Health Promotion / Prevention / Screening

P14.04
Opioid Prescribing During Pregnancy: Eight-Year Secular Trends at HealthPartners Medical Goup

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Background: Nationally opioid prescribing for chronic non-cancer pain has increased significantly over the last 20 years. Recently published evidence suggests that 20% to 40% of women received opioid prescriptions of varying doses and durations during pregnancy, which may cause increased risks of harm to mother and fetus. The purpose of this retrospective observational study was to determine the prevalence of opioid prescribing three months before pregnancy, each trimester of pregnancy, and three months postpartum, as well as the secular utilization trend over an eight-year period among member-patients at HealthPartners Medical Group (HPMG).
Methods: All pregnant member-patients of HPMG who delivered a live birth between 2006-2014 and had continuous pharmacy benefits beginning three months prior to their estimated pregnancy start through three months postpartum were included. Demographic, clinical, pharmaceutical, and provider variables of interest were identified and described. Significant opioid prescribing during pregnancy was defined as more than five days' supply prescribed in any three-month period, excluding the two-week postpartum period. Time trends for 2006-2014 were examined using linear regression.
Results: Of 11,565 pregnancies during the study period, significant opioid prescribing during three months before, during pregnancy, or three months postpartum periods were observed in 862 (7.5%) pregnancies (816 unique women). A total of 454 (3.9%) pregnant women received significant opioid prescriptions during one or more trimesters of their pregnancy. From 2006 to 2014, the rate of significant opioid prescribing during each trimester of pregnancy and three months before and after pregnancy decreased -0.2% per year.
Conclusion: Significant opioid prescribing during the three trimesters of pregnancy and three months before and after pregnancy for member-patients of HPMG was significantly lower than reported studies from other populations and locations across the U.S. over the last 15 years. Furthermore, significant opioid prescribing was trending downward slightly over time, rather than rising as reported elsewhere. Explanatory factors for these findings should be explored.

Keywords: Substance Abuse and Addiction, Maternal and Perinatal Care, Pharmaceuticals: Prescribing, Use, Costs

P14.05
Defining depression cohorts using the EHR: ICD9 codes versus medication orders

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Background: Electronic Health Records (EHR) allow healthcare researchers to conduct unprecedented large scale studies on diseases, treatments, and healthcare system utilization. EHR studies are limited by the quality of the data set available. Careful consideration must be given to how to define patient cohorts. One approach aimed at limiting the number of non-clinically relevant patients included in a cohort is rigid inclusion criteria. With rigid inclusion criteria, however, we run the risk of excluding those with clinical features that are receiving treatment but do not meet these criteria. They may not meet these criteria due to patient or provider bias against including certain features like ICD9 codes in their health record, or perhaps there are administrative data sequestration protocols inherent in the system, barring researcher access to pertinent patient information, as may be the case with certain psychiatric conditions.
Methods: We have compared two methods of defining a cohort of depressed patients using information in the EHR.
Results: We show that either using ICD9 codes for depression or medication orders for antidepressants results in exclusion of potentially clinically relevant patients in both cases. We also show that both of these methods result in cohorts with highly correlated clinical features such as Emergency Department usage and primary discharge diagnosis codes, outpatient clinic visitation frequency, and inpatient discharge diagnosis codes.
Conclusion: For the case of defining a cohort to study depression, less rigid electronic phenotypes may better capture patients that are receiving some sort of treatment for their depression.

Keywords: Rural Health, Pharmacy, Primary Care, Time Series, Demographics, Behavioral and Mental Health, Chronic Disease, Hospitals, Biostatistics, Communication of Research Findings, Epidemiology, Pharmaceuticals: Prescribing, Use, Costs

P14.06
Treating Behavioral Health Conditions: What worries pediatric residents?

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Background: Changes in the delivery of health care have increased attention to behavioral health care. Particularly, there is an emphasis on improving the delivery of behavioral health care through integrated care delivery systems. Unfortunately, many medical students emerge from their medical school experience with little more than a brief exposure, often a one month rotation, in a psychiatric setting. As residents arrive for their first and subsequent years of training, formal exposure to behavioral training often does not occur. Pediatric residents frequently begin their residency in 'continuity clinic' where they are providing primary behavioral care to children, adolescents and their parents. This care often involves providing guidance about behavioral health issues. Residents are often 'flying by the seat of their pants' in this particular care area because there has not been formal training. This study represents a qualitative study of year 1 residents early in their first year of residency and as they transition into year 2 of their pediatric residency. It is intended to document their concerns, knowledge, and attitudes about providing behavioral health care. Residents will be followed in this project for three years as a program of formal didactic education, integration of a clinical psychologists, curbside consults and shared visits is implemented to address gaps in behavioral health experience and knowledge.
Methods: Residents participated in focus groups during year 1 and 2 of their residency. Discussion focused on knowledge gaps, concerns, and successes in their delivery of behavioral health care within their general pediatric practice.
Results: Several key themes emerged including time management, struggles with establishing rapport with patients, knowing referral sources and protocols, comfort level diagnosing but not knowing how to treat a variety of conditions, difficulties in establishing communication and relationships with adults and dysfunctional families, making mistakes that result in children dying, and the relative importance of behavioral health.
Conclusion: Changes in residency training to improve skills in behavioral health treatment may be warranted.

Keywords: Program Evaluation, Behavioral and Mental Health, Clinical Practice Patterns / Guidelines, Qualitative Research, Access to Services

P14.07
Population-based Outreach vs Usual Care to Prevent Suicide Attempt: Study Protocol for a Randomized Clinical Trial

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Background: Suicide is the 10th leading cause of death. PHQ9 item 9 (which asks about suicidal thoughts) identifies those at risk of suicide attempt/death. Patients with scores of 2 or 3 on item 9 show a sustained increase in risk, with a cumulative hazard near 4 % over 12 months.
Methods: Outpatients who score a 2 or 3 on item 9 of the PHQ9 are identified using EHR data at 3 MHRN sites: Group Health, HealthPartners and Kaiser Colorado. Using a modified Zelen design, patients are automatically assigned 1:1:1 to continue in usual care

(i.e. no contact) or to be offered one of two population-based prevention programs meant to supplement usual care: (1) Care Management (systematic outreach to assess risk, EHR-based tools for risk-based pathways, and care management to facilitate and monitor recommended follow-up care), or (2) Skills Training (interactive online training in dialectical behavioral therapy skills supported by reminder and reinforcement messages). Randomization automatically occurs within each site's sampling computer program, stratified by item 9 score. A computer-generated concealed allocation table provides randomly generated assignments in block sizes of either 6 or 9. The multi-site interventions are embedded in the EHR. Online patient-provider secure messaging via the EHR patient portal is used for patient invitation and outreach, as well as administration of suicide risk questionnaires. Secure provider-to-provider messaging is used to communicate with primary care and mental health providers. Population management and reporting tools are used to apply follow-up algorithms and deliver recommendations to care managers regarding outreach and follow-up. Nonfatal and fatal suicide attempts are identified using state vital statistics data and diagnoses of self-inflicted injury from EHR and claim records. Primary evaluation will compare risk of first suicide attempt over the 18 months following randomization. Groups will be compared according to initial treatment assignment, regardless of level of participation in either intervention.
Results: To date, 4,869 outpatients out of a planned 18,000 have been randomized across the 3 sites.
Conclusion: Our experience thus far illustrates the promise and challenges of implementing multi-site clinical trial recruitment and intervention delivery in electronic health records systems.

Keywords: Information Technology, Behavioral and Mental Health, Pragmatic Trials, Patient Reported Outcomes / Functional Status, Clinical Trials

P14.08
Adolescent SBIRT in Pediatric Primary Care: Patient Outcomes from a Randomized Trial in an Integrated Healthcare System

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Background: Many adolescents in need of specialty treatment for substance use and mental health problems never access care. Screening, brief intervention and referral to treatment (SBIRT) is a promising approach to early identification and intervention for adolescent substance use. We describe patient outcomes from a trial of different modalities of SBIRT for adolescents in primary care.
Methods: We randomized pediatricians (n=52) in a Pediatrics clinic to three study arms: 1) pediatrician-only, in which pediatricians were trained to deliver SBIRT; 2) embedded-BHC arm, in which pediatricians referred adolescents who endorsed risk factors (substance use or mood symptoms) to a behavioral health clinician (BHC); and 3) Usual Care (UC). We used EHR data to examine risk factors, CRAFFT scores, treatment referral, initiation and engagement.
Results: 1,871 patients were eligible for assessments, brief interventions and referrals. Differences in outcomes between the index and the next well visit within 2 years were examined across the three arms. The odds of risk factor endorsement decreased over time for all patients (adjusted odds ratio [aOR]=0.07, 95%CI=0.05-0.11); the embedded-BHC arm had significantly lower odds of risk factor endorsement compared to UC (aOR=0.65, 95%CI=0.43-0.97); there were no differences between UC and the physician-only arm. There were no differences in CRAFFT scores over time or between intervention arms. The embedded-BHC arm had fewer referrals to specialty treatment compared to the other study arms; referral rates between the physician-only and UC arms did not differ. Among those referred, the physician-only arm had significantly lower odds of treatment initiation compared with UC (aOR=0.53, 95% CI=0.28-0.99) and the embedded-BHC arm (aOR=0.25, 95% CI=0.12-0.49); no differences were found between UC and the embedded-BHC. There were no differences in treatment engagement (at least 2 visits within 30 days) across the arms.
Conclusion: Patients in the embedded-BHC arm reported lower behavioral health risk at subsequent screenings, and the embedded-BHC intervention arm was more effective at facilitating treatment initiation for those adolescents needing specialty behavioral health services.

Keywords: Child and Adolescent Health, Behavioral and Mental Health, Substance Abuse and Addiction

P14.10
Health Care Service Utilization among Anxious and Non-Anxious Youth

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Anxiety disorders are the most common mental health problem, impacting 15 to 20% of youth at any given time. Despite high prevalence, little is known about the type of health care services utilized by anxious youth, impeding public health efforts to improve access to and quality of care. To address this need, the current study will directly compare service utilization in a large sample of anxious and non-anxious youth patients enrolled within Mental Health Research Network (MHRN).
Preliminary analyses were conducted using a sample of 17,929 youths (ages 4 to 17) from the Kaiser Permanente Northwest site. Anxiety diagnoses were derived from ICD-9 codes and service use from procedure codes during 2013-2014. Analyses were completed using a match-control design, where anxious youth were matched with their non-anxious peers using sociodemographic indices.

Results from the KPNW site showed that anxious youth were significantly more likely to receive care than non-anxious matched controls in pediatrics (OR = 2.28, $p < .001$), family medicine (OR = 1.36, $p < .001$), emergency departments (OR = 2.23, $p < .001$), and urgent care (OR = 1.66, $p < .001$). Anxious youth also were more likely to receive services in specialty care settings such as and outpatient mental health (OR = 17.34, $p < .001$), inpatient mental health (OR = 16.56, $p < .001$), neurology (OR = 3.71, $p < .001$), and cardiology (OR = 2.85, $p < .001$). Overall, anxious youths in this insured sample were high utilizers of services, including increased use of high cost services.

Final analyses will integrate data from an additional three MHRN sites using innovative statistical methods designed to pool and analyze de-identified services data across multiple sites. The present study will be one of the first to examine health services use for a large and diverse sample of anxious youth across several different health care settings and systems. Findings from this study will provide unique and critical information about the availability and type of care currently utilized by anxious youth. Results may be useful in guiding efforts to most efficiently intervene with this widely prevalent and highly impairing condition.

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P15.01
Expanding the VA Women's Health Practice-Based Research Network: Increasing Capacity for Equitable Representation of Women in VA Research

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Background: Veterans Affairs (VA) Women's Health Practice Based Research Network (WH-PBRN) facilitates multi-site WH research through a network of partnered VA facilities, and fosters bi-directional partnership of clinicians and researchers striving to improve the health and health care of women Veterans (WVs). Initial WH-PBRN development was informed by pilot studies conducted at four inaugural sites. The WH-PBRN then expanded to 37 VA sites in 2012. To further grow into a more diverse network, a call for Site applications went out March 2015; WH-PBRN expanded to 60 sites June 2015. As a program evaluation activity, we examined representativeness of WH-PBRN sites (relative to VA sites nationally) before and after expansion.
Methods: WH-PBRN Site applications included questions about facility characteristics, including items indicating level of local research support, such as presence of an affiliated HSR&D center at the facility. We coupled that data with aggregated, site-level, national VA administrative data from Fiscal Year 2014 describing characteristics of WV patients using each site.
Results: From Pre- to Post-Expansion, the network grew from 37 sites, representing 146,706 WV outpatients, to 60 sites, representing more than half of all WV outpatients (220,465 WV out of 391,062 nationally). Expansion successfully increased representation of diverse populations. For example, across sites, number of WV from a racial/ethnic minority group increased from 38% Pre to 40% Post. Member sites together are fairly representative of VHA as a whole; for example, 43% of WV at the 60 PBRN sites have age <45 (versus 42% VA-wide), 22% (versus 26%) have a rural residence, 84% (versus 91%) used primary care, and 39% (versus 41%) used mental health services. The main difference is that 35% have an HSR&D Research Center (versus 16% VA-wide). Number of VA Integrated Service Networks represented increased from 17 Pre to 20 Post, increasing geographic heterogeneity.
Conclusion: WH-PBRN represents a large and geographically diverse nation-wide network of 60 VA sites. Expansion increased the number and diversity of WVs represented in the network. Across facilities, most women use primary care services, suggesting VHA primary care settings are an excellent venue for recruitment. Similarly, a large proportion receives mental health care: this is important since women's mental health care remains a major focus of VHA research. The expanded WH-PBRN provides greater opportunity to increase equitable representation of WVs in VA research, and to conduct health services research that examines diverse health care delivery systems.

Keywords: Human Subjects Research, Organizations, Program Evaluation, Healthcare Workforce, VA Health System, Gender / Sex Differences in Health and Health Care, Evaluation Research, HCSRN Structure and Operations, Dissemination and Implementation of Innovations

P15.02
Organizational Learning in an Integrated Health System: Informing Operations for a Learning Health Care System

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Background: Since 2013 a multidisciplinary group has been working to spur Geisinger's growth as a Learning Health Care System (LHCS), using the Institute of Medicine (IOM) model as a guide. In March 2016, the group conducted a survey of staff to elicit perceptions and assess awareness of learning, and aspects of the learning environment, at Geisinger.
Methods: The target audience for the survey was identified by leadership and included clinical, research, administrative and information technology (IT) staff at the Geisinger Medical Center (GMC), the system's flagship hospital. The survey was sent via email using Qualtrics software, and non-responders received two weekly reminders.
Results: Of 559 contacted, 357 (63.9%) staff members responded, including clinical (n=164), administration (n=78), research (n=23), IT (n=5) employees, and 87 identifying with multiple areas. Most participants (62.5%) had not previously heard of the IOM LHCS model. The majority of respondents characterized the environment at GMC (83.2%) and in their work unit (86.6%) as conducive to learning; however, 94.7% indicated that they were unlikely to participate in training or learning activities. The survey asked participants to assess the importance of LHCS functions to their work and to evaluate the current support that they receive for these functions. Several functions were ranked as important to their work but in need of increased support: the ability to capture and view patient-reported data; the service request process; the ability to access data and use it without the assistance of a specialized data analyst; the capacity to track clinical outcomes; the ability to communicate with other providers simultaneously; and patient centered care and patient engagement in quality improvement, innovation and research teams.

Conclusion: Although most respondents were unaware of the IOM model, the majority indicated that the GMC environment is conducive to learning. Further exploration is needed to determine why so few indicated an unwillingness to participate in learning activities. Areas where there is a gap between importance to work and current support offer a potential focus for future efforts to stimulate Geisinger's growth as a LHCS. Survey results were presented at a GMC symposium on learning and patient engagement, and follow-up activities are in process.

Keywords: Organizations, Healthcare Workforce, Information Technology, Survey Research and Methods, Engagement of Stakeholders, Health Care Organizations, Hospitals, Quality Improvement

P15.03
Stakeholder Engagement in a Patient-activation Behavioral Intervention for Prescription Opioid Patients (ACTIVATE)

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Background: The complexity of the prescription opioid epidemic has highlighted the need to address opioid use and pain management using a multi-faceted patient-centered approach. This PCORI-funded study uses multiple strategies to leverage the experience and expertise of patient and clinical stakeholders.
Methods: This pragmatic randomized trial of a behavioral intervention was conducted in two busy primary care clinics in an integrated health care system. Adult patients using prescription opioids for at least 3 months were identified using electronic health records. After consent, patients were randomized into either the intervention arm or the usual care arm. The intervention consisted of four group sessions led by a clinical psychologist focusing on patient activation skills, pain management, opioid education, and communication strategies with providers. Baseline and follow up telephone interviews at 6 and 12 months measure patient-centered outcomes, including quality of life, pain severity, functional status, opioid use, patient satisfaction, and self-management strategies. We engaged stakeholders in study design, curriculum development, data collection, data interpretation, and dissemination. Our stakeholder panel consists of five patients with pain (three from Kaiser and two from a Federally Qualified Health Center), clinicians from primary care, emergency medicine, psychiatry, pain management, pharmacy, a patient advocate and an external researcher. A small number of qualitative interviews will be conducted with providers in primary care about their experience prescribing opioids.
Results: Over 2400 potentially eligible patients were screened and 377 patients were enrolled over 13 months. Six and 12 month follow up interviews are currently being conducted. Qualitative findings suggest difficulties in recruiting this complex patient population, which face considerable barriers to participation. Patients report distress over a more conservative prescribing environment, difficulties obtaining opioids, living with chronic pain, and challenges communicating with providers. Qualitative findings and baseline data will be presented. Methodological considerations for conducting patient-centered research in primary care will be addressed and the benefits of engaging stakeholders in pragmatic trials will be discussed.
Conclusion: By collaborating with a wide range of stakeholders, we hope to measure the effectiveness of a behavioral intervention on patient-centered outcomes and extend the impact of the findings beyond the health care system.

Keywords: Primary Care, Pragmatic Trials, Engagement of Stakeholders, Substance Abuse and Addiction, Qualitative Research

P15.04
Acculturation and Patient Reported Experience with Healthcare: An In-depth Examination Using CG-CAHPS Surveys, Electronic Health Records, and Patient Surveys

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Background: Asians in the US, particularly South Asians (SA) and Chinese who are the groups of more recent immigration history, report poorer healthcare experiences than non-Hispanic Whites (NHW). Few studies have examined the variation in patient-reported experience in relation to acculturation. This study aims to fill this gap using data from CG-CAHPS Survey, linked Electronic Health Records (EHR), and patient acculturation survey to provide an in-depth understanding of the role of acculturation in evaluating healthcare experiences among SA and Chinese patients.
Methods: A random sample of SA, Chinese and NHW patients in a multi-specialty ambulatory practice in California were selected for recruitment. A total of 69 Chinese, 40 South Asian and 22 NHW completed the CG-CAHPS survey evaluating their most recent visit. SA and Chinese patients also completed a 12-item validated acculturation survey that assesses language use, media use and social relationships. We conducted multivariate logistic regression models to evaluate the effect of acculturation on patients' reports on CG-CAHPS regarding "see the provider within 15 minutes", "provider spend enough time with you", "provider explain in an way that was easy to understand" and "overall ratings of provider", taking into account the actual wait time, type of visit, and history with provider recorded in the EHR of the surveyed visit, and patient's self-rated health status.
Results: SA and Chinese reported poorer experience than NHW in multiple aspects of care assessed by the CG-CAPHS survey, given similar care provided (e.g., actual wait time and time with provider). Acculturation appeared to be a significant predictor of their reported experience, with varying effects between SA and Chinese. With regard to doctor-patient communication and overall ratings of providers, acculturation has a positive effect on Chinese patients' reported experiences but exerts no significant effects on SAs. In

terms of wait time and time spent with providers, however, acculturation has no significant effects on Chinese patients but exerts a slightly positive effect on SA patients.
Conclusion: Acculturation affects SA and Chinese to varying extents across different aspects of care. Health systems may consider targeted strategies to expand culturally competent care for different Asian populations.

Keywords: Communication between Patients and Providers, Racial/Ethnic Differences in Health and Health Care, Patient Experience / Satisfaction

P15.05
Are Asians harder to please? A Mixed Methods: Study of Racial/Ethnic Differences in Expectations and Evaluation of Healthcare Experiences

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Background: While Asians in the US report poorer healthcare experiences than non-Hispanic Whites (NHWs), the underlying reasons for such difference remain unclear. We examined how expectations and norms surrounding evaluation among NHW, Chinese, and South Asians (SA), as applied to a standardized healthcare experience, explain the differences in reported healthcare experiences.
Methods: A purposeful sample of 10 NHW, 11 Chinese, and 12 SA patients were recruited from a large multi-specialty ambulatory care practice in California. Participants first read a vignette describing an office visit and then asked to evaluate the vignette using an Experiences of Care (EOC) survey that consisted of 17 items selected from the CG-CAHPS. After completing the EOC survey independently, participants took part in a cognitive interview to describe their interpretations of each EOC survey item, reasons for their rating choices and suggested improvements needed to meet their expectations. We conducted comparative analyses across racial/ethnic groups for 1) the proportion of "top-box" (the best) responses for each EOC survey item, 2) evaluation norms characterized by the "top-box" responses paired with corresponding narratives regarding "improvement needed", and 3) narratives surrounding expectations, experiences, and evaluation norms for each aspect of care on the EOC survey.
Results: NHW were more likely to give the "top-box" ratings and concordantly indicate "no improvement needed" compared to SA ($p<0.05$) and Chinese ($p<0.05$) patients. Regardless of the rating given, both Chinese and SA were more likely than NHWs to avoid the "top box" and indicate "improvement needed" ($p<0.05$), echoed by their narratives reporting higher expectations regarding timeliness of visits, communicating with providers, and getting tests and referrals, which were often unmet. A common belief expressed by both Asian groups was that "top-box" ratings are reserved for situations that dramatically exceeded their expectations, which might in part explain their lower likelihood to give "top-box" ratings than NHWs for the same situation.
Conclusion: Higher expectations among SA and Chinese patients may in part explain their poorer reported experiences. Further, the same care experience tends to be rated as poorer by Asians than NHWs, which may also contribute to the lower ratings of healthcare experiences among Asian patients.

Keywords: Communication between Patients and Providers, Racial/Ethnic Differences in Health and Health Care, Qualitative Research, Patient Experience / Satisfaction

P15.06
Towards Culturally-Competent Care: Perspectives from both Physicians and Patients

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Background: Patient satisfaction has become an increasingly important healthcare quality indicator and been widely used to compare quality across healthcare organizations and providers. At a large multispecialty ambulatory care practice in California, a notable difference across regions has been recognized with sites serving higher proportions of Asian patients tending to receive significantly lower satisfaction scores. The current study aims to identify the key drivers of this issue and provide recommendations for strategies to improve culturally-competent care across health systems.
Methods: We conducted 18 focus groups and 32 interviews with a total of 69 Chinese and 40 South Asian patients, as well as 7 in-depth interviews with primary care physicians serving a significant proportion of Chinese and South Asian (SA) patients. All data were transcribed verbatim and coded with Dedoose, a multi-functional qualitative analysis software. First, data were coded by aspects of care. Then an inductive thematic approach was used to identify themes around language barriers, racial/ethnic/cultural differences in relation to care. Further, patient-reported themes were triangulated with physicians' accounts to draw recommendations for expanding culturally competent care.
Results: Both patients and providers emphasized that an understanding of Asian patients' beliefs about health and illness, which are fundamentally different from western Medicine, is an imperative to deliver culturally-competent care. In addition, knowledge of the social norms in inter-personal and family interactions was also considered important. For Chinese and SA patients in particular, more education is needed on the use of lab tests, imaging and antibiotics. Moreover, patients with lower English proficiency in both groups reported language as a barrier to satisfactory experience. Translation services were not favored by either patients or physicians because they are perceived to be time-consuming and of low quality. While patients reported frustration in scheduling with physicians who understand both their language and culture, such physicians reported being overwhelmed with work load. Physicians also voiced the need for more medical assistants and receptionists with the language capacity to support their care.

Conclusion: Culturally-competent care requires knowledge of cultural beliefs and practices in relation to health, as well as language support from the care team and the health system.

Keywords: Ambulatory/Outpatient Care, Racial/Ethnic Differences in Health and Health Care, Qualitative Research, Patient Experience / Satisfaction

P15.07
Response to survey solicitation to patient portal members differs by age, race and healthcare utilization

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Background: Health care systems are increasingly utilizing electronic medical record (EMR) – associated patient portals to facilitate communication with patients and between providers and their patients. These patient portals are growing in recognition as potentially valuable research tools. However, while there is much known about the demographics of patients who are portal members (older, white, ref this), not much is known about which portal members respond to surveys solicited within that specific population. Therefore, the objective of this study was to determine the demographics of patient portal users who respond to a survey request.
Methods: A one-time email with a link to a survey through REDCap was sent to 10,015 randomly selected MyChart users. This survey included questions regarding the timing of the release of both routine and potentially sensitive (e.g. biopsy, genetic or sexually transmitted disease) test results. Two weeks were allowed for survey completion.
Results: The survey had a 13% response rate (n=1303) which varied by several demographic characteristics. Specifically, the adjusted odds ratios indicated that on average, a ten year increase in age corresponds with higher odds of responding to the survey (OR=1.40, p<0.001). Race was a significant factor as users self-identified as “Black” (OR=0.50, p<0.001) and “Other” (OR=0.74, p<0.001) races were less likely to respond than those self-identified as “White.” Patients that averaged more than one visit to a specialist per year over the last 2 years were more likely to respond than those who averaged one or fewer visits (OR=1.32, p<0.001), with similar results for primary care provider visits (OR=1.22, p=0.02).
Conclusion: We found that there are demographic differences in respondents to a survey solicited to a random sample of active patient portal users. Respondents tended to be older, white, and more frequent users of care from both specialist and primary care physicians. Patient portals are potentially valuable tools for research; however, it is important to understand that respondents to surveys solicited to this sampling frame may not be entirely representative and additional approaches to engage a wide range of participants are likely necessary.

Keywords: Survey Research and Methods, Demographics, Sampling, Communication between Patients and Providers

P15.08
Preference for immediate release of test results through a patient portal differs by demographics and type of results.

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Background: Electronic medical record (EMR) use has increased dramatically over the past 10 years on a national scale and associated patient portals provide a direct and secure environment in which patients can receive information from their health care providers, leading to unprecedented advances in communication between providers and patients. While previous studies have shown patients are in favor of receiving test results through such portals, preferences specific to the type of result, and if these preferences change with certain patient characteristics, are unknown. The objective of this study was to determine differences in patient preferences for the release of test results through an EMR-associated portal.
Methods: A one-time email with a link to a survey through REDCap was sent to 10,015 randomly selected patient portal users. The survey had questions regarding the release of ‘regular’ test results and the release of ‘sensitive’ results (including genetic testing, sexually transmitted disease and biopsy results). Two weeks were allowed for survey completion. Variables assessed included age, race, sex, marital status, co-morbidities, specialty and primary care physician visits, and insurance type. Analysis was performed in R and statistical significance was set at p<0.05.
Results: The survey had a 13% response rate (n=1303). Most patients preferred their ‘regular’ results released to them immediately (86%) while the remaining patients preferred a built-in automatic delay. Preferences regarding the release of ‘regular’ results did not differ by patient characteristics. Only 59% of patients preferred ‘sensitive’ results released immediately, with female patients more likely to prefer a delay in the release of sensitive results (OR=1.45, p=0.01). Preference regarding release of ‘sensitive’ results did not differ by other patient characteristics.
Conclusion: We found patient preference to vary with the type of result (regular or sensitive), but the only difference in preference specific to patient characteristic was that of female patients preferring a delay in the release of sensitive results. With the growing availability of patient-provider communication through EMRs and the importance of incorporating patient-centered approaches into healthcare, it may be advantageous to tailor the release of results to patient preferences, such as adjusting release by the type of result.

Keywords: Survey Research and Methods, Demographics, Communication between Patients and Providers, Engagement of Stakeholders

Develop patient-focused educational materials and scripting for a randomized trial to reduce opioid use following total hip and total knee arthroplasty (THA/TKA) P16.01

David Smith, Lynn DeBar, Jennifer Kuntz, Jill Mesa, Jennifer Schneider

P16.01

Develop patient-focused educational materials and scripting for a randomized trial to reduce opioid use following total hip and total knee arthroplasty (THA/TKA)

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Background: The American Academy of Orthopaedic Surgeons recognizes the unintended consequences of focusing on opioids for pain management
Methods: Qualitative study with open-ended, structured interviews (n=18) at Kaiser Permanente Northwest. A purposeful sampling method identified surgeons, advice nurses, physical therapists, physician assistants and patients. Patients were recent THA/TKA cases in the top third of opioid use after surgery Interview guides captured feedback consistently. Provider interviews explored their approach with THA/TKA patients on: pain management; barriers to opioid titration; and recommendations/changes on educational materials to support pain management and opioid-reduction. Patient interviews explored their experience, understanding, and beliefs surrounding opioids; and recommendations on important content. A qualitative methodologist conducted interviews and content analysis to identify key themes
Results: Recommendations for content in patient educational materials and scripting included: • Clear descriptions of how opioids work in the body, how to taper, non-opioid pain management options, and problems from over-use (e.g. side effects, and pain masking) • Messaging on how long to expect to use opioids and type of pain to expect • Providing a visual timeline for patients to reinforce pain medication titration expectations and home or physical therapy exercises, especially during the acute phase • Emphasis on the multi-modal approach to pain management and the importance of a balance between opioids for recovery vs over-use • Explanations to chronic opioid users that their pain and its management may vary from opioid-naïve patients • Provide education and messaging multiple times prior to and after surgery
Conclusion: Patients and providers agreed that clearly stated verbal and written messaging is needed beyond what has typically been done regarding opioid expectations; the resulting materials are being tested in an ongoing trial

Keywords: Qualitative Research, Pharmaceuticals: Prescribing, Use, Costs

Technologies for Managing VDW Access and Identifying appropriate levels of staffing at CIRI P17.01
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Feasibility of collecting patient-reported outcomes after major cancer surgery: A survey of KP members six months after cystectomy for bladder cancer P17.02
Joanna Bulkley, Maureen O'Keeffe Rosetti, Christopher Wendel, James Davis, Michael Leo, Sheila Weinmann, Julie Munneke, Teresa Harrison, Marilyn Kwan, Kim Danforth, Carmit McMullen

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Identification of Incident Uterine Fibroids Using Electronic Medical Record Data P17.09
Onchee Yu, Renate Schulze-Rath, Susan Reed, Jane Grafton, Kelly Hansen, Delia Scholes

P17.01
Technologies for Managing VDW Access and Identifying appropriate levels of staffing at CIRI

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Background: CIRI has implemented a number of tools to enable users to achieve self-service access to VDW and make requests for additional data (not provided by VDW Self Service). In addition to our tools for managing the access to historic retrospective data we have also integrated a Clinical Trial Management System (CTMS) for protocol management, study accounting, electronic data capture and patient management. Identifying tools that can help automate delivery and monitor demand are essential components of our technology strategy.
Methods: Our strategy for developing or selecting technology assets has been guided by the following factors: 1) functionality, does the tool do what we need it to do or desire it to do?; 2) usability, is the tool or technology easy to learn and use for persons of all levels of ability, and can it be used broadly to support various types of research?; 3) security, does the technology provide adequate measures to ensure security of data stored and/or accessed?; 4) interoperability with other tools; and 5) cost of the technology, initial and long term, with consideration of open source options.
Results: To date, we have implemented tools for clinical trial management of both sponsor and investigator-initiated trials, a data query tool to allow end-users to access the VDW to perform simple queries and prep-to-research activities, electronic data capture for collecting study-specific data and patient-reported outcomes, and a grant management system. We have also implemented a tool for tracking project deliverables and staff time, which we are using to quantify demand and identify need for additional resources. We are currently evaluating tools for data visualization and for streamlining acquisition of additional data assets to compliment the VDW.
Conclusion: Having a strategy around development and implementation of technology assets is critical for assuring safe and broad access to our data resources, and for monitoring demand among users in order to identify needs for appropriate resources. These tools will enable CIRI to expand the scope of research conducted at CHI and to create a network of researchers who can collaborate on studies without being co-located by creating virtual research organizations across our facilities.

Keywords: Information Technology, Research Administration, Contracting, and Operations

P17.02
Feasibility of collecting patient-reported outcomes after major cancer surgery: A survey of KP members six months after cystectomy for bladder cancer

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Background: Researchers seeking to understand the physical, socioemotional, and quality of life impacts of serious health conditions such as cancer need to interact with patients during times of poor health if they hope to develop a more complete understanding of patient experience. A common concern is these patients will be over-burdened if asked to participate in research and that participation rates will be low. Our analysis describes recruitment methods and examines survey response rates among bladder cancer patients in the period after bladder removal surgery, when they may be facing health challenges and are adjusting to altered urinary function.
Methods: We conducted focus groups with bladder cancer patients with urinary diversions to identify topic domains and develop a patient-reported outcomes questionnaire. We then conducted a survey 6-months post surgery at three Kaiser Permanente sites. Eligible patients had bladder removal and reconstruction surgery as identified from the electronic health record and confirmed through chart review. Patients were mailed a cover letter and a 30-page questionnaire, which included fixed-choice and open-ended questions on quality of life, healthcare decision making, urinary function, sexual function, body image, coping, and healthcare expenses. We placed up to 10 phone calls to non-respondents. As explained in the cover letter, return of the survey was considered consent to participate.
Results: The participation rate was 69%(site range 63%-78%). 88% of participants completed 95% or more of the scale items. The scales with the most missing items proportionally were Spiritual Well-being (8.9%), Urinary Function (5.9%), Goal Dissonance (5.6%) , and Decision Regret (4.5%). Among 269 participants, 76% provided an estimate of total out-of-pocket expenses since bladder cancer surgery and 62% provided at least one estimate for specific categories of expenses.
Conclusion: Our results suggest that even during periods of serious health challenges, patients will participate in research studies and are willing to complete long questionnaires when they are highly relevant to their condition. Focus group reports from our study indicate that patients desire the opportunity to be heard and to share their experience, and that in doing so they hope to contribute to improving care for future bladder cancer patients.

Keywords: Human Subjects Research, Cancer, Survey Research and Methods, Patient Experience / Satisfaction

P17.03
Enrolling patients in the Sutter Biobank: Lessons learned from testing different recruitment methods

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Background: Multiple methods may be used to recruit patients for research. These vary in resources required, including monetary costs and staff time, as well as in 'yield' or the proportion of people approached who agree to participate. Biobanking is a new and growing area of health research that presents a variety of logistical considerations from recruitment to enrollment.
Methods: A pilot study was conducted to test different recruitment strategies for the Sutter Biobank recruitment of a general / healthy population sample. Patients were first contacted either by an email or a traditional letter. Patients could choose to not be further contacted about the study. Follow-up contact options included an email, letter, or phone call. The initial recruitment material invited the patient to a website with more information about the Biobank and a consent form. After a patient accesses the site and either accepts or declines participation, a brief QI question was asked about why they made their decision.
Results: The results of the pilot study will describe the outcomes of each recruitment strategy from the staff time and cost per number of enrolled biobank participants. Demographic factors about those who participate, decline participation, or do not respond will be available from the EHR for additional context.
Conclusion: Different recruitment methods have different tradeoffs in terms of effort put in and the outcome of biobank enrollment. These results may indicate that certain strategies are more effective for some populations compared to other populations. For hard-to-reach patients or for those with more questions or concerns, a phone call may encourage reviewing the biobank materials before deciding whether to accept or decline participation.

Keywords: Genetics and Genomics

P17.04
Identification of Migraine at Sutter Health: an Application of an EHR-based Algorithm

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Background: Migraine is one of the most common and disabling disorders in the world. In the United States, one in four households is affected by it. With no diagnostic test, migraine is most commonly detected through patient interview and rule out of other causes of headache. Studies to identify patient populations for prevalence estimates or clinical research often involve costly and time-consuming population-based surveys or data collected from specialty headache clinics. To identify migraineurs in Sutter Health, we extracted data from electronic health records (EHR) and applied a migraine probability algorithm (MPA) that we previously developed in a separate, large integrated health care system. Our goal was to identify a target population of migraineurs from which to recruit for future studies.
Methods: We identified all migraine diagnoses, migraine-specific prescriptions, and migraine listed as a significant health problem from the EHR for the five-year period November, 2010 through October, 2015. Applying the MPA, we calculated a migraine probability for all patients in the Sutter Health primary care population, defined as adults with one or more visits to primary care during the study period. We report prevalence estimates by age, sex, and race.
Results: The prevalence of medically-ascertained migraine among the Sutter Health primary care population was 7.3% overall. Migraine was more prevalent among women than men, 9.8% and 3.4% respectively, and peaked for women ages 35-54, 12.2%. Migraine prevalence was highest among whites, 8.4%; lowest among Asians, 4.4%.
Conclusion: Our study confirms that using EHR data along with the MPA is an inexpensive and easily applied method of identifying migraineurs for use in research. We have calculated prevalence estimates at Sutter Health, and will use this methodology to identify potential participants for a concurrent NIH trial of Mindfulness for migraine. Although our calculated prevalence estimates are lower than those reported in the literature, we believe this is due to the restriction that patients utilize Sutter Health primary care services. To test this, we included specialty care patients, and identified as many as 3% more migraineurs, thus warranting further study. Future plans include a patient survey to validate the MPA in the Sutter Health patient population.

Keywords: Observational Studies, Primary Care, Chronic Disease, Epidemiology

P17.05
Fidelity Measurement of a Mindfulness-Based Stress Reduction (MBSR) Intervention for a Randomized Controlled Feasibility Trial for Migraine Patients

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Background: Mindfulness-Based Stress Reduction (MBSR) is an 8-week meditation-based intervention developed by Jon Kabat-Zinn at the University of Massachusetts Medical Center (UMass) in the 1970s. Increasing evidence has shown effectiveness for many patients with a variety of pain-related and functional disorders. In preparation for a fully powered randomized controlled clinical trial of MBSR for patients with moderate-to-severe migraine headache, we will conduct a 2-arm, parallel-comparison randomized controlled feasibility trial of MBSR vs. usual care for 60 migraine patients at a

large health system. Assuring and documenting fidelity for practitioner-delivered interventions is a critical aspect of these trials for assuring that delivery of the intervention adheres to consistent standards for integrative health care. Fidelity measurement is one of the main outcomes for this pilot study.
Methods: MBSR instructors will use a standardized curriculum developed at UMass. MBSR content oversight will be provided by a senior teacher who has founded several MBSR programs in healthcare settings. He will have primary responsibility for ensuring fidelity of the MBSR intervention by meeting with each teacher on a monthly basis to ensure adherence to the standard curriculum. He and the research team will also create an MBSR "fidelity checklist", which will be used by a research specialist who will record and listen to a randomly selected session for each instructor to monitor the teaching.
Results: Fidelity measurement is defined as the extent to which delivery of an intervention adheres to the protocol or program model as originally developed. Despite its importance, there has been little development of tools for measuring fidelity and evaluated methods for documenting the degree of fidelity in a clinical trial. This presentation will describe the details of our fidelity-assessment methodology; the MBSR “fidelity checklist” developed for this trial will also be shared for adaptation by other investigators conducting similar studies.
Conclusion: Proven fidelity of the MBSR intervention is needed for the results of this study to be generalizable for a fully powered Phase III trial. In addition, the information we gain from fidelity measurement will help inform future studies of MBSR for migraine and other conditions.

Keywords: Human Subjects Research, Pragmatic Trials, Chronic Disease, Clinical Trials

P17.06
Stakeholders’ Views on Data Sharing and Multi-Site Research

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Background: Data sharing is a fundamental step in multi-site studies, enabling research on rare outcomes, treatment heterogeneity, and greater generalizability. However, data sharing entails costs and risks. Newly developed privacy-preserving analytic and data-sharing methods offer an approach to sharing data and conducting multi-site research that eliminates the need to share identifiable patient-level information. Identifying stakeholders’ perceptions and synthesizing overarching themes about willingness to share data are important first steps towards increasing the acceptability and use of these new tools. We therefore sought to understand stakeholders’ views on data sharing generally, and privacy-preserving methods in particular.
Methods: We conducted semi-structured group and individual interviews with a purposive sample of stakeholders to gather a variety of perspectives on data sharing in general, and the use of privacy-preserving methods (PPM) specifically. Interviews were audio-recorded and professionally transcribed. Using content coding followed by thematic coding we sought to identify factors affecting stakeholders’ willingness to share data, with particular attention to the potential impact of PPM.
Results: A total of 11 stakeholder interviews were completed, involving patients (n= 15), researchers (n= 10), IRB and regulatory staff (n=3), multi-center research governance (n=2) and healthcare system leaders (n=4). Stakeholders’ perceptions of the benefit and value of the research was the strongest influence towards data sharing; perceived value was related to the relevance of the scientific question and the methodologic rigor. Influences against data sharing were primarily cost and data security risks; the latter was mitigated by various safeguards (encryption, data use agreements, oversight), successful data sharing experience, established relationships, and trust. The risk reduction obtained by sharing aggregate data rather than individual-level data was acknowledged as being potentially more acceptable to some stakeholders, but interviewees also expressed concerns about the increased cost, and questioned whether aggregating data resulted in a loss of information that would in turn lessen the value or validity of the research.
Conclusion: The gains in privacy protection associated with the use of PPM in multi-site studies involving data sharing were attractive to some stakeholders, but factors such as the value and generalizability of the research appear potentially more influential.

Keywords: Human Subjects Research, Confidentiality / HIPAA, Observational Studies, Engagement of Stakeholders, Qualitative Research

P17.07
Direct Adjustment of Obesity Estimates in the Colorado BMI Monitoring System

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Background: In the Colorado BMI Monitoring System, electronic health record (EHR) BMI data from participating healthcare organizations are provided to the Colorado Department of Public Health and Environment (CDPHE) and combined to establish BMI estimates at the census tract level. This system provides estimates with more geographic specificity than national surveys, however, population representativeness is a limitation. Data are sampled from all members of five healthcare organizations, and selection bias is possible.
Methods: We applied direct adjustment based on gender, race/ethnicity and age to estimate BMI and overweight/obesity

prevalence estimates. To avoid limiting to complete case data, missing race/ethnicity data were imputed using hot decking based on census tract, gender, and age classes. Raking, an iterative method of marginal weight adjustment, was used to create sample weights used in direct adjustment estimates by census tract. Hot decking and raking were performed using modified SAS macros developed by Abt Associates.
Results: Processes were developed on one site's 2012-2014 data (n=479,960) and are being tested on all site data at CDPHE. Missing race was imputed for 13.2% of members and failed on only 0.1%. Individual weights were generated through raking for 99.5% of individuals with a recent BMI measurement. For 658 of 668 Denver metro census tracts, crude and adjusted estimates were similar (Pearson R= 0.981, p <0.01), and the median absolute difference in crude versus adjusted adult obesity prevalence estimates was 0.05 (IQR -0.54, 0.80).
Conclusion: It is feasible to apply direct standardization to large data systems with many geographic units. Imputation via hot decking is appealing because it has been used in large government and public health surveys, it is effective using a limited set of demographic variables, and it provides a reasonable estimate of variable distribution by drawing from observed values. Raking is an advantageous weighting method in direct adjustment because it avoids empty or small cell size and only requires population marginal demographic group estimates. Overall, adjusting census tract obesity prevalence estimates modified values slightly (the majority of absolute difference of crude and adjusted, was within 1% in either direction), and adjusted estimates created more conservative confidence limits.

Keywords: Geographic Information Systems, Observational Studies, Biostatistics, Epidemiology

P17.08
Sleep Deprivation in Hospitalized Patients Over the Age of 60: An Approach to Recruitment Challenges in an Inpatient Setting

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Background: Chronic sleep deprivation in older adults contributes to dementia, cardiovascular disease, and mortality, but has not been studied in a hospital setting. We conducted a pilot study in a Northern California hospital to evaluate the quantity and quality of sleep among inpatients age 60 and older. The study goal was to evaluate the association between sleep and hospital outcomes such as length of stay, delirium and re-admissions. The focus of this abstract is to describe our approach to recruitment challenges in a hospital setting.
Methods: This study was conducted at an 81-bed community acute-care hospital, in rural Tracy, California. Our goal was to recruit 100 patients in a one-year period. We began with strict eligibility criteria, exclusively recruiting patients admitted with an expected length of stay (LOS) of two or more days and without cognitive impairments. We measured sleep with 24-hour wrist actigraphy and sleep diaries, and collected patient reported outcomes (PRO) through in-person questionnaire. Study staff included more than 25 volunteers from local universities. We also included an education component for bedside nursing staff and volunteers.
Results: In the first 5 months we recruited 12 patients, and worked with leadership to revise eligibility requirements and recruitment methods in an attempt to increase yield. Specifically, we relaxed the 2-day expected LOS and extended recruitment efforts to the emergency department (ED). We also added Spanish-language materials. In the four months since making these changes, we have recruited 28 patients. We determined that the Spanish materials and recruitment effort from the ED did not impact recruitment rates, however, modifications to the eligibility criteria led to better recruitment.
Conclusion: There are several important elements to successful recruitment and participant retention for research in a hospital setting. Flexibility and creativity are essential; in our case, we relaxed restrictions on estimated LOS. In addition, having assistance from highly-trained volunteers and nursing staff was equally valuable. Finally, the support of leadership (Chief Medical Executive and nursing administration) allowed us to make some of the necessary changes throughout the process. With our new processes in place, we hope to complete recruitment within 6 months.

Keywords: Human Subjects Research, Aging/Elderly/Geriatrics, Observational Studies, Survey Research and Methods, Acute Inpatient Care, Hospitals, Dissemination and Implementation of Innovations, Patient Reported Outcomes / Functional Status, Quality Improvement

P17.09
Identification of Incident Uterine Fibroids Using Electronic Medical Record Data

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Background: Uterine fibroids are the most common benign tumors of the uterus that are associated with considerable morbidity in women. Diagnosis codes have been used to identify symptomatic fibroid cases but their accuracy, especially for incident cases, is uncertain. This study assessed the accuracy of diagnosis codes in identifying incident fibroids and developed algorithms to improve incident fibroid case-finding, using additional electronic data.
Methods: Women aged 18-65 who received an ICD-9 diagnosis code for uterine fibroid during 2012-2014 were identified from electronic databases at Group Health Cooperative, an integrated health-care system in Washington State. Women with a fibroid history or hysterectomy were excluded. Medical records were reviewed on a random sample of 617 women to confirm incident fibroid status. Additional data on demographics, symptoms, treatment, imaging, health care utilization, comorbidities and medication were collected. Classification and regression tree

analysis incorporated these additional data were used to develop algorithms to identify incident fibroid. We focused on an algorithm with high sensitivity (i.e. maximizing the inclusion of true incident cases), and another with high specificity (i.e. avoiding incorrectly including non-cases as incident cases). Algorithms performance was assessed by calculating sensitivity, specificity, and positive predictive value (PPV) using medical record as gold standard.
Results: Among the 617 women, mean age at diagnosis was 48 years. Medical record review confirmed 583 (95%) fibroid cases, and 482 incident cases, a 78% PPV for incident cases based on diagnosis codes alone. Incorporating additional electronic data, the algorithm classified 395 incident cases among women with at least 2 pelvic ultrasounds on and prior to diagnosis date. Of these, 344 were correctly classified as incident cases, yielding an 87% PPV. Sensitivity was 71%, and specificity 62%. A second algorithm further classified women based on a fibroid code of 218.9 in 2 years after diagnosis and lower body mass index yielded 93% PPV, 53% sensitivity, and 85% specificity.
Conclusion: Identification of incident uterine fibroids through ICD-9 diagnosis codes alone was good with moderate PPV. Algorithms using additional electronic data improved incident fibroid case finding with higher PPV, and either higher sensitivity or higher specificity to meet different study aims.

Keywords: Observational Studies, Clinical Decision Making, Biostatistics

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