PS1-33:

Algorithm for Matched Case/Control Studies

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

Comparative Effectiveness

C-A2-01:

Virtual Consults in an Electronic Medical Record: Physician Use, Satisfaction, and Learnings

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

C-A2-02:

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

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

C-A2-04:

The Geisinger Transitions of Care Initiative: Overview of an Interdisciplinary Quality Improvement Process

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

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

C-B2-01:

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

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

C-B2-02:

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

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Background: Geisinger Health Plan's ProvenHealth Navigator (PHN) Program, a "Patient Centered Medical Home" initiative is designed to improve patient experience, optimize patient's health status, and improve efficiency. Components include 24-hour primary and specialty care access, a GHP funded nurse case manager embedded in each practice site to coordinate services for patients with complex medical conditions, home based monitoring, interactive voice-response surveillance, and support for end-of-life care decisions. We analyzed hospitalization rates as well as financial outcomes to measure the effect of the

PHN intervention in 11 clinics. **Methods:** Monthly data from 44 Geisinger clinic sites from 2005 to 2008 were retrospectively analyzed to test for a significant effect of the PHN intervention on admissions, readmissions, and expense outcomes. Eleven sites began the ProvenHealth Navigator at different times during the study period between 2006 and 2008. Statistical analysis was performed (SAS 9.1.3, Cary, NC) using Poisson regression to model admissions per member and readmissions per admission, or using linear regression to model inpatient expenses and total pre-prescription (PreRx) expenses per member. Each of these clinic level outcomes was modeled as a function of year, month, mean risk score, percent males, mean age and PHN status. PHN status was modeled using a within clinic and betweenclinic variable (Berlin et al., *Biometrics* 1999) to minimize confounding due to center-exposure association. The significance of the within clinic variable was tested at the $p < 0.05$ level. Repeated measures from clinics were clustered using the Generalized Estimating Equation method with exchangeable covariance. **Results:** Results are expressed as parameter estimates [95% confidence interval]. The PHN intervention was associated with a 17.1% lower admission rate [10.2 to 23.4, $P < 0.001$], a 14.5% lower readmission rate [0.8 to 26.2, $P = 0.04$], a non significant \$27 or 15% lower inpatient allowed expense per member per month [\$60 to +\$5, $P = 0.099$], and a \$59 or 11% lower PreRx expense per member per month [\$25 to \$93, $P < 0.001$]. **Conclusions:** Geisinger's ProvenHealth Navigator was associated with significantly improved outcomes in the clinics where it was implemented. Non-randomized clinic selection and varying intervention times were considered in the model. Future work should investigate interactions between PHN and clinic characteristics and cost-benefit relationships.

C-B2-03:

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

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