

Abstract PS2-22

Impact of Co-payments on Patient Compliance and Persistence for Smoking Cessation Pharmacotherapy

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Background/Aims: Increasing patient co-payments commonly cause decreased medication adherence. This analysis evaluated the impact of co-payment on patient compliance and persistence with smoking cessation pharmacotherapy. **Methods:** Patients were identified from the Lovelace Health Plan (LHP) from January 1, 2000, to June 30, 2005, by a bupropion prescription claim (<300 mg/day), exclusive of a diagnosis for a mood disorder (ICD-9 311.X), with no more than 9 refills and with continuous enrollment 3 months prior and 12 months post the initial fill date. Patients were grouped into three co-payment groups: <\$10, >\$10 to <\$20 and >\$20. Compliance was calculated as the days of available therapy over indicated therapy (49 days) and persistence as the percentage of patients remaining on therapy at 15, 49 and 60 days. Patients were stratified by age, gender, ethnicity and comorbidities. Resource use and costs were collected for each group. **Results:** The study population consisted of 1732 subjects with 496, 330 and 292 in each of the co-payment categories and a cohort of 613 patients for whom the co-pay was not available. Patients who paid <\$10 were the least compliant, with a medication possession ratio (MPR) of 0.7325 (CI, 0.7164-0.7486), and those who paid >\$20 were the most compliant, with an MPR of 0.7646 (CI, 0.7614-0.8084). Compliance was associated with gender (0.7654 female vs. 0.7419 male), age (0.7634 age 40-64 vs. 0.7370 age 18-39), and ethnicity (0.7650 non-Hispanic vs. 0.7220 Hispanic). Persistence at 15 days was almost 100% for all three tiers. Persistence at 49 days was 0.3919 (CI, 0.3559- 0.4424) for the lowest co-pay cohort and 0.5358 (CI, 0.4784-0.5933, $P<0.001$) for the highest co-pay cohort. Persistence at 60 days followed the same trends as at 49 days. Females aged 40-64 and non-Hispanics demonstrated greater persistency. The impact of age, gender, ethnicity, and comorbidities on the results will be presented along with the resource use and cost distributions between groups. **Conclusions:** The more common relationship of increased cost-sharing to decreased adherence seen in other disease states may be the inverse for smoking cessation pharmacotherapy. Patient behavioral components, such as motivation to quit, may play a larger role.

Abstract PS2-23

The Associations of Medication Adherence with Employment and Work Disability Among Patients with Relapsing Remitting Multiple Sclerosis

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Background: To understand fully the economic impact of interventions designed to manage relapsing-remitting multiple sclerosis (RRMS), the impact of medication adherence on patient outcomes needs to be understood. This study examines the associations between adherence to commonly used disease modifying agents (DMAs) and employment or work disability among patients with RRMS. **Methods:** We used automated medical and pharmaceutical claims data along with data from patient charts to identify eligible study participants with RRMS and their adherence to DMAs. A mixed mailed/telephone survey administered to a cohort of 224 HMO insured patients with RRMS was used to solicit information on employment status and socio-demographic characteristics. A continuous measure of medication availability (CMA) expressed as the ratio of the cumulative days supply of DMA dispensed over 365 days was constructed for the year preceding survey administration. CMA $\geq 80\%$ was used to identify patients who were adherent. We used multivariable logistic regressions to examine the associations between adherence and the probability of employment or work disability. Models controlled for patient age, gender, race, and comorbidities. **Results:** One hundred seventy patients responded to the survey (response rate: 76%). Our final sample was comprised of 111 patients who had been dispensed a DMA in the year preceding survey administration. Among these, 57% reported working at the time of the survey

and 21% reported they were work disabled (i.e., had an impairment or a health problem that kept them from working). In the multivariable logistic model predicting employment status, being therapy adherent was associated with a greater likelihood of working (OR, 3.18; $P<0.05$). In the multivariable model predicting work disability, being therapy adherent was associated with a decreased likelihood of work disability (OR, 0.37; $P<0.10$). **Conclusions:** Our findings suggest that adherence to DMAs among RRMS patients is associated with a greater probability of employment and a lesser probability of work disability. In the assessment of the cost-effectiveness of interventions to improve medication adherence, the effects on employment and work disability of medication adherence should be considered along with those of medical care costs and other outcomes.

Abstract PS2-24

Diminishing Incentives: Drug Co-Payment Effects Over Four Years

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Background: There is limited information about how prescription drug cost-sharing effects change over time. **Aim:** In a natural experiment, we examined annual changes in prescription drug expenditures associated with having a two-tier prescription drug co-payment over a 5-year period. **Methods:** We examined 8224 adult Kaiser Permanente-Northern California commercially insured members with diabetes in January 2001 who were continuously enrolled from 2001-2005. In 2001, subjects paid \$5 for prescription drugs. Starting in 2002, 66% of subjects paid \$15 for brand-name drugs and \$5 for generics (two-tier), while 34% of subjects had no changes (one-tier). There were no further changes in co-payments from 2002-2005. We used linear regression with a generalized estimation equations approach to examine annual prescription drug costs, truncated at the 99th percentile. We adjusted for patients' characteristics (age, gender, membership tenure, race/ethnicity, neighborhood social economic status and comorbidity) and secular trends (yearly indicators). We examined group differences (two-tier vs. one-tier) over time using group-year interactions and estimated adjusted prescription drug costs based on the model coefficients and mean values of the covariates. **Results:** The mean age of subjects was 51 years; 47% were female, and 40% were white. In the baseline year, 2001, the mean number of prescription fills was 26.5: 27.0 in the two-tier group and 25.6 in the one-tier group. The adjusted annual total prescription drug costs were \$1342 and \$1435 in the two-tier and one-tier groups, respectively (difference=-\$93, 95% CI: -\$168 to -\$18). In 2002, the first year with a two-tier drug co-payment, annual drug costs decreased significantly among the two-tier group compared with the one-tier group (difference-in-difference =-\$52; 95%CI: -\$97 to -\$8). In subsequent years, the magnitude of the changes were small and not statistically significant relative to the baseline year (difference-in-difference=-\$38 for year two of the two-tier co-payment, 95%CI: -\$85 to \$10; -\$38 for year three, 95%CI: -\$87 to \$11; and -\$34, 95%CI: -\$88 to \$20). **Conclusions:** Introduction of a two-tier co-payment structure resulted in decreases in total prescription drug costs in the first year as expected. In subsequent years, however, changes in annual costs relative to baseline levels were smaller in magnitude and not statistically significant.

Abstract PS2-28

Using Natural Language Processing to Explore Schemes for Assessing Disease Risk from Free-Text Radiology Reports

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Background: Radiology reports are a form of clinical text that contains rich and useful information that is difficult to extract by automated means. The Cancer Text Information Extraction System (caTIES) is open-source software that uses natural language processing (NLP) techniques to identify concepts from standardized medical thesauri found in clinical text. Information derived from clinical text via NLP may be able to assist clinicians assess clinical risk of disease. We are exploring automated concept-coding of radiological exams of the abdomen in an effort to develop schemes for ordinal classification of clinical risk of diseases such as ovarian cancer.

Methods: We designated 63,681 pelvic ultrasound exams of 44,704 women performed during 1997-2006 as cases or controls. Cases included 214 exams of 188 women who received a pathologically confirmed ovarian cancer diagnosis within 1 year; controls include 63,467 exams of 44,516 women who did not. We divided all exams for cases and 10,000 randomly selected exams from controls into split-half development and validation samples (having 107 cases and 5000 controls each). The full text of development sample reports was concept-coded using caTIES. Guided by domain expertise and trial-and-error we developed an algorithm to identify cases and classified each report according to it. Expert review of the 107 case reports and random samples of 300 false positive and 300 true negative controls is ongoing, as is algorithm modification. The validation sample remains unused. **Results:** A simple algorithm employing concepts 'mass,' 'simple,' 'hemorrhagic,' and 'resolution' achieved sensitivity of 63% and specificity of 93%. Expert review indicates the algorithm may be improved by 1) focusing exclusively on concepts in the report's impression section, 2) incorporating additional concepts to identify true positives and exclude false positives, 3) developing custom NLP rules to associate organ systems and concepts referring to them, and 4) excluding concepts expressed in future and past tenses. **Conclusions:** Progress to date is encouraging for developing schemes useful for ordinal classification of clinical risk of disease. Opportunities for applying NLP to clinical text for medical research are numerous and caTIES appears to be a promising tool, especially if customized to perform domain-specific NLP tasks.

Abstract PS2-29

Incident Asthma Surveillance Using Electronic Medical Record (EMR) Data – Methods from the PASS and PASS2 Studies

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Background: Availability of longitudinal data from the electronic medical record (EMR) provides opportunities to monitor trends in the incidence and treatment of chronic diseases such as asthma. The Centers for Disease Control (CDC)-funded PASS studies developed, evaluated and implemented an algorithm for using the EMR to identify incident cases of asthma in the Kaiser Permanente Northern California (KPNW) region over a 5-year period. **Methods:** The original PASS study was carried out in two phases. In phase I candidate algorithms based on medication dispensings and asthma diagnoses from doctor visits were developed and piloted. A range of options for medication dispensing criteria, health plan eligibility, and length of the surveillance period were considered. The resulting algorithm was arrived at through a collaborative decision process involving the CDC and investigators from two field centers. In phase II the algorithm was validated by recruiting a subset of 219 randomly-selected patients identified by the algorithm as having incident asthma and collecting clinical and self-report measures from them, including pulmonary function tests. Two KPNW pulmonologists reviewed all information relating to each of these cases to arrive at a 'gold standard' asthma classification for these patients. **Results:** The final PASS asthma algorithm requires the following criteria be met: either two dispensings of asthma medication, or two or more visits at which asthma was noted as a diagnosis. The 'at-risk' population is identified by excluding those who meet these criteria in the 4 years prior to the year of interest and those who do not meet membership eligibility. Individuals in the resulting 'at-risk' population who meet the asthma criteria in the year of interest are identified as incident for asthma. The validation phase resulted in KPNW physicians rating 85% of the 219 charts reviewed as probable/possible asthma and 15% as unlikely. This represents a predictive value of 86%. This algorithm has subsequently been implemented in the 5-year PASS2 study which aims to, among other things, carry out asthma surveillance to determine the incidence and prevalence of physician-diagnosed asthma and develop and maintain a research database of incident asthma cases. The next step is to evaluate the scalability of this algorithm in other EMR-based systems. **Conclusion:** The PASS studies have demonstrated that it is feasible to develop and implement an EMR-based algorithm for asthma surveillance. Similar methods can be employed for other chronic diseases.

Abstract PS2-30

Care Coordination and Health Information Technology: Information Availability and Timeliness Across Care Transitions

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Background: Patients who require care by multiple clinicians are at risk for problems during these transitions. Use of an electronic health record (EHR) could provide clinicians a mechanism to coordinate activities and information, thereby improving care across transitions. We examined the impact of having EHR on the availability and timeliness of clinical information within an integrated delivery system. **Population:** All adult primary care clinicians (n=396 PCs) working in a large prepaid, integrated delivery system who completed the surveys in both 2005 and 2006. Overall, 57.3% were female, 48.9% were white, 83.1% were physicians, mean age was 45 years, and the mean panel size was 1540 patients. In 2005 only 2.0% of respondents had finished implementing the EHR at the time of their survey versus 39.4% in 2006. **Methods:** Using survey data collected in both 2005 and 2006, we examined clinician reports of the availability and timeliness of relevant clinical information when multiple clinicians are involved with their patients' care. We collapsed the five-point responses into two categories, e.g., high availability when the information was 'always' or 'usually' available. We defined EHR status as pre-, during, or post-implementation using the implementation dates for the medical center. Using multivariate logistic regression, adjusting for clustering by clinician, medical center, year, clinician gender, race, panel size, job title and status, we examined the association between EHR status and both clinical information availability and timeliness. **Results:** In year-one, 42.7% of PCs reported having high levels of clinical information availability, compared with 64.9% in year-two; 39.3% and 62.4% reported having high levels of timely information in years one and two, respectively. Overall, 35.3% and 57.8% reported having high levels of both information availability and timeliness in years one and two, respectively. After adjustment, clinicians working in medical centers that had completed the EHR implementation were significantly more likely to report having high levels of both clinical information availability and timeliness (OR=2.88; 95% CI, 1.46-5.69). **Conclusion:** EHRs could be an important tool for improving the timeliness and availability of clinical information. These improvements could facilitate the coordination of care between clinicians.

Abstract PS2-31

Virtual Data Warehouse 'High Utilizers'

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Background: The virtual data warehouse (VDW) was created as a mechanism for streamlining the process of proposing and conducting multi-site research by eliminating the need for custom data extraction programming at each site. At the core of the VDW are a series of standard file definitions. Content areas and data elements commonly required for research are identified, and data dictionaries created for each one. The data dictionaries specify a common format for each element—variable name, label, extended definitions, code values, and value labels. Local site programmers then developed programs to aggregate and transform their local legacy data into the standard VDW files. The data at the sites is thus made uniform, making it possible for multiple sites to run the same program against their local VDW data, and produce comparable results. The VDW is 'virtual' in the sense that the actual data remain at the local sites. It is not a centralized database held at a coordinating center and accessible only to a privileged few. Rather, it is a mechanism for sharing and reusing SAS code, and accelerating the research process. **Methods:** This poster presents data from 3 HMOs that shows how the VDW is used at these sites. **Results:** Programmers at Group Health, Kaiser Northwest, and Kaiser Colorado all use the VDW for more than multi-site projects. Using both automated file