each. Principal components analysis (PCA) was then applied to the data to identify major types of expenditure trends across all the different therapeutic classes. RESULTS: In total, across all drugs in the 64 therapeutic classes, Medicaid spending increased from $4.6 billion with 231 million prescriptions in 1991 to $22.5 billion with 350 million prescriptions in 2004, representing total Medicaid spending on outpatient drugs during the time period. PCA revealed three principal components that accounted for 90 percent of total variation in Medicaid drug expenditure patterns. The first principal component (PC1), explaining 66 percent of the variation, is an exponential-like upward trend; PC2, explaining 17% of the variation, represents an increasing-then-decreasing expenditure pattern; and PC3, explaining 7% of the variation, represents an up-and-down cyclical expenditure pattern. Therapeutic classes exhibiting high correlation (r > 0.9) with PC1 include corticoid steroids, anti-neoplastics, anti-seizure agents, bone density regulators, anti-inflammatory agents, antiretroviral agents, antipsychotics, antidepressants, oral diabetic agents, and gastrointestinal agents. When PCA was applied to drug utilization trends, the same principal components were discovered and accounted for 92% of total variation in drug utilization patterns. CONCLUSION: Most drug therapeutic classes exhibited exponential-like upward expenditure trends, clearly contributing to the overall rising expenditure burden for Medicaid.

CHARACTERIZING PHARMACY AND MEDICAL CLAIMS FOR A PRIVATE INSURANCE POLYPHARMACY POPULATION

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OBJECTIVE: To describe and characterize a group of private insurance members taking multiple medications over a one-year period. METHODS: Persons were selected for this polypharmacy analysis if they had at least five unique maintenance prescriptions in their pharmacy claims records for the period of January–March 2005, based on a customized list of chronic medications. The full set of pharmacy and medical claims for these members were evaluated for a 12-month period, October 2004 to September 2005. Standard descriptive statistics were calculated to characterize the population. Logistic regression models were used to assess the association of pharmacy claims and “safety events” (i.e., emergency room visits (ER) and hospitalizations (H)). RESULTS: The final analytic sample, having both pharmacy and medical coverage for the period, consisted of N = 14,890 members ≥19 years of age (66% female), from four U.S. states. There were over 93,000 unique pharmacy claims with a monthly average of 63 per member. Males (M) and females (F) had similar averages (M = 6.2; F = 6.3), yet males were more likely to have ER (12.1% M vs. 10.8% F, p = 0.022) and H (8.3% M vs. 6.3% F, p < 0.0001). Unadjusted logistic regressions estimated the effect of medication claims on ER and H as OR = 1.14, p < 0.0001 and OR = 1.18, p < 0.0001, respectively. This implies 14% and 18% higher odds of ER or H, respectively, for every unit increase in monthly medications. Adjusting for age and gender does not substantially affect these results. CONCLUSION: Evaluating serious medical events in sub-populations taking multiple prescription medications provides important information for health insurers trying to reduce ER and hospitalizations. In a privately insured polypharmacy sub-population, there was a strong association with these safety events and increased average monthly pharmacy claims. Private insurers should consider establishing managed care programs to evaluate and improve the overall safety of their members taking higher numbers of monthly medications.

RELATIONSHIP OF DOCTOR SHOPPING AND POLYPHARMACY: A NATIONWIDE STUDY IN TAIWAN

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OBJECTIVE: The National Health Insurance (NHI) system in Taiwan is characterized by 1) free choice of physicians and health care facilities without formal referral; 2) generous drug benefits; and 3) low co-payments. The NHI beneficiaries thus exhibit features of frequent attendances, frequent changes of physicians, and a higher number of drug items in a prescription. It is interesting to know how likely a doctor shopper is to be a patient of polypharmacy. METHODS: The data sources came from the historical claims datasets of 200,000-person cohort in 2005, offered by the National Health Insurance Research Database in Taiwan. The analysis was limited to the ambulatory records with conditions of chronic diseases, represented by visits with more than seven days of drug supply. For those people with at least one visit for chronic diseases, the degree of correlation between the total number of consulted facilities and the total number of distinct prescribed drug items in all visits for chronic diseases in 2005 would be determined. RESULTS: Of the study cohort 56,956 people (30,070 females and 26,886 males; mean age 49.9 ± 19.9 [SD] years) had at least one visit for chronic diseases in 2005. On average, one of these people had paid 6.8 ± 7.0 (max. 98) visits, consulted 1.5 ± 0.9 (max. 32) facilities, and received 7.3 ± 7.3 (max. 93) distinct drug items for chronic diseases in a year. The total number of consulted facilities for chronic diseases in a year was strongly correlated with the total number of distinct prescribed drug items in all visits for chronic diseases in a year (Spearman’s rho 0.548, p < 0.001 [2-tailed]). CONCLUSION: More visits for chronic diseases at different facilities were related to more drugs prescribed. Besides the patients’ reasons, the causes inherent in the health care system deserve investigations.

THE EPIDEMIOLOGY AND OUTCOMES OF PATIENTS BY SERUM DIGOXIN LEVELS DURING HOSPITALIZATION

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OBJECTIVE: Dosing and therapeutic range of digoxin has recently changed based on results from clinical trials. We examined the epidemiology, mortality and length of stay (LOS) of patients with serum digoxin level results during hospitalization. METHODS: We retrospectively analyzed 4765 cases with serum digoxin levels from 2 institutions that electronically provided laboratory data from 2004–2006. Cases were stratified into the groups based on maximum serum digoxin level: <1.0, 1.0–2.0, 2.1–2.4, and >2.4. The actual to predicted hospital mortality and length of stay was compared across each strata with predicted mortality and LOS determined by previously described admission based clinical models. RESULTS: Approximately 3 in 5 cases (57.8%) had a serum digoxin level higher than the recommended range of <1.0. The crude mortality for cases with digoxin levels ≤1.0 was 4.1% and 9.1% for those with digoxin levels ≥1.0. After adjustment for severity of illness on admission cases with a digoxin level ≥1.0 had a significantly higher actual to predicted mortality ratio (1.3 [CI: 1.1–1.4]) than cases <1.0 (0.8 [0.7–1.0]). While crude LOS was higher for serum digoxin...
levels \( \geq 1 \, (7.2 \pm 7.7 \text{ days vs. } 5.5 \pm 5.6 \text{ days}) \) after risk adjustment the actual to predicted LOS ratio was not significantly different from 1. CONCLUSION: The majority of cases have serum digoxin levels that are above the currently recommended range and cases with serum digoxin levels \( \geq 1 \) have a higher mortality. Cases with serum digoxin levels \( \geq 1 \) did not have higher risk-adjusted LOS. Digoxin dosing during hospitalization requires careful monitoring and has the potential of improving safety and related outcomes.

**PHP38**

A QUALITATIVE REVIEW OF OFF-LABEL USES OF INTRAVENOUS IMMUNGLOBULIN

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OBJECTIVE: The various off-label uses of intravenous immune globulin (IVIG), used for the treatment of immunodeficiency disorders, far exceeds its labeled indications. This study represents an effort to identify these uses. METHODS: Clinical studies concerning the off-label uses of IVIG preparations were identified by searching the PUBMED (MEDLINE+) database from January 1, 1998 to January 1, 2006. The search was limited to clinical trials, meta-analyses, randomized controlled trials, and case reports in English. RESULTS: A review of 138 clinical trial abstracts identified 10 trials examining 2 labeled uses (635 patients) and 128 trials examining 61 different off-label uses (6781 patients). The top off-label indications included multiple sclerosis, graft versus host disease in transplant patients, prevention of antiphospholipid syndrome in miscarriage, and Guillain-Barre syndrome. The studies appear to support many of the acceptable off-label uses cited by various guideline groups. A total of 276 case reports were identified, with 268 reports representing 156 different off-label uses (362 patients). Patient outcomes from published abstracts were positive for 267 patients (74%). Seven meta-analyses were identified, evaluating recurrent miscarriage, in vitro fertilization failure, infection in preterm infants, multiple sclerosis, immune thrombocytopenic purpura, and pemphigoid. With the exception of recurrent miscarriage and infection in preterm infants, off-label use of IVIG for these indications was found to have positive outcomes. CONCLUSION: Over 130 off-label uses were identified from reviewing clinical trials and case reports. An examination of IVIG guidelines by specialty society, payer, and other review organizations shows that the biomedical evidence supporting off-label uses is being interpreted in different ways. Health care institutions are strongly urged to approve and closely monitor specific uses of IVIG to reserve dwindling supplies for the "best evidence" uses. Clinicians should be aware of the limits of knowledge in many off-label uses and exercise restraint in prescribing for unproven indications.

**PHP39**

THE EPIDEMIOLOGY AND OUTCOMES OF PATIENTS TREATED WITH HEPARIN DURING HOSPITALIZATION

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OBJECTIVE: Current national patient safety goals call to “Reduce the likelihood of patient harm associated with the use of anticoagulation therapy”. We examined the epidemiology, length of stay and occurrence of bleeding in non-surgical patients treated with heparin infusions during hospitalization. METHODS: We retrospectively analyzed 668 non-surgical cases that were treated with heparin for at least 24 hours during hospitalization from 2 institutions that electronically provided laboratory and pharmacy data from 2005–2006. Cases were categorized into the following groups based on serum APTT results: subtherapeutic (<51), therapeutic (51–75), above therapeutic (76–99) and supratherapeutic (≥100). The number of cases meeting each APTT category was compared at approximately 6 and 24 hours post heparin treatment. The actual to predicted hospital length of stay was compared for each APTT category with predicted LOS determined using previously described admission based clinical models. Bleeding was assessed by the presence of diagnostic codes. RESULTS: Those with APTT measured, the percent of cases at 6 and 24 hours were; 20.7 vs. 20.3 for subtherapeutic, 23.4 vs. 31.6 for therapeutic, 16.2 vs. 19.0 for above therapeutic, and 30.4 vs. 18.6 for supratherapeutic. There was a 1.8 day excess LOS in the subtherapeutic group at 24 hours (p < 0.05). Unadjusted bleeding rates were 21.6% for subtherapeutic, 17.5% in therapeutic, 13.4% in above therapeutic and 12.1% in supratherapeutic cases at 24 hours. CONCLUSION: One in 5 cases treated with heparin had a subtherapeutic APTT at 24 hours and these cases had a significantly longer LOS. Clinicians responsible for ensuring anticoagulation safety should incorporate monitoring strategies for subtherapeutic APTT results as diligently as those for supratherapeutic results.

**PHP40**

ANALYZING INEQUITY IN HEALTH CARE UTILIZATION BY THE US POPULATION

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OBJECTIVE: To evaluate equity concerns in routine and preventive health care utilization. METHODS: Data from the MEPS's Household Component (2004), a nationally representative survey of the U.S. civilian noninstitutionalized population, was used. Equity was defined on the principle of equal treatment for equal need. Need variables controlled in the model were perceived health status, presence of illness, comorbidities, activities and instrumental activities of daily living limitations. Non-need variables assessed for presence of horizontal equity were age, gender, race, ethnicity, income, and education. Need variables were studied to confirm presence of vertical equity, which was defined as different levels of need variables consuming appropriate different levels of health care. Equity in routine health care utilization namely-expenditures on Emergency room (ER), Inpatient hospitalization (IPH), Outpatient care (OPT), Office-based care (OFB), Dental care (DENTAL), and Prescription drugs (RX) were analyzed by GLM with log-link and Gamma/Poisson families. Binary measures of dental check-up, cholesterol check-up, blood-pressure check-up, and flu-shots, as indicators of preventive health care utilization, were analyzed by logistic and skewed-logistic models. RESULTS: Horizontal inequity was observed by age, gender, and income in all routine care variables except ER. Inequity by education was observed in OFB, DENTAL, and RX. Race related inequity was observed in OFB, IHP, DENTAL, and RX. Inequity by ethnicity was observed in utilization of all routine care variables. Necessary condition for vertical equity was not satisfied only in ER and DENTAL utilization. Horizontal inequity was observed in all four preventive care variables by age, gender, ethnicity, income, and education. Horizontal inequity by race was observed in cholesterol check-up, blood pressure check-up, and receipt of flu shots. Evidence of vertical equity was not observed in preventive care utilization. CONCLUSION: Horizontal inequity in age, gender, race, ethnic-