**OBJECTIVES:** In April 2005, the Food and Drug Administration (FDA) issued a black box warning (BBW) regarding the risks of using atypical antipsychotics (AAPs) for behavioral disorders in elderly patients with dementia. The objective of the present study was to investigate the impact of the BBW on the utilization of non-antipsychotic psychotropic drugs (NAPDs) such as benzodiazepines, anticonvulsants, antidepressants, and anti-dementia agents in non-institutionalized dementia population. **METHODS:** Medical Expenditure Panel Surveys, from year 2004 through 2007, were used in this study. Utilization rates of NAPDs pre-warning (2004-2005) and post-warning (2006-2007) were tracked over a four-year time period for both the main sample and Medicare cohorts. Chi-Square tests and multivariate logistic regression analyses were performed to examine pre-post differences in utilization rates (defined as elderly patients taking at least one medication associated with dementia) and gain insights into patterns of NAPD use with respect to demographic, insurance and other factors. **RESULTS:** NAPD use increased in the post-warning period for the main sample as well as the Medicare sample during the time period covered. The increase, however, was not statistically significant. Multivariate logistic regression in the main sample showed a greater likelihood of individuals receiving anti-dementia medications (Odds Ratio, OR= 1.976, $p$= 0.0195) and benzodiazepines (OR=3.046, $p$= 0.0227) in the post-warning period as compared to the pre-warning period. Similarly, dementia patients had a greater likelihood of receiving anti-dementia medications (OR= 2.229, $p$=0.0065) in the post-warning period as compared to the pre-warning period in the Medicare sample as well. **CONCLUSIONS:** The regulatory warnings and labeling changes regarding off-label use of atypical antipsychotics in dementia treatment might have resulted in spillover compensatory shift in the use of NAPD in non-institutionalized populations.

PMH78

## ECONOMIC BURDEN ASSOCIATED WITH EXTRA-PYRAMIDAL SYMPTOMS IN A MEDICAID POPULATION WITH SCHIZOPHRENIA

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**OBJECTIVES:** Extra-pyramidal symptoms (EPS) can be a treatment emergent adverse event associated with the use of atypical antipsychotics (AAPs). Studies assessing the economic burden of EPS in schizophrenia are scarce.This study aims to assess health care resource use and costs associated with EPS in patients with schizophrenia using Medicaid data **METHODS:** A retrospective analysis of Marketscan Medicaid Multi-State Database (2004-2009) was conducted. Patients with a diagnosis of schizophrenia and newly initiated on AAP were included. The index date was the date of the first AAP prescription fill. Two cohorts were created based on the presence or absence of either a diagnosis code for EPS or a prescription claim for a known medication to treat EPS during the 90 days post-index. Patients with EPS were matched to patients without EPS using propensity scores. The number of hospitalizations, emergency room (ER) and associated health care costs were assessed in the 12 months follow up. Regression models were conducted to compare utilization and costs between the two groups. **RESULTS:** Total sample size was 4602. Of those, 545 (11.8%) had EPS. Younger age (36.6 vs. 38.9 years, $p$<0.0001), higher proportion of African American patients (58.9% vs. 55.4%, $p$<0.03), and a higher rate of risperidone use as the index treatment (61.1% vs. 36.1%, $p$<0.0001) were observed in the EPS group. After matching, baseline covariates were similar between groups. Patients with EPS had a significantly higher likelihood of schizophrenia-related (OR=1.62, 95% CI=1.18-2.23, $p$=0.003) and all cause hospitalizations (OR=1.45, 95% CI=1.12-1.88, $p$=0.0042) compared to patients without EPS. The difference in schizophrenia-specific total health care, hospitalization, and prescription drug costs between patients with and without EPS was $2636 (95% CI=$1270-$4002), $1427 (95% CI=$467-2388), and $860 (95% CI=$480-$1239), respectively. **CONCLUSIONS:** The presence of EPS in patients with schizophrenia is associated with increased health care resource utilization and higher direct medical costs.

PMH79

## MEDICAL COSTS AND HOSPITALIZATIONS AMONG PERSONS WITH DEPRESSION TREATED WITH ADJUNCTIVE ATYPICAL ANTIPSYCHOTIC THERAPY

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**OBJECTIVES:** Major depressive disorder (MDD) is frequently debilitating. The American Psychiatric Association recommends adjunctive atypical antipsychotics (AA) as a treatment option when response to antidepressants is inadequate. This study compared medical costs and hospitalizations among MDD patients treated with FDA-approved adjunctive AA. **METHODS:** This retrospective analysis used medical and pharmacy claims data and enrollment information from a large US health plan. Subjects were adult commercial enrollees with depression (ICD-9-CM 296.2x, 296.3x, 296.82, 300.4, 311) augmenting antidepressant therapy with an AA (aripiprazole, olanzapine, or quetiapine) from 1/1/2004-1/31/2010. Subjects were continuously enrolled for 6-month pre- and 12-month post-augmentation periods. Those with schizophrenia or bipolar disorder were excluded. Post-augmentation outcomes were all-cause and mental health (MH-) related medical costs and hospitalizations. Costs and hospitalizations were modeled with generalized linear models (gamma distribution, log link) and logistic regression, respectively. Regressions controlled for dose, demographics, and general and MH-related health status. Outpatient pharmacy costs were not assessed. **RESULTS:** 10,292 subjects were identified across AA cohorts: aripiprazole, n=3,849; olanzapine, n=1,033; and quetiapine, n=5,410. Mean age was 44.1±11.6 years and 70.3% were female. Compared with the aripiprazole cohort, regression results showed that the olanzapine cohort had higher predicted all-cause (1.22, $p$=0.004) and MH-related (1.33, $p$=0.002) medical cost ratios and higher odds of all-cause (1.58, $p$<0.001) and MH-related (1.81, $p$<0.001) hospitalizations. The quetiapine cohort also had higher predicted all-cause (1.27, $p$<0.001) and MH-related (1.23, $p$=0.001) medical cost ratios and higher odds of all-cause (1.65, $p$<0.001) and MH-related (1.78, $p$<0.001) hospitalizations. Mean predicted all-cause and MH-related medical costs, respectively, were $11,401 and $2,495 for aripiprazole, $13,905 and $3,316 for olanzapine, and $14,513 and $3,072 for quetiapine. **CONCLUSIONS:** Compared with adjunctive olanzapine or quetiapine, adjunctive aripiprazole was associated with lower mean all-cause and MH-related medical costs and with lower odds of all-cause and MH-related hospitalizations in patients with depression.

PMH80

## THE IMPORTANCE OF MARKET STRUCTURE IN GENERIC DRUG MARKETS

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**OBJECTIVES:** A conspiracy between Mylan Laboratories and its active-ingredient suppliers during the late 1990s resulted in the exit of manufacturers from the lorazepam market and a collusive price increase. The objectives were to 1) analyze the market structure for lorazepam before and after the conspiracy; 2) measure lorazepam prices before and after the conspiracy; and 3) estimate the social cost of the conspiracy. **METHODS:** Data sources were the Medicaid State Drug Utilization Data maintained by the Centers for Medicare & Medicaid Services (CMS) and the First DataBank® National Drug File. The four-firm concentration ratio (CR4) and the Herfindahl-Hirschman index (HHI) for the Medicaid lorazepam market were measured from 1991 through 2009. Average quarterly per-claim pharmacy reimbursement, as a proxy for average drug price, was computed. Average wholesale prices (AWPs) for specific drug forms were obtained from First DataBank®. Three separate methods were used to estimate overall Medicaid and social cost. **RESULTS:** CR4 and HHI rose from 53 and 906, respectively, in 1991 to 87 and 2234 in 2009. In 1997, the average spending per generic lorazepam prescription by Medicaid was $7.00; it was $30.24 in 1999. In 2009, spending per prescription was $8.48. AWPs for 3 common dosage forms jumped identically for 8 firms on February 18, 1998. The estimated total (12-year) cost of the conspiracy to Medicaid ranged from $613.7 - $713.5 million (2009 $); and, overall for society, from $4.9 - $5.7 billion (2009 $). **CONCLUSIONS:** Not all generic markets offer competitive prices. The lorazepam conspiracy was very costly to Medicaid and other payers. This study has policy implications for antitrust authorities as well as physicians and payers who need to have available to them solid comparative-effectiveness research to justify the use of substitute drugs in case of collusive pricing behavior in a single market such as lorazepam.

PMH81

## ASSOCIATION OF GENERIC ENTRIES, PRODUCT-LINE EXTENSION ENTRIES AND NEW INDICATION APPROVAL WITH CHANGE IN PRICE-PER-PRESCRIPTION OF BRAND SELECTIVE-SEROTONIN-REUPTAKE-INHIBITORS IN THE TEXAS MEDICAID PROGRAM (1991-2009)

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**OBJECTIVES:** To evaluate the association of entries of generics/product-line extensions and approval for clinical indications other than depression [such as generalized /social anxiety disorders (GAD/SAD)] with change in price-per-prescription of brand selective-serotonin-reuptake-inhibitors (SSRIs) in the Texas Medicaid program. **METHODS:** Utilization and expenditure variables from the Texas Medicaid summary database (1991-2009) were used. Price-per-prescription of a brand SSRI for a given quarter was calculated as total expenditure (amount reimbursed) divided by utilization (number of prescriptions dispensed). Two specifications of autoregressive models were used with log-transformed price-per-prescription of a brand SSRI as a ratio of current-to-previous quarter as the dependent variable. In the first specification, generic entry of a brand SSRI was indicated by a dummy variable. In the second specification, generic entry was measured by two continuous variables - time to generic entry and time after generic entry. In both specifications, each of the events indicating entries of generics/product-line extensions and approval for GAD and SAD were indicated by dummy variables. **RESULTS:** The entry of sertraline was found to be positively associated ($p$<0.05) with change in price-per-prescription in both specifications of the Paxil® model. Time to patent expiry was positively associated ($p$<0.001) with change in price-per-prescription in the Celexa® model. No other events were statistically significant. **CONCLUSIONS:** Entries of generics/product-line extensions and approval for new clinical indications were not associated with change in price-per-prescription for a majority of brand SSRIs. Promotional strategies indicating market entries of new product-line extensions and facets of usage other than depression may be useful in controlling the reimbursement of SSRI brands.

PMH82

## DO SALES OF PSEUDOEPHEDRINE PREDICT METHAMPHETAMINE-RELATED HOSPITALIZATIONS?

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**OBJECTIVES:** The illicit production of methamphetamine from the precursor chemical pseudoephedrine (PSE) in domestic clandestine laboratories fuels a significant portion of the domestic methamphetamine supply. Although states and the federal government have taken steps to control access to PSE, it continues to be available as a non-prescription drug in all but two states. The purpose of this project was to assess the relationship between PSE sales and indicators of methamphetamine use, specifically methamphetamine-related hospital admissions, in

Kentucky. **METHODS:** Regression models were calculated to predict methamphetamine-related hospitalizations from 2010 county level Kentucky data. Explanatory factors include PSE sales (in grams), number of clandestine lab incidents reported, USDA urban/rural indicator, methamphetamine-related arrests, number of controlled substance (CS) prescriptions dispensed, and population. Data sources include the Kentucky All Schedule Prescription Electronic Reporting Program, the Kentucky Inpatient Discharge Data Set, the Kentucky State Policy Crime in Kentucky Report, and Clandestine Laboratory Surveillance System. **RESULTS:** PSE sales were not associated with methamphetamine-related hospitalizations in this model. The number of clandestine lab incidents reported, however, has a strong positive impact on methamphetamine-related hospitalizations ($p<0.001$). Methamphetamine-related arrests also have a strong positive relationship to hospitalization ($p<0.001$). Finally, use of controlled substances has a small but negative impact on methamphetamine-related hospitalization ($p<0.05$). **CONCLUSIONS:** PSE sales data alone cannot be used to predict methamphetamine use as evidenced by methamphetamine-related hospitalizations. The number of clandestine lab incidents, however, reported is strongly associated with methamphetamine-related hospitalizations. These findings suggest that policies aimed at reducing clandestine labs may have a significant impact on indicators of methamphetamine use.

## MENTAL HEALTH – Research on Methods

### PMH83
### COMPARISON OF TOTAL HEALTH CARE COSTS BETWEEN REMITTERS AND NON-REMITTERS FOR SCHIZOPHRENIA PATIENTS FROM A PROSPECTIVE LONGITUDINAL, OBSERVATIONAL STUDY IN THE PRESENCE OF MISSING DATA

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**OBJECTIVES:** Missing data has presented challenges to health economic analyses, especially for a long-term observational study with repeated measures of clinical and economic outcomes. The aim of this analysis was to compare the total health care costs between symptom remission and non-remission from a long-term, observational study using mixed-effects models with and without multiple imputations (MI) of missing data. **METHODS:** Data (N=2282) used for this analysis were from a 3-year observational study of patients treated for schizophrenia in the United States between July 1997 and September 2003. Costs of mental health services were obtained at enrollment and at 6-month intervals during the 3-year follow up. Cohorts of remitters versus non-remitters at enrollment were created using established criteria. Total costs for remitters and non-remitters were compared using mixed-effects models with and without MI based on Markov chain Monte Carlo with multivariate normality assumption (MI-MCMC) or fully conditional specification with predictive mean match method (MI-FCS). All analyses on costs were adjusted for patient's demographics and comorbidities. **RESULTS:** The majority of the patients were male (61.6%) and non-remitters (73.8%) with a mean age of 42 years. Out of 2282 patients, 41.2% had at least 1 visit (out of 7 visits) with missing costs data. Without MI, the total healthcare costs were estimated to be $8689.6 for the non-remitters and $6730.0 for the remitters with a difference of $1959.7 (95% CI: $790 - $3129.4) over a 6-month period ($p=0.001$). The estimated differences in total costs between remitters and non-remitters were $1763.3 over the 6-month period with the MI-MCMC method ($p=0.004$) and $1483.9 with the MI-FCS method ($p=0.009$). **CONCLUSIONS:** Significant differences in total costs between remitters and non-remitters were obtained from this study using mixed-effects models with and without MIs. Further analysis will be conducted to explore MI for estimation of other costs and examine missingness mechanisms.

### PMH84
### VALIDITY OF ADMINISTRATIVE CLAIMS DATA FOR CALCULATING ADHERENCE MEASURES FOR LONG-ACTING INJECTABLE (LAI) ANTIPSYCHOTIC THERAPIES

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**OBJECTIVES:** To examine sources of error in claims-based adherence calculations for LAI antipsychotics with potentially invalid days' supply (DS) values and evaluate the assumption that quantity-dispensed (QD) values are in product units. **METHODS:** Pharmacy claims for single-dose LAI antipsychotics dispensed between January 1, 2009 and December 31, 2010 were selected from a large US database. Frequency distributions were generated for observed DS and QD values for each product and dose. Observed QD values on premixed LAI antipsychotic claims were divided by the product's volume to test the assumption that QD was entered in milliliters rather than units. After adjustment to QD for premixed LAI antipsychotic claims, duration of therapy per injection was calculated for all LAI antipsychotics as DS/QD. Calculated therapy duration was compared with the dosing interval in the product's package insert (PI). Percentage of claims with duration of therapy per injection within the product's PI range was calculated as a measure of the validity of the observed DS value. **RESULTS:** For the 611,325 LAI antipsychotic claims analyzed, observed QD values ranged from 0.01 to 117, suggesting values that did not always represent product units. After adjustment to QD for premixed LAI antipsychotics, 98.5% of claims had an integer value for calculated quantity in product units, supporting the assumption that premixed LAI antipsychotics' quantities were entered in milliliters. After adjustment, 21.5% of claims had a calculated therapy duration per injection outside the PI range. Percentage of claims with calculated therapy durations outside the PI ranged from 10.6% to 39.1% for paliperidone palmitate, 7.6% to 13.1% for risperidone long-acting injection, and 3.1% to 10.8% for olanzapine pamoate. **CONCLUSIONS:** Results raise concerns regarding potentially invalid values in DS and QD fields. Algorithms for appropriate use of LAI antipsychotic pharmacy claims in adherence calculations, quality measurement, and cost analyses are recommended.

### PMH85
### AN APPLICATION OF GROUP-BASED MODELING APPROACH FOR TRAJECTORY RECOGNITION: THE DEVELOPMENTAL COURSES OF HYPERACTIVITY AND INATTENTIVE SYMPTOMS

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**OBJECTIVES:** Uncertainty remains regarding the developmental courses of inattentive (IN) and hyperactivity (HA) symptoms. Using group-based trajectory modeling, we sought to identify distinct independent and joint IN/HA symptom trajectories and their predictors. **METHODS:** A total of 1037 boys (mean age: 6.2±0.3 years) from low socioeconomic areas in Montreal were recruited in 1984 for the Longitudinal and Experimental Study of Low Socioeconomic Status (SES) Boys in Montreal. Teacher and mother ratings of subjects' IN and HA symptoms were collected annually at ages 6, and 10 to 15 using the Social Behavior Questionnaire, where the higher of the two raters' scores was taken as subject's IN/HA score. Numbers and probabilities of independent IN and HA trajectories were identified using group-based semi-parametric mixture models. Joint IN/HA trajectories were then constructed as the joint probabilities of independent IN/HA trajectories. Multinomial logistic regressions were conducted to assess baseline parental and subject behavioral problems as predictors of joint trajectories. **RESULTS:** Six and five independent trajectories were generated for IN and HA symptoms, respectively, constituting 30 joint trajectories. The most common independent IN trajectory (29.5% of study sample) had a moderate number of IN symptoms at baseline that increased slightly with age (moderate-slightly rising), whereas the most common independent HA trajectory (28.5%) was baseline moderate-sharply declining. The most common joint trajectories were based on the co-occurrence of a moderate-sharply rising IN trajectory, and a low-/moderate-slightly rising HA trajectory (17% vs. 14%). Subjects' aggressiveness, conduct-, oppositional-, and anti-social problems ($p<0.001$), and paternal SES ($p=0.01$) were significant predictors of joint trajectories. **CONCLUSIONS:** Group-based trajectory modeling may be a useful time-dependent pattern recognition tool. It enabled the identification of distinct independent and joint IN/HA trajectories in age-related developmental courses. Assessing baseline behavioral problems and paternal SES may help identify and target interventions for young boys at risk of high-level IN/HA symptoms early on.

### PMH86
### TIME-ON-THERAPY FOR ATYPICAL ANTIPSYCHOTICS IN A MARKOV COHORT ANALYSIS

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**OBJECTIVES:** To demonstrate a unique approach to modeling long-term time-on-therapy and cardiovascular disease (CVD) outcomes of patients with schizophrenia treated with atypical antipsychotics (AAPs). **METHODS:** A 5-year Markov cohort analysis among adult patients with schizophrenia was undertaken to compare time-on-therapy and CVD outcome differences lurasidone, generic-olanzapine, aripiprazole, quetiapine, and ziprasidone. Modeled health states were: patients on initial AAP; patients switched to a second composite-AAP; and patients on clozapine after failing a second composite-AAP. The composite-AAP health state simulated frequent treatment switching and was operationalized by averaging outcomes, costs, and discontinuation rates (for transition probabilities) of the AAPs. Patients discontinuing composite-AAP due to lack of efficacy were switched to clozapine. Time-on-therapy was modeled using sub-states based on time of switching. Baseline characteristics of the modeled cohort, data for discontinuation rates, and average weight change were obtained from CATIE, a comparative clinical trial of lurasidone vs quetiapine XR, and an open-label study comparing aripiprazole and olanzapine. Relative risk of diabetes obtained from a retrospective analysis predicted CVD events using Framingham BMI risk equations. **RESULTS:** Over 5 years, patient time-on-therapy for the initial-AAP, composite-AAP, and clozapine, respectively, was 0.85, 3.13, 1.01 years (lurasidone); 1.00, 2.98, 1.02 (generic-olanzapine); 0.51, 3.41, 1.08 (aripiprazole); 0.47, 3.45, 1.08 (quetiapine); and 0.54, 3.37, 1.09 (ziprasidone). In a 10,000 patient cohort, there were 407, 434, 415, 416, and 412 CVD events, respectively, in the lurasidone, generic-olanzapine, aripiprazole, quetiapine, and ziprasidone arms. **CONCLUSIONS:** This long-term Markov cohort model simulates multiple treatment switches by using a composite health state from sub-states and also enabled outcome assessment of time-dependent patient characteristics, such as CVD events. The results were consistent with published Markov micro-simulation models showing that lurasidone and generic-olanzapine had favorable discontinuation rates and that lurasidone and ziprasidone had fewer CVD events. This analysis represents an effective alternative for modeling cohort-level outcomes.

### PMH87
### CROSS-CULTURAL ADAPTATION OF A RESEARCH VERSION OF THE REY AUDITORY VERBAL LEARNING TEST (RAVLT) INTO (US) SPANISH

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**OBJECTIVES:** The Rey Auditory Verbal Learning Test (RAVLT) was developed to evaluate verbal memory. The standard form comprises a 15-word list (List A) learn-