

with hypoglycemia ED visits was in a declining trend of 2005-2009 and the lowest in 2009 (n=71,751). Consequently, the estimated annual expenditure of hospital admission from ED declined each year from 2005 (\$2.90 billion) to 2009 (\$1.25 billion). The expenditure of hypoglycemia visits to ambulatory facilities fluctuated between 0.37 million in 2007 and 1.08 million in 2008, resulting in the estimated annual cost of approximately \$80.46 million to \$229.03 million, respectively. **CONCLUSIONS:** Annual direct medical cost associated with hypoglycemia in the U.S. was \$3.49 billion in 2005 and declined to \$1.84 billion in 2009. The trend may be attributed to improvements in patient education, glucose monitoring, and new anti-diabetic medications with lower risk for hypoglycemia.

## PDB88

## IMPACT OF MEDICARE PART D: COMPARISON OF HEALTH CARE EXPENDITURES AND UTILIZATION FOR MEDICARE PATIENTS WITH DIABETES

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**OBJECTIVES:** To compare overall and diabetes-related health care utilization and expenditures in Medicare beneficiaries with diabetes prior to and after implementation of Part D. **METHODS:** Data were from the 2001-2010 Medical Expenditure Panel Survey. Medicare beneficiaries aged  $\geq 65$  years with self-reported diabetes were identified, excluding individuals who were Medicare-Medicaid dual eligible, had TRICARE, or other public coverage. The outcomes included overall and diabetes-related prescriptions, medical services utilization, and expenditures as well as out-of-pocket costs. These outcomes were analyzed using generalized linear model regression models with a log-link and gamma (for costs) or Poisson (utilization) distribution. All expenditures were inflated to 2010 dollars. STATA survey commands were used to account for the complex survey design. **RESULTS:** There were 21,864 eligible Medicare beneficiaries with diabetes that comprised the sample population. After adjusting for sociodemographic characteristics and health status, implementation of Part D was associated with decreased out-of-pocket expenditures for insulin (Coeff.: -0.577,  $p < 0.05$ ) and oral antidiabetic agents (Coeff.: -1.292,  $p < 0.001$ ). No statistically significant effect on total health care and prescription expenditures were found. Implementation of Part D was associated with increased number of prescriptions filled (Coeff.: 0.145,  $p < 0.001$ ) without increase in emergency room visits or inpatient stays. **CONCLUSIONS:** The implementation of Medicare Part D increased medication use and reduced out-of-pocket costs for elderly diabetes patients. This reduction would allow for enhanced access to necessary medications, and thereby may have a positive impact on adherence and health outcomes.

## PDB89

## FACTORS ASSOCIATED WITH PRESCRIPTION DRUG EXPENDITURE IN PATIENTS WITH DIABETES MELLITUS: AN ANALYSIS OF MEDICAL EXPENDITURE PANEL SURVEY, 2005-2009

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**OBJECTIVES:** To determine the factors associated with prescription drug expenditure in patients with Diabetes Mellitus in the United States (US). **METHODS:** A retrospective cross-sectional study was conducted using the 2005-2009 Medical Expenditure Panel Survey (MEPS) data, a nationally representative data on non-institutionalized US population. The study sample included diabetic patients identified using the diabetes diagnosis variable reported in the MEPS data and the ICD-9CM code: 250. Descriptive statistics were performed on the weighted sample to estimate the average prescription drug expenditure for patients with Diabetes. The Anderson Behavioral Model was used as the theoretical framework to identify factors associated with prescription drug expenditure and Ordinary Least Square regression was used for analysis. The prescription drug expenditure was log transformed to address skewed nature of cost data. **RESULTS:** An estimated 97 million patients were diagnosed with Diabetes Mellitus during 2005-2009. The average prescription drug expenditure for these patients was \$3088 per year (95% CI: 2977-3199). The linear regression revealed that predisposing (age, race, marital status and employment status), enabling (region, health insurance coverage, prescription insurance coverage and usual source of care) and need (Charlson comorbidity index and general health status) characteristics were significantly associated with prescription drug expenditure. One year increase in age increased expenditure by 1.1%. Non-Hispanic blacks had 33% higher expenditure than other races. Patients with health insurance coverage, prescription insurance coverage and usual source of care had 54%, 13% and 69% higher expenditure respectively as compared to those without these benefits. Charlson comorbidity index was positively associated with prescription drug expenditure. Patients with poor/fair self-reported health status had 61% higher expenditure than other patients. **CONCLUSIONS:** Predisposing and enabling factors like race, employment, health and prescription insurance coverage and usual source of care had significant impact on prescription expenditure despite controlling for health status and need characteristics.

## PDB90

## ADHERENCE TO INSULIN THERAPY MAY SUBSTANTIALLY REDUCE COSTS ASSOCIATED WITH HEALTH RESOURCE UTILIZATION AMONG INSULIN PEN USERS WITH TYPE II DIABETES MELLITUS

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**OBJECTIVES:** To evaluate the impact of adherence to insulin therapy on health resource utilization (HRU) among patients with type 2 diabetes mellitus (T2DM) using an insulin pen. **METHODS:** The Truven Health MarketScan Research Database was used to identify patients with  $\geq 1$  one insulin pen claim between

January 2006 and September 2010 with continuous enrollment for 12 months after that claim, had a diagnosis of T2DM and one prescription for an oral anti-diabetic drug. Patient demographics, clinical characteristics, health care expenditures and medication (insulin pen) possession ratios (MPR) were also analyzed. Total costs were calculated by summing the patient and payer portions of all post-index health insurance claims. MPR was calculated using the days supply field of the insulin prescription claims, adjusted to account for variations in time between insulin refills. **RESULTS:** 32,361 patients met the study criteria. On average patients were 59.1 (SD=11.6) years old and 52.4% were male; 97.1% of the sample had capitated, non-capitated or a fee-for-service health plan (2.8% unknown). The baseline Charlson comorbidity score was 2.0 (SD=1.7). The most common comorbidities included hypertension (46.7%), dyslipidemia (31.3%), ischemic heart disease (23.4%), diabetic neuropathy (19.6%), and renal disease (15.9%). Concomitant medication use was prevalent with at least one quarter of the sample filling a prescription for one or more of the following: sulfonylureas (27.1%), antidepressants (30.9%), biguanides (48.4%), antihyperlipidemics (77.8%) and antihypertensives (87.0%). All-cause expenditures for insulin pen users during the study period were \$24,680 (SD=\$44,005). Average sample MPR was 0.63 (SD=0.29). When broken into quintiles there is a significant difference in health care expenditures between the least adherent (MPR 0-0.20, \$26,310) and most adherent groups (MPR 0.81-1.00, \$23,839) ( $p < 0.007$ ). **CONCLUSIONS:** Managing patient adherence may present an opportunity to curb health resource utilization in T2DM insulin pen users.

## PDB91

## ECONOMIC OUTCOMES ASSOCIATED WITH HBA1C AND LDL-C GOAL ACHIEVEMENT IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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**OBJECTIVES:** To examine the economic outcomes associated with dual-goal achievement of reaching glycated hemoglobin (HbA1c  $< 7\%$ ) and low-density lipoprotein cholesterol (LDL-C  $< 100\text{mg/dL}$ ) targets in patients with type 2 diabetes mellitus (T2DM). **METHODS:** Adult T2DM patients (ICD-9 codes: 250.x0, 250.x2) were identified from the South Central Veterans Affairs Health Care Network (01/2004-06/2010) and followed until the end of data or death. A longitudinal design was adopted with patient information recorded in six-month cycles. Goal achievement status in each cycle was determined based on the average HbA1c and LDL-C levels using the area under the curve method. Economic outcomes included diabetes-related utilization events (inpatient (IP) days, number of outpatient (OP) visits) and diabetes-related medical service costs. The association between goal achievement status in a given study cycle and economic outcomes in the following cycle were assessed using multivariate generalized linear models, controlling for within-patient correlation. **RESULTS:** A majority of the 75,646 patients selected for the study were male (97.4%); average age was 64.7 years, mean BMI was 31.6 kg/m<sup>2</sup>, and median follow-up time was 4.5 years. Compared with achievement of only the LDL-C goal, dual-goal achievement was associated with significantly fewer diabetes-related IP days (Incidence Rate Ratio (IRR): 0.93; 95% Confidence Interval (CI): 0.87-1.00), and OP visits (IRR: 0.88; CI: 0.87-0.89), and incurred significantly lower diabetes-related medical service costs (difference: -\$130.89,  $p = 0.02$ ). Compared with achievement of only the HbA1c goal, dual-goal achievement was associated with significantly fewer OP visits (IRR: 0.98; CI: 0.97-1.00) but no statistical difference in the number of hospitalization days (IRR: 0.98, CI: 0.89-1.07) or diabetes-related medical service costs (difference: -\$56.17,  $p = 0.40$ ). **CONCLUSIONS:** In this study of US Veterans with T2DM, dual-goal achievement was associated with fewer utilization events and lower costs when compared with only LDL-C goal achievement.

## PDB92

## IMPACT OF ORAL MEDICATION ADHERENCE AND LAB TESTING ON FIVE-YEAR TOTAL MEDICAL COSTS IN A COMMERCIALY INSURED DIABETIC POPULATION

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**OBJECTIVES:** The primary aim was to examine the economic outcomes associated with long-term adherence to oral diabetes medications in the Diabetes Mellitus (DM) population. The secondary aim was to examine the economic outcomes associated with having a history of an HbA1c test during the study period. **METHODS:** Patients continuously enrolled from January 01, 2006 to December 31, 2011 and did not have a diabetes diagnosis or medication one year prior to the index date were eligible for inclusion in this retrospective study (N=2090). Patients who had at least two oral diabetes medication fills in the index year, had an integrated medical and pharmacy benefit, and who did not have any injectable medications during the study period were stratified to examine the primary aim (N=781). Patients were defined as adherent if they had a medication possession ratio (MPR) of greater than 80% in all five years (N=153), the remainder were classified as non-adherent (N=628). To quantify the economic outcomes associated with a history of an HbA1c test, patients were stratified based on a history of HbA1c test. **RESULTS:** Compared to the non-adherent group, the adherent group had lower unadjusted mean medical costs. The five-year total medical costs were \$25,726 in the non-adherent group and \$22,153 in the adherent group, a 16% difference ( $p \leq 0.05$ ). A similar difference was observed when comparing inpatient and emergency room costs (\$8694 vs. \$5268,  $p \leq 0.001$ ) compared to patients without an HbA1c test during the study period (N=792), patients with an HbA1c test (N=1298) had lower total medical costs (\$36,599 vs. \$29,153 respectively,  $p < 0.05$ ) and inpatient and emergency room