METHODS: This study used administrative claims data to identify continuously enrolled patients using insulin between 1/1/98 and 12/31/99. During a six-month identification period, patients receiving one or more prescriptions for lispro were categorized as lispro patients. Non-lispro patients were then matched to lispro patients using a Propensity Score (PS) derived from baseline characteristics. The PS model included variables such as age, gender, comorbidities, oral hypoglycemic use, dominant physician specialty, health plan location and baseline costs. After 1:1 matching, 12 months of follow-up cost and utilization data were then compared using unmatched t-tests.
RESULTS: Of 11,443 patients, 3,341 (29.2%) had at least one prescription for lispro insulin, while the remaining 8,102 (70.8%) had at least one regular (non-lispro) insulin prescription. At baseline, lispro patients tended to be younger, were more often Type 1 with a history of insulin use, had fewer comorbidities, visited endocrinologists over family practice physicians and had lower total costs. PS balancing assured that only the 1,832 most appropriate patients of each type were then used in outcomes comparisons. Lispro patients had significantly higher average office visits ($p = 0.0022$) and pharmacy prescriptions ($p = 0.0165$) but lower inpatient hospital visits ($p = 0.0028$) compared to non-lispro patients. Cost results were similar with lispro insulin patients having significantly higher average office visit costs ($p = 0.0237$) and pharmacy costs ($p < 0.0001$) but lower inpatient hospital costs ($p = 0.0227$). Total costs were not significantly different ($p = 0.5266$).
CONCLUSIONS: Lispro insulin and non-lispro regular insulin patients did not incur significantly different total costs. While lispro patients had higher pharmacy and office visit costs, they did not incur higher total medical costs. More intensive ambulatory care in such chronic disease patients does not appear to be associated with higher overall medical costs.

DIABETES—*Quality of Life Presentations*

PDB12

FACTORS PREDICTING SELF-RATED HEALTH AND PATIENT SATISFACTION IN A MANAGED CARE DIABETES POPULATION

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OBJECTIVES: To determine the relationship of demographics, severity of illness and quality of care measures with general health perception (GHP) and patient satisfaction (PS) levels among managed care diabetes patients.
METHODS: The sample included 300 adult diabetes patients enrolled in an IPA-model HMO. All data were collected through surveys and medical claims. Survey data from July 1999 were merged with medical and pharmacy claims data from July 1998 through June 1999. Our analysis consisted of two multiple regression models with GHP (100 point transformed scale, higher score = better health) and PS (9 point scale, higher score = greater satisfaction) being the dependent variables, respectively. Predictor variables in both models included: demographics (age, gender, education, income), severity of illness (insulin use, duration of diabetes), number of comorbidities, receipt of foot and eye exams, diabetes education, lipid tests, microalbumin tests, frequency of self-monitoring of blood glucose, and the frequency of tests for HbA1c and blood glucose.
RESULTS: Mean (SD) for GHP and PS scores were 49.8 (25.0) and 7.8 (1.8), respectively. The R^2 for model 1 (GHP) and model 2 (PS) were 0.20 and 0.10, respectively. Significant predictors ($p < 0.05$) of GHP included comorbidities (beta = –0.11), income (beta = 0.26), and HbA1c tests (beta = 0.19). Thus, higher GHP was associated with having fewer comorbidities, higher income and more frequent testing of HbA1c in the prior year. Significant predictors of PS included comorbidities (beta = –0.15), foot exams (beta = 0.16), and diabetes education (beta = 0.16). Thus, higher satisfaction was associated with fewer comorbidities, receipt of a foot exam from any healthcare provider, and participation in a diabetes education program.
CONCLUSION: When controlling for demographics, comorbidities and severity of illness, those patients who received more frequent HbA1c monitoring reported higher self-rated health, and patients who received foot exams and diabetes education were more satisfied with the care they received for diabetes.

DIABETES—*Health Policy Presentations*

PDB13

TRENDS IN INSULIN THERAPY FOR TREATMENT OF TYPE-2 DIABETES MELLITUS

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OBJECTIVES: New oral antihyperglycemic drugs (OADs) have been introduced in recent years, and diabetes treatment guidelines are increasingly suggesting that insulin be used for type-2 diabetes only when other therapies are ineffective. This study evaluates the resulting impacts on trends in insulin mono and combination therapies for type-2 diabetic patients from 1997–2000.
METHODS: Commercially insured patients who had one or more diabetes diagnoses or drugs are selected from over 3 million employees, retirees, and dependents in each of the years 1997–2000 of The MEDSTAT Group MarketScan database. Patients likely to have type-1 diabetes are identified and removed from the database. Descriptive analyses compare the percentages of type-2 diabetes patients treated with insulin monotherapy and specific combination therapies in each of the four years. Statisti-

cal analyses are conducted to assess the significance of trends.
RESULTS: Up to 155,000 type-2 diabetes patients are identified in each year. Insulin was used by 21.6% in 1997, decreasing to 20.3% in 2000. During the same period, the use of insulin-alone declined from 12.6% to 9.9%, while the use of insulin and OADs in the same year increased from 9.0% to 10.4%. Patients receiving insulin, compared to patients treated with OADs or no drug therapy, were more likely to have significant diabetic comorbidities (54.4% vs. 26.1% and 21.5%), and more doctor visits per year (9.2 vs.7.4 and 6.8).
CONCLUSIONS: It appears that the use of insulin therapy for treating type 2 diabetes patients has declined slightly over the past four years (1997–2000), possibly in response to the introduction of new oral antihyperglycemic drugs and the widespread promotion of treatment guidelines. It is likely that the use of insulin combination therapies has increased, while the use of insulin monotherapy has decreased over the same time period.

PDB14

PATIENT'S PERSPECTIVE OF HYPOGLYCEMIA AS AN ADVERSE EFFECT OF ORAL ANTIDIABETIC MEDICATIONS

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OBJECTIVE: To assess patient perspective on hypoglycemia in patients with type 2 diabetes taking oral hypoglycemic agents (OHAs).
METHODS: A questionnaire was developed to explore the subjects' perception and knowledge of hypoglycemia, including frequency and severity of symptoms. We also assessed the potential relationship of hypoglycemia to OHAs. Thirty-one study subjects with type 2 diabetes and at least 30 years of age responded to advertisements to participate in this study. Patients were distributed in three groups according to age and previous experience of hypoglycemia: group 1: older patients with hypoglycemia experience, group 2: patients without previous hypoglycemia and group 3: adults with previous hypoglycemia. Patients completed a questionnaire and then took part in a moderated focus group.
RESULTS: Eight subjects in group 1 (mean age 66.4 ± 2.8 years old) and 12 patients in group 3 (mean age 52.7 ± 6.4 years old) reported experiencing hypoglycemia; while 12 patients in group 2 (mean age 56.8 ± 6.8 years old) reported, "not experiencing hypoglycemia" in the past. Patients completed the questionnaire and then participated in a moderated focus group. Less than 25% of group 1 and 2 patients recognized the symptoms of hypoglycemia. Approximately 27% of patients in group 2 experienced these symptoms but none recognized they were manifestations of hypoglycemia and 18% reported that they experienced trembling very often or always. None of the subjects connected these symptoms with their antidiabetic medications. All patients in group 1 seemed to be surprised that OHAs have side effects. Approximately 25% of patients gave a wrong definition of hypoglycemia in their questionnaires.
CONCLUSIONS: There seems to be a large information gap about hypoglycemia. Patient and provider education is needed to help patients to understand what hypoglycemia is or recognize the symptoms of hypoglycemia.

PDB15

USING SURVIVAL MODELS TO PREDICT THE START OF INSULIN IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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OBJECTIVES: The objective of this study was to determine if routinely collected administrative claims data could be used to effectively predict what segment of a population of patients with type 2 diabetes mellitus (type 2 DM) would progress to insulin as part of their drug regimen.
METHODS: To determine the time until a patient with type 2 DM starts insulin, defined as survival time, we used the PHREG procedure of SAS. This procedure uses Cox's proportional hazards model in order to estimate survival functions for diabetic patients. Based on the number of medications in the patients' regimen, eleven models were developed to predict the number of patients in a cohort expected to start insulin therapy over the two-year study period. The models were also used to identify the patients most likely to start insulin therapy and to estimate their probability. Split sample design was used to gauge the predictive ability of the models.
RESULTS: In the monotherapy cohort model, the average of the absolute difference between the predicted and actual number of patients starting insulin each month was 0.965, with the maximum error for any month being 4.1 patients (an average of 27 patients started insulin per month). 27.03% and 24.12% of the patients that went on insulin within six months or two years respectively were in the top 10% in terms of risk. In comparison, 3.3% and 3.53% of the patients that went on insulin within six months or two years respectively were found to be in the bottom 10% in terms of risk.
CONCLUSIONS: This study demonstrates that survival models can be used to predict and identify patients with type 2 DM who will require insulin as part of their treatment regimen. As a result, it is possible to develop tools based on these models that can be used by practitioners to assist in patient care.