Original Research

Longitudinal Changes in Medical Services and Related Costs in a Single Cohort of Patients Newly Diagnosed With Type 2 Diabetes, 2006 to 2012

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ABSTRACT

Purpose: Documenting diabetes treatment patterns and associated costs over time is an important step in gauging the medical and economic impact of current treatment guidelines in a real-world setting. This study was designed to assess changes in medication treatment patterns, health care costs, and comorbidities over a 6-year period after a new diagnosis of type 2 diabetes mellitus (T2DM). This analysis is the first of its kind to observe, over time, a single US cohort of patients newly diagnosed with T2DM.

Methods: This study was a longitudinal assessment of changes in medical services and comorbidities for a single cohort (N = 35,017) of adults newly diagnosed with T2DM in 2006 using claims data from Truven Health Analytics MarketScan® databases. Prevalence of diabetes-related comorbidities and utilization/costs of inpatient/ outpatient services and medications were analyzed annually for the index (diagnosis) year (Y1) through year 6 (Y6) postindex. Costs were adjusted to 2012 dollars.

Findings: From Y1 to Y6, increased prevalence was noted for several T2DM-associated comorbidities: cerebrovascular disease (13%–21%), peripheral vascular disease (3%–10%), nephropathy (3%–13%), and retinopathy (4%–14%). All-cause costs of inpatient and outpatient services and medications were analyzed for the index year (Y1) through Y6 postindex (adjusted to 2012 dollars). Total health care utilization costs (services plus drugs) increased by 33.3% from Y1 ($329.8 million) to Y6 ($439.5 million). Inpatient costs across the entire cohort increased 19.3% from Y1 ($49.8 million; $1421/ patient) to Y6 ($59.4 million; $1695/patient) but increased 46.6% among utilizers, despite a decline in inpatient utilizers (7.3% to 5.9% of patients). The percentage of outpatient services utilizers remained stable (Y1, 98.2%; Y6, 97.2%), but total visits increased by 9.1%. Costs of outpatient services increased by 32.5%, from $145 million (Y1) to $192 million (Y6). Total drug costs increased from $101.5 million (Y1) to $114.7 million (Y6) but accounted for a smaller percentage of all health care costs in Y6 versus Y1 (26.1% vs 30.7%). Antidiabetes drugs accounted for a small percentage of overall costs in both Y1 (3.6%) and Y6 (5.3%).

Implications: Overall, we found evidence of increasing comorbidities paralleled by large increases in costs for medical services but less for prescriptions. These findings confirm a need for aggressive diabetes management to slow disease progression and minimize comorbidity and economic burdens of the disease. (*Clin Ther.* 2016;38:1314–1326) © 2016 Elsevier HS Journals, Inc. All rights reserved.

Key words: claims data, comorbidities, health care costs, longitudinal, type 2 diabetes mellitus, treatment patterns.

INTRODUCTION

The management of type 2 diabetes mellitus (T2DM) continues to evolve with the ongoing development of

new medications, as well as modifications to the overall treatment strategy, trends that are reflected in the frequency in updates to practice guidelines.[1–3] Costs associated with the treatment of T2DM and its complications are high, accounting for ~11% of health care expenditures worldwide, totaling $612 billion in 2014.[4]

Documenting diabetes treatment patterns and associated costs over time is an important step in gauging the medical and economic impact of current treatment guidelines in a real-world setting. Diabetes-related comorbidities have an effect on treatment choices and health care costs and also need to be examined. Claims-based analyses are particularly suited to examine these issues,[5] and although previous studies of this nature have been conducted,[6–10] this analysis is the first of its kind in a single US cohort followed over time to the best of our knowledge.

The present long-term longitudinal study of real-world claims data from a single cohort of patients newly diagnosed with T2DM was designed with the objective of assessing changes in comorbidities, medication treatment patterns, and health care costs for the 6 years after diagnosis.

PATIENTS AND METHODS
Design

This retrospective, single-cohort study included adult patients newly diagnosed with T2DM in 2006 and continuously enrolled through 2012. The Truven Health MarketScan® Databases, which contain administrative claims data on >170 million unique patients in the United States since 1995, were used as the data source. The Truven databases include a subset of 9.1 million people diagnosed with diabetes. These databases include de-identified claims data from persons residing in all states of the United States and are fully compliant with the Health Insurance Portability and Accountability Act of 1996.

Inclusion Criteria

Eligible patients were required to be at least 18 years of age and have ≥2 T2DM diagnoses (*International Classification of Diseases, Ninth Revision,* codes 250.X0 and 250.X2). Patients with only 1 T2DM diagnosis were eligible if they also had at least 1 prescription claim for an oral antidiabetes drug (OAD). To eliminate the possibility of misdiagnosis, patients were excluded if they had >1 diagnosis for type 1

DM (*International Classification of Diseases, Ninth Revision*, code of 250.X1 or 250.X3) or if they had claims for gestational diabetes during the study period. The diagnoses of T2DM were evaluated over all available patient-years, not limited to 2006, to ensure the most accurate classification of the patients. The initial (index) diagnosis of T2DM must have occurred during 2006, with a minimum of 6 months of insurance plan enrollment before the index diagnosis. Other eligibility requirements included continuous enrollment in a plan with prescription drug benefits starting from 2006 (index year) through 2012, and a requirement to have at least 1 antidiabetes drug prescription claim in any of the 6 years after the index date. However, any claims for insulin must not have been within 30 days of the index date to further exclude patients with type 1 diabetes.

Data Collection and Analysis

Data were analyzed to determine drug treatment patterns, costs of inpatient and outpatient services, including emergency department (ED) visits, and presence of diabetes-related comorbidities over the 6-year period after the T2DM diagnosis. The end points included data for year 1 (2006–2007) through year 6 (2011–2012) for the following: prescription drug claim patterns according to OAD class, insulin, or glucagon-like peptide-1 (GLP-1) receptor agonists; number of OADs prescribed (1, 2, or 3); and according to combinations of OAD classes, with and without insulin. The end points also included data on numbers of diabetes-related comorbidities (cerebrovascular, peripheral vascular, cardiovascular, nephropathy, neuropathy, retinopathy); Diabetes Complications Severity Index (DCSI) scores; and health care resource utilization, whether claims were coded as diabetes-related or not. The DCSI is a scoring system used to grade the severity of diabetes complications, and it includes 7 categories (cardiovascular disease, nephropathy, retinopathy, peripheral vascular disease, stroke, neuropathy, and metabolic).[11] Each category is rated as follows: 0 = no abnormality; 1 = some abnormality; or 2 = severe abnormality. The exception to this grading is neuropathy, which is rated only as 0 = not present or 1 = abnormal. The composite DCSI scores thus range from 0 (no abnormality) to 13 (greatest severity).

All claims for costs of inpatient and outpatient services, medications, and supplies were included. Health care costs are presented both as costs for the entire T2DM cohort (ie, costs/T2DM patient) and also