



# Beneficial Agents for Patients With Type 2 Diabetes and Cardiovascular Disease or Obesity: Utilization in an Era of Accumulating Evidence

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This study was an analysis of a national sample of U.S. medical office visits from 2014 to 2016, a period when evidence of effectiveness was emerging for a variety of beneficial type 2 diabetes agents with regard to potential reduction in diabetes comorbidities. Ideal therapy was defined as an American Diabetes Association–identified beneficial agent plus metformin. The associations between atherosclerotic cardiovascular disease or obesity and use of these agents were explored.

Accumulating evidence (1–7) about antidiabetic agents that are beneficial in patients with atherosclerotic cardiovascular disease (ASCVD) or obesity, including selected sodium–glucose cotransporter 2 (SGLT2) inhibitors and glucagon-like peptide 1 (GLP-1) receptor agonists, was reflected in recently published guidelines (8,9). Adoption of such new therapeutic approaches may depend on factors such as patient attributes rather than on guideline promulgation alone (10,11). Information about adoption of new therapies is needed to inform educational efforts and future analyses of treatment trends. The present exploratory and hypothesis-generating study was conducted to assess the rate and predictors of use of beneficial agents for ASCVD and obesity during a time period when evidence of their effectiveness was emerging, but guidelines for their use had not yet been published.

## Design and Methods

### Data Source and Sample

Data were obtained from the National Ambulatory Medical Care Survey (NAMCS), an annual, nationally

representative (12) and widely used (13) assessment of U.S. office-based physician visits sampled using a complex multistage design (14). Data for the survey are collected from medical records using automated, laptop-based tools (14). Collected data elements used in this study included BMI, up to five diagnoses associated with the visit, and indicators of chronic conditions (e.g., asthma, coronary artery disease [CAD], cerebrovascular disease [CEBVD], chronic kidney disease [CKD], and end-stage renal disease [ESRD]), collected for all patients regardless of visit-related diagnoses (14). Also used were indicators of up to 20 prescribed medications coded with the Lexicon Plus classification system licensed for the NAMCS by Cerner Multum (14).

The sample included visits made during the 2014–2016 period by patients who were  $\geq 18$  years of age and had either type 2 or unspecified type diabetes and at least one prescribed antidiabetic drug (Supplementary Appendix 1). Excluded were patients with type 1 diabetes and visits resulting in emergency or inpatient care.

### Outcomes and Predictors

The primary outcome was prescribed ideal therapy, defined as metformin plus an agent identified in the guidelines (8,9) as beneficial (Supplementary Appendix 1). A secondary outcome was a prescribed beneficial agent without metformin. Key independent variables of interest were ASCVD (i.e., CAD, CEBVD, peripheral arterial disease, or history of myocardial infarction or stroke) and obesity (i.e., BMI  $\geq 30$  kg/m<sup>2</sup>

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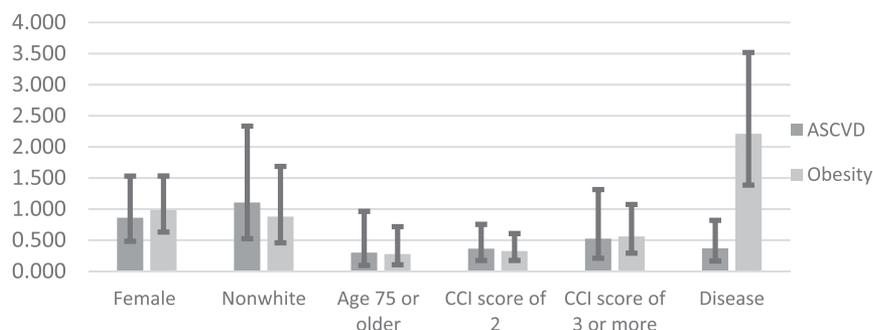
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**FIGURE 1** Adjusted odds of ideal therapy for patients with type 2 diabetes and ASCVD or obesity.

and pharmacy, will be needed to reassess these findings in a larger sample and to examine how patients and providers become aware of and choose beneficial pharmacotherapies.

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### DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

### AUTHOR CONTRIBUTIONS

K.B. was responsible for the conception and design of the study, assisted by K.A.F. Data analysis was performed by K.A.F., assisted by K.B. K.A.F. drafted the manuscript. Both authors contributed to manuscript revision and read and approved the final manuscript. K.B. and K.A.F. are co-guarantors of the work, had full access to all the study data, and take responsibility for the integrity of the data and the accuracy of the data analysis.

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