



Changes in Statin Use Among U.S. Adults With Diabetes: A Population-Based Analysis of NHANES 2011–2018

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OBJECTIVE

To evaluate statin use in the U.S. before and after the 2015 American Diabetes Association position statement, which expanded statin therapy recommendations to include all adults 40–75 years old with diabetes.

RESEARCH DESIGN AND METHODS

The National Health and Nutrition Examination Survey (NHANES) was used to obtain a representative sample. The difference-in-differences technique determined the impact of the recommendation on the proportion of people with diabetes for whom statin therapy was newly recommended.

RESULTS

Among people with diabetes, the change in statin use in people without atherosclerotic cardiovascular disease (ASCVD) risk factors, controlling for change among people with ASCVD/risk factors, was 6.6% ($P = 0.388$). In the adjusted analysis, overt ASCVD, age, Black race, health insurance, a place for routine care, and total cholesterol were significantly associated with statin use ($P < 0.05$).

CONCLUSIONS

The most recent change in statin recommendations had minimal impact on the proportion of patients receiving a statin.

For >40 years, diabetes has been recognized as an independent risk factor for atherosclerotic cardiovascular disease (ASCVD). Statin therapy can reduce the development or progression of ASCVD in people with diabetes. Over time, the American Diabetes Association (ADA) *Standards of Medical Care in Diabetes* has expanded the population for whom statin therapy is recommended. Since 2015, statin therapy is advocated for all people with diabetes aged 40–75 years (1). This recommendation increased the number of people with a statin indication from those with overt ASCVD or age >40 years with one or more cardiovascular risk factor (2).

The goal of clinical practice recommendations is to disseminate knowledge to improve evidence-based patient care. Unfortunately, translation into practice remains slow and inequitable. Understanding previous implementation patterns can identify new strategies for success. Evidence describing the influence of the ADA Standards of Medical Care on statin prescribing is limited to single centers or reports of lipid profile testing (3–5). The objective of this study was to evaluate changes in statin use at the population-level in the U.S. before and after the 2015 position statement.

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RESEARCH DESIGN AND METHODS

The study population was adults 40–75 years old with diabetes participating in the mobile examination component of the National Health and Nutrition Examination Survey (NHANES). Recent survey cycles were pooled into two cohorts, covering 4 years before (2011–2014) and 4 years after (2015–2018) the 2015 statement. Additional population details and definitions can be found in the Supplementary Appendix. The primary outcome was the change in statin use among participants with diabetes but without ASCVD risk factors (no-ASCVD group) controlling for the change among those with ASCVD or ASCVD risk factors (control group).

The quasi-experimental difference-in-differences technique was used to describe the effect of the 2015 ADA statement on statin use in the no-ASCVD group. This approach reduced bias in the postperiod by accounting for change from other causes and was operationalized using logistic regression with an interaction between period and group (6). The parallel trend assumption was assessed by visual inspection. Multivariable logistic regression was used to identify associations between statin therapy and cohort, ASCVD, age, sex, race, education, income, health insurance, routine medical care, HbA_{1c}, systolic blood pressure, and total cholesterol. Analyses were weighted to represent the U.S.

population using the Analysis of Complex Survey Samples, “survey,” package in RStudio 3.6.1 software. *P* values <0.05 were considered significant.

RESULTS

NHANES participants aged 40–75 years with diabetes included 2,875 individuals representing >20 million adults in the U.S. Baseline characteristics are presented in Supplementary Table 1. Notably, >90% had a place to receive routine care with one or more visits with a provider per year. Overall, the percentage of people with diabetes taking a statin increased minimally from 48.5% in the 2011–2014 cohort to 53% in the 2015–2018 cohort (*P* = 0.133). In the 2011–2014 cohort, 86.1% had an indication for a statin (control/ASCVD group), of whom 51.1% were on therapy. In the no-ASCVD group, 32.7% were on a statin. For the 2015–2018 cohort, 54.8% of participants in the control group received a statin compared with 43% in the no-ASCVD group.

The change in the no-ASCVD group, controlling for the ASCVD group, was 6.6% (95% CI –8.3 to 21.5; *P* = 0.3875). Because the interaction in the unadjusted analysis was not significant and remained so after adding covariates, it was removed from the final adjusted model to simplify the interpretation. The adjusted analysis demonstrated no

significant change in statin use with time (odds ratio 1.2, *P* = 0.152) (Fig. 1). Overt ASCVD, increasing age, health insurance, a place for routine care, and total cholesterol were significantly associated with increased statin use. Black race was associated with reduced statin use when controlling for the remaining demographic variables.

CONCLUSIONS

This is the first study to evaluate the effect of the ADA Standards of Medical Care on statin prescribing in the U.S. Despite evidence supporting statin benefits, no significant increase in use was noted among people to whom the 2015 ADA statement expanded treatment recommendations using a difference-in-difference approach to reduce bias from unmeasured factors.

Barriers to the translation of recommendations include the evidence strength, complexity, provider knowledge and attitudes, and available resources (7). Our work demonstrates that most people 40–75 years old with diabetes in the U.S. had the opportunity to be prescribed statin therapy since the 2015 recommendations, highlighting the potential impact of targeting provider knowledge and resources to improve implementation. The field of implementation science provides a number of strategies to

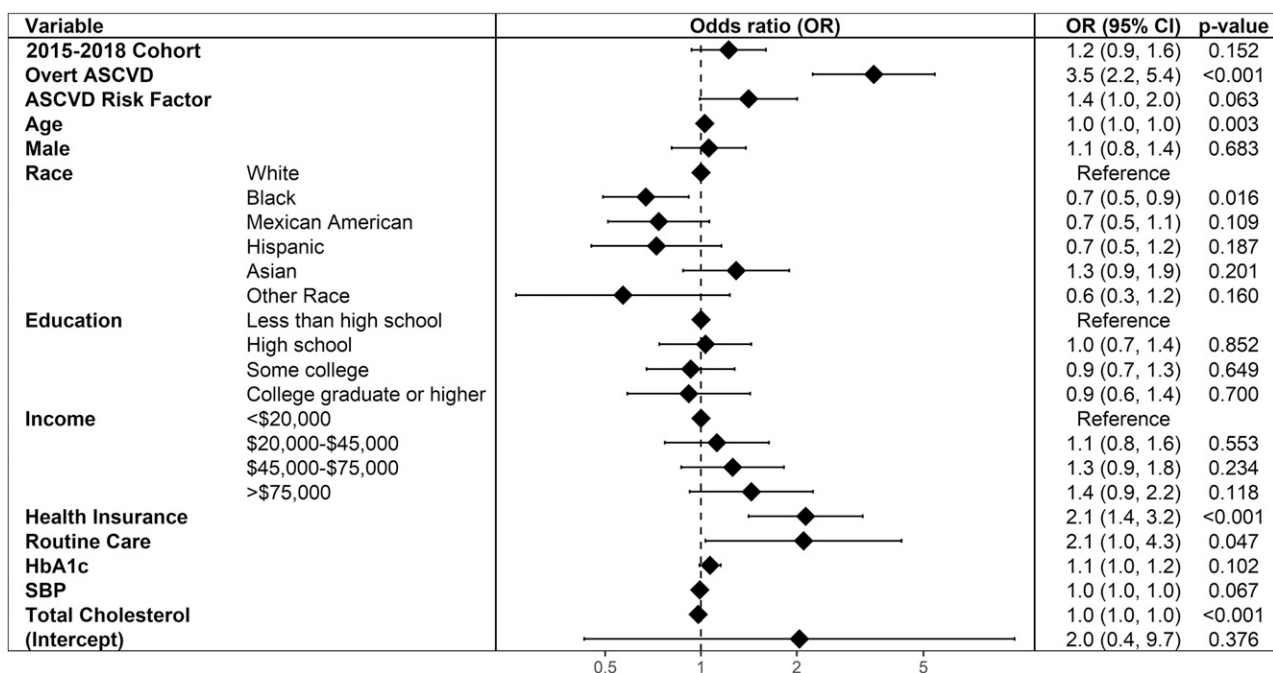


Figure 1—Associations with statin use shown as the odds ratio (diamond) with 95% CI (solid lines). SBP, systolic blood pressure.

implement change in clinical care, such as audits and feedback, training, changing infrastructure, engaging stakeholders, providing interactive assistance, clinical support, and using financial strategies (8). Clinical decision support (CDS) has become increasingly common and addresses several implementation strategies, including a change in infrastructure and clinician support. CDS can enhance health by providing clinicians with person-specific information, intelligently filtered, and delivered in electronic workflows. Examples of successful guideline implementation using CDS include anticoagulation, hyperlipidemia, and asthma (9–11). Concerning diabetes management, CDS has been associated with improved blood pressure, HbA_{1c}, and LDL (12).

In this analysis, the strongest predictor of statin use was ASCVD or risk factors. CDS may aid in recognizing patients without these identifiers and may be most useful when directed at populations receiving statins at comparatively low rates. For example, tailoring interventions to automatically alert providers to prescribing opportunities in younger and Black people may be particularly beneficial because they are less likely to receive treatment (13).

This study has several important limitations. First, given the nature of NHANES, ASCVD risk may be incompletely defined. For example, hyperlipidemia was not included as an ASCVD risk factor due to the inability to objectively define the presence of the condition in patients receiving statin therapy. In the 2011–2014 no-ASCVD group, 74% of the statin use was in people who self-reported a history of hyperlipidemia. Among all patients in this cohort, 69.7% reported hyperlipidemia with only 34.7% receiving therapy, suggesting, despite this limitation, a similarly low proportion of patients are receiving the indicated therapy. Secondly, the study design did not allow assessment of previous statin use or decision against therapy. Arguments exist that basing care solely on guidelines fails to address patient-specific complexity (14). Additionally, patients for whom therapy is recommended may decline or discontinue statin therapy, citing fear of adverse effects, cost, preference for natural remedies, or lack of efficacy. Recently, a large registry determined ~40% of

participants discontinued or declined therapy; worry about adverse effects was the most cited reason (13). Importantly, among those who discontinued therapy, >50% were willing to reconsider. This analysis also highlights the role of provider adherence to recommendations, as the primary cause of statin underuse was failure to be offered therapy. Accordingly, prompting physicians with dynamic, patient-focused CDS tools, including patient education, to evaluate or reevaluate statin use has demonstrated the ability to improve prescribing (15).

In conclusion, a significant proportion of people in the U.S. with an indication for a statin, as endorsed by the ADA Standards of Medical Care, were not receiving therapy. The most recent recommendation change did not significantly increase statin use. Additional work continues to be necessary to improve the implementation of evidence-based medical care. Given most people with diabetes in the U.S. regularly see a health care provider, CDS may be helpful.

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