Impact of the 2013 American College of Cardiology/American Heart Association cholesterol guidelines on the prescription of high-intensity statins in patients hospitalized for acute coronary syndrome or stroke

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Background The 2013 American College of Cardiology/American Heart Association cholesterol management guidelines represented a paradigm shift from the National Cholesterol Education Program Adult Treatment Panel III guidelines, replacing low-density lipoprotein cholesterol targets with a risk assessment model to guide statin therapy. Our objectives are to compare provider prescription of high-intensity statin therapy in patients hospitalized with acute coronary syndrome (ACS) or cerebrovascular accident (CVA) before and after the publication of the 2013 cholesterol guidelines, determine potential predictors of high-intensity statin utilization, and identify targets for improvement in cardiovascular risk reduction among these high-risk populations.

Methods A single-center retrospective cohort study of 695 patients discharged with a diagnosis of ACS or CVA in the 6 months before (n = 359) and after (n = 336) the release of the 2013 American College of Cardiology/American Heart Association cholesterol guidelines. Patient characteristics were compared using analysis of variance and χ^2 tests. Multivariable logistic regression models were used to assess clinical predictors of provider utilization of high-intensity statins.

Results After the 2013 cholesterol guidelines, the rate of prescribing high-intensity statins was greater for statin-naïve patients compared with those already on statin therapy (odds ratio [OR] 0.51, $P = .02$). Prescription of high-intensity statins was higher for patients with ACS compared with CVA (OR 8.4, $P < .001$—pre-2013 guidelines; OR 4.5, $P < .001$—post-2013 guidelines). Prescription of high-intensity statins steadily improved over the study period, significantly among patients with CVA ($P < .001$).

Conclusions Physicians were more likely to prescribe high-intensity statins in statin-naïve patients as compared with intensifying existing statin therapy, and their prescription pattern was lower after CVA vs ACS. (Am Heart J 2016;181:130-136.)

Treatment of elevated low-density lipoprotein cholesterol (LDL-C) has been a long-standing principal goal for both primary and secondary prevention of major cardiovascular (CV) events, including myocardial infarction, stroke, coronary revascularization, and CV death. The previous cholesterol guidelines (National Cholesterol Education Program Adult Treatment Panel III guidelines) highlighted a specific LDL-C target level based on underlying risk as the principal cholesterol target for reducing the risk of CV events.[1] This practice of treating patients to achieve a goal LDL-C target level based on CV risk had been in place for more than 2 decades before the introduction of the updated 2013 cholesterol guidelines.

In 2013, the American College of Cardiology (ACC) and the American Heart Association (AHA) released new guidelines on the treatment of cholesterol to reduce atherosclerotic CV risk in adults.[2] The 2013 guidelines emphasize initiating statin therapy at the appropriate intensity based on risk category as opposed to reaching a target LDL-C level. The 2013 ACC/AHA guidelines emphasize using "high-intensity" statin therapy for those patients at highest risk for a CV event, which includes patients with clinical atherosclerotic CV disease. Patients with clinical atherosclerotic CV disease include those with acute coronary syndrome (ACS), history of

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myocardial infarction, stable or unstable angina (UA), coronary or other arterial revascularization, cerebrovascular accident (CVA), transient ischemic attack, or peripheral arterial disease. These new recommendations were made based on available high-quality randomized controlled trials evaluating the effectiveness of statins in reducing CV events that compared fixed-dose high-intensity statins to lower-intensity statins or placebo.[3-6]

These data supporting high-intensity statin use in patients with ACS or CVA were available several years before the publication of the updated cholesterol guidelines in 2013 and may have impacted clinical practice before the official guideline update. To evaluate the impact of the 2013 ACC/AHA cholesterol guidelines in the management of those patients with the highest CV risk—patients admitted with a recent CV event, including ACS or CVA—we evaluated the rate of prescription of high-intensity statins in this patient population during a 6-month period before and after the publication of the 2013 cholesterol guidelines.

Methods

Design overview and participants

We conducted a single-center retrospective cohort study of patients with a diagnosis of ACS or CVA during 2 periods: (1) between May 1, 2013 and November 12, 2013 and (2) between November 13, 2013 and June 1, 2014. These 2 periods comprise the 6 months before and after the publication of the 2013 ACC/AHA cholesterol guidelines. The study was approved by the Thomas Jefferson University Institutional Review Board before data collection. The Jefferson Clinical Research Institute supported the research study with funds to conduct most of the statistical analyses.

Medical record reviews were performed on all identified patients by the authors. Patients were identified for inclusion in the study by *International Classification of Diseases, Ninth Revision* (*ICD-9*) diagnostic codes for ischemic CVA (*ICD-9* code: 434.91) or ACS, which includes the following: ST-elevation myocardial infarction (STEMI; *ICD-9* code: 410.9), non-STEMI (NSTEMI; *ICD-9* code: 410.7), or UA (*ICD-9* code: 413.9). Patients younger than 21 years, those older than 75 years, or those with any of the following conditions were excluded from the study: hemorrhagic stroke (*ICD-9* code: 432.9), stroke secondary to cardioembolic disease, no available lipid panel within 30 days before or during the hospital admission, renal transplant recipients, or end-stage renal disease on hemodialysis. Stroke secondary to cardioembolic disease was identified based on brain imaging suggestive of embolic etiology, absence of cerebrovascular or carotid disease, documentation in the medical record of ischemic strokes being most likely embolic in origin, and/or presence of atrial fibrillation/flutter. In addition, patients in any of the following scenarios were excluded: death, hospice or comfort care, patients with documented statin allergy/intolerance, patients with documented contraindications to statin therapy including myopathy or hepatotoxicity, and patients who were documented to have declined statin therapy. These scenarios were identified through medical record review of laboratory test results, discharge instructions, and discharge summaries.

Patient characteristics and comorbidities were also collected via medical record review using our electronic medical record. Patient demographic data included the following: age, gender, body mass index (BMI), race/ethnicity, and smoking status. Patient comorbidities included the following: coronary artery disease, CVA, hypertension, diabetes mellitus, peripheral artery disease, and chronic kidney disease. The most recent lipid profile, hemoglobin A1c, and left ventricle ejection fraction were also tabulated.

Statistical analysis

Patient characteristics during the time frames before and after the publication of the 2013 cholesterol guidelines were compared using 1-way analysis of variance for continuous variables and χ^2 tests for categorical variables, with a P value $<.05$ indicating statistical significance.

High-intensity statins, as defined by the 2013 ACC/AHA cholesterol guidelines,[2] include atorvastatin 40-80 mg and rosuvastatin 20-40 mg. A statin-naïve patient was defined as a patient who was not taking any statin therapy at the time of admission.

The odds of prescribing high-intensity statin during the 6-month periods before and after the release of the 2013 ACC/AHA cholesterol guidelines were analyzed in separate logistic regression models. The models for adherence were based on the available data during the 6 months before and the 6 months after November 12, 2013—the date of publication of the 2013 cholesterol guidelines. All covariates, as well as linear and quadratic time trends, were considered as initial predictors of adherence. The final parsimonious models were obtained using backward elimination of insignificant predictors, with a P value $<.05$ reflecting statistical significance. The odds of adherence were adjusted for comorbidities, ethnicity, age, and gender. The data were analyzed in STATA 12 (StataCorp, College Station, TX).

The authors are solely responsible for the design and conduct of this study, all study analyses, and drafting and editing of the manuscript.

Results

Patient characteristics

There were a total of 695 patients who met the eligibility criteria for the study. Of these patients, 359 patients were discharged during the 6 months before the release of the 2013 ACC/AHA cholesterol guidelines, and 336 patients were discharged during the 6 months after their release. Both