Journal of Clinical Lipidology (2012) 6, 545–552

Journal of Clinical Lipidology

Non–high-density lipoprotein cholesterol reporting and goal attainment in primary care

Salim S. Virani, MD, PhD*, Degang Wang, PhD, LeChauncy D. Woodard, MD, MPH, Supicha S. Chitwood, MPH, Cassie R. Landrum, MPH, Franklin J. Zieve, MD, PhD, Christie M. Ballantyne, MD, Laura A. Petersen, MD, MPH

Health Policy and Quality Program, Michael E. DeBakey VA Medical Center, 2002 Holcombe Blvd., Health Services Research and Development Center of Excellence, and Section of Health Services Research, Department of Medicine, Baylor College of Medicine, Houston, TX 77030, USA (Drs. Virani, Wang, Woodard, Chitwood, Landrum, and Petersen); Section of Cardiovascular Research, Department of Medicine, Baylor College of Medicine; and Center for Cardiovascular Disease Prevention, Methodist DeBakey Heart and Vascular Center, Houston, TX, USA (Drs. Virani and Ballantyne); and Research and Development, McGuire VA Medical Center, Richmond, VA, USA (Dr. Zieve)

KEYWORDS:
Coronary disease;
Diabetes mellitus;
Non-HDL cholesterol;
Prevention;
Treatment goals

BACKGROUND: The Adult Treatment Panel III guidelines established non–high-density lipoprotein cholesterol (non-HDL-C) as a secondary treatment target. However, non-HDL-C levels are not reported on standard lipid panels by many hospital-based and/or commercial biochemical laboratories.

OBJECTIVE: We determined whether reporting non-HDL-C was associated with improved non-HDL-C goal attainment.

METHODS: We identified patients with cardiovascular disease (CVD) and/or diabetes receiving care within the Veterans Health Administration. We matched a facility that reported non-HDL-C levels on lipid panels (3994 CVD and 5108 diabetes patients) to a facility with similar size, patient complexity, and academic mission that did not report non-HDL-C (4269 CVD and 6591 diabetes patients). We performed patient-level analysis to assess differences in non-HDL-C from baseline to the most recent lipid panel at these facilities.

RESULTS: Baseline non-HDL-C levels for CVD patients were 114 mg/dL and 107 mg/dL at the reporting and nonreporting facilities, respectively. At 2.3-year follow-up, non-HDL-C levels decreased at both facilities but by a greater amount at the reporting facility (−11 mg/dL vs −3 mg/dL at the nonreporting facility, $P < .001$). Results remained significant ($P < .001$) after we adjusted for patient's age, race, gender, illness burden, history of diabetes, hypertension, medication adherence, statin use, number of lipid panels, and number of primary care visits between baseline and follow-up. Reductions were greater among CVD patients with triglycerides ≥200 mg/dL (−25 mg/dL vs −16 mg/dL at the respective facilities, $P = .004$). Results were similar in diabetes patients. Reporting was also associated with greater proportions of patients meeting non-HDL-C treatment goal of <130 mg/dL.

CONCLUSION: Non-HDL-C reporting could improve non-HDL-C goal attainment.

Non–high-density lipoprotein cholesterol (non-HDL-C) is considered a secondary treatment target in patients with elevated triglycerides per the Adult Treatment Panel (ATP)

* Corresponding author.
E-mail address: virani@bcm.edu
Submitted February 23, 2012. Accepted for publication April 18, 2012.

1933-2874/$ - see front matter Published by Elsevier Inc. on behalf of National Lipid Association.
doi:10.1016/j.jacl.2012.04.080

III cholesterol management guidelines.[1,2] In studies, researchers have shown that non-HDL-C is a better marker of coronary heart disease (CHD) risk than low-density lipoprotein cholesterol (LDL-C) in patients with cardiovascular disease (CVD) and diabetes.[3–10]

Although LDL-C goal attainment has improved,[11–13] attainment of non-HDL-C goals remains poor.[13] The reasons for poor non-HDL-C goal attainment have been explored.[14,15] Non-HDL-C calculation requires performing an extra step (subtracting HDL-C from total cholesterol), and several researchers have shown that 44% of providers cannot calculate non-HDL-C levels from standard lipid panels.[14,15] To circumvent these gaps, several organizations, including the American College of Cardiology,[8] American Diabetes Association,[16] and National Lipid Association,[17] have recommended reporting non-HDL-C levels on all lipid panel results. However, it is not known whether this strategy will improve non-HDL-C goal attainment.

A systematic-review by Oxman et al[18] showed that the use of clinical reminders (including enhanced reporting of laboratory results) had only modest effects on improving guideline-based care. Similarly, another systematic review showed a median absolute performance improvement of 14.1% in 14 cluster-randomized trials evaluating the impact of reminders on clinical care.[19]

Therefore, we examined whether directly reporting non-HDL-C levels on standard lipid panels was associated with a reduction in non-HDL-C levels in CVD and diabetes patients, and if so, to quantify the magnitude of the reduction. Our secondary aim was to ascertain whether non-HDL-C reporting was associated with attainment of the guideline-recommended non-HDL-C treatment goal ($<$130 mg/dL)[1] in greater proportions of patients with CVD and diabetes.

Methods

We identified patients with CVD or diabetes receiving primary care within the Department of Veterans Affairs (VA) Health Care system. Patients with CVD were defined as those having a history of CHD or peripheral artery disease.

Patients with CHD were identified by using *International Classification of Diseases,* 9th revision, clinical modification diagnosis and procedure codes for unstable angina or myocardial infarction or by current procedural terminology codes for percutaneous coronary intervention or coronary artery bypass grafting (see Supplemental Table 1 for codes and other details). Patients with peripheral artery disease were identified using *International Classification of Diseases,* 9th revision, clinical modification codes (Supplemental Table 1).

We classified patients as having diabetes if they had any of the following documented during the study interval or 2 years before: two outpatient diagnosis codes or one inpatient diagnosis code[20] indicating diabetes (Supplemental Table 1), a filled prescription for diabetes medication, or at least two outpatient blood glucose readings of $\geq$200 mg/dL.

We first identified patients with CVD or diabetes who received care at a VA facility that reported non-HDL-C reporting (total cholesterol minus HDL-C) on routine lipid panels beginning September 9, 2008, without previous educational efforts or announcement of this change. Non-HDL-C treatment goals (30 mg/dL above LDL-C goals) were not listed.

We used the most recent lipid panel performed within 12 months before September 9, 2008, to calculate non-HDL-C levels for each patient as total cholesterol minus HDL-C. These levels were used as baseline non-HDL-C levels, and non-HDL-C levels on the most recent lipid panel were used as follow-up non-HDL-C levels. Of 10,227 CVD or diabetes patients at this reporting facility, 7035 (71.4%) had follow-up lipid panel results available in the last 12 months.

Because non-HDL-C goal attainment may have improved as a temporal trend as the result of better guideline dissemination and the availability (and use) of more potent statins during the study interval, we identified a comparator site among the 133 VA facilities by using a validated matching algorithm.[21] The comparator site closely matched the index facility for the variables in the algorithm (see Supplemental Table 2) but did not report non-HDL-C levels on lipid panel results. For patients with CVD or diabetes who received care at the nonreporting facility, we calculated baseline and follow-up non-HDL-C levels. Of 12,450 CVD or diabetes patients at the nonreporting facility, 9034 (72.6%) had follow-up lipid panel results available in the last 12 months. Both reporting and nonreporting sites used the well standardized Center for Disease Control and Prevention methodology for lipid measurement and the methodology did not change during the study interval.

For both facilities, we also determined and adjusted for patient characteristics that could impact non-HDL-C goal attainment. These included age, race, gender, history of hypertension (see Supplemental Table 1 for codes), baseline hemoglobin A1C levels in diabetes patients, baseline statin use, number of lipid panels and number of primary care visits during the study interval, and number of days between baseline and follow-up lipid panels.

Because a patient's adherence with medication may impact providers' decision to intensify treatment for elevated non-HDL-C, which in turn could impact follow-up non-HDL-C levels, we determined each patient's adherence to lipid-lowering medications at baseline by calculating medication possession ratio (MPR) as the number of days the patient had lipid-lowering medication available (on the basis of when prescription was filled and quantity supplied) in the 180 days before the patient's visit/180 days. MPR $\geq$0.8 is a well-described measure of patient adherence to medications.[22,23] An MPR of 1.00 indicates the patient had a supply of lipid-lowering medication for the entire review period.

To assess the impact of patient's illness burden on non-HDL-C levels, we calculated a Diagnostic Cost Group (DCG) relative risk score (RRS) for each patient and used this as a covariate in our adjustment models. DCG RRS is a