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Statin Cost-Effectiveness Comparisons Using Real-World Effectiveness Data: Formulary Implications

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ABSTRACT

Objective: To compare the effectiveness and cost-effectiveness among generic and branded statins in routine clinical practice.

Methods: Retrospective database study of patients, 18+, who were newly prescribed statin therapy. Statin effectiveness and cost-effectiveness in reducing low-density lipoprotein cholesterol (LDL-C) and attaining LDL-C goals were evaluated.

Results: Of 10,421 eligible patients, % LDL-C reduction was significantly greater ($P < 0.001$) with rosuvastatin (–31.6%) than other statins (–13.9 to –21.9%). Percentage of patients at moderate/high risk attaining LDL-C goal was higher ($P < 0.001$) for rosuvastatin (76.1%) versus other statins (57.6–72.6%). Rosuvastatin was more effective and less costly than atorvastatin. Among generic statins, simvastatin required >61% discount to branded price to achieve similar cost-effectiveness as generic lovastatin.

Conclusions: In clinical practice, rosuvastatin is more effective and less costly in lowering LDL-C and LDL-C goal attainment compared with atorvastatin. Simvastatin was more cost-effective compared with lovastatin if >61% discount to branded price was achieved.

Keywords: ATP III goal attainment, cost-effectiveness, LDL reduction, real-world effectiveness, rosuvastatin.

Introduction

Coronary heart disease (CHD) continues to be the leading cause of mortality and morbidity in the United States [1] and is one of the top five most costly health conditions to US employers, with total annual costs of $130 billion [2,3]. Evidence-based guidelines issued by the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) underline the importance of hyperlipidemia treatment with an aggressive LDL-C goal of <100 mg/dL for high risk patients [4].

In the changing statin marketplace and in multitier formulary systems, it is important for managed care plans to identify and utilize the most cost-effective options among generic and branded statins. Lovastatin (LOV) became available as a generic statin in 2002. Pravastatin (PRV) and simvastatin (SMV) followed with generic introduction in April and June 2006. Because there are more choices for generic statins, health-care administrators are considering various statin formulary changes to optimize pharmacy budget spend. An optimal statin formulary would provide adequate clinical flexibility to maximize clinical benefit to patients with efficient use of health-care resources. So it is important for health plan administrators to identify the most cost-effective statin that may be a generic statin for tier one and a more effective branded statin that may be placed in tier two. A formulary structure such as this can meet the objective of appropriate clinical choices, as well as cost-effective use of statins. On the other hand, efficient health-care delivery systems may consider using generic agents for patients at low risk and a branded statin for patients at higher risk of CHD. Nevertheless, there is limited real-world evidence available comparing the effectiveness and cost-effectiveness of the specific generic and branded statins to guide the formulary decision.

Clinical trials have clearly demonstrated that statin therapy lowers LDL-C by 45% to 63% with rosuvastatin (RSV) and 25% to 60% with other statins [5–7]. Moreover, randomized trials have shown that approximately 86% to 94% of patients attain NCEP ATP III LDL-C goal with rosuvastatin therapy; fewer attain goal with the other statins [6,7]. Nevertheless, observational studies from chart review of primary care physician practice have revealed lower rates of statin effectiveness and the number of patients achieving treatment goals. For example, only 23% to 48% of high-risk patients were reported to have attained their LDL-C goal in these studies [8–10]. This paradox between clinical trial-reported statin efficacy and actual clinical practice statin effectiveness highlights

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the need to better understand the comparative effectiveness of statins in a real-world setting.

The objectives of the present study was to estimate the effectiveness of rosuvastatin to other statins, cost-effectiveness of RSV compared with atorvastatin (ATV) (branded statins), and among SMV, PRV, and LOV (generic statins) in patients treated in routine clinical practice. Cost-effectiveness comparisons for branded and generic statins were separately conducted to aid in the formulary decision-making within a typical US health plan or pharmacy benefit management organization where formulary structure is comprised of generic agent(s) in tier one and branded agent(s) in tier two.

Methods

A retrospective study was conducted utilizing the General Electric Medical System (GEMS) electronic medical records database of patients who were treated in outpatient physician practices in the United States. The objectives of the study were to examine the effectiveness of statin monotherapy in the clinical practice setting by comparing RSV with ATV, SMV, PRV. and LOV for reducing LDL-C and LDL-C goal attainment. The analysis was conducted to determine whether the most efficacious (LDL-C lowering and NCEP ATP III goal attainment) statin (RSV) as observed in clinical trials is the most effective statin in the real-world setting as well. Similarly, the analysis determined if the most efficacious (LDL-C lowering and NCEP ATP III goal attainment) generic statin (SMV), as observed in clinical trials, is also more effective than other generic statins (PRV, LOV) in the real-world clinical practice. Cost-effectiveness was assessed among branded statins and generic statins separately. LOV was selected as the reference generic statin because it had a more stable acquisition cost because it has been on the market longest.

Patients receiving fluvastatin, the least efficacious statin, were too few for meaningful analysis (<4% of the statin users), and were excluded from the analysis. Recently, a fixed dose combination of SMV and ezetimibe became available; however, it was not included in this study because the number of eligible patients receiving this fixed dose combination was relatively small for reliable effectiveness estimates.

Patients who were newly prescribed statin therapy during August 2003 to May 2005 and had no prior prescription for any dyslipidemic medication, including bile acid sequestrants, fibrin, niacin, ezetimibe, or a statin, in the preceding 12 months were included in the study. Titration of statin therapy was allowed, but patients switching to other statins during the study period were excluded. Patients had to be continuously enrolled (i.e., active in physician's practice) for a minimum of 15 months; 12 months prior to and 3 months postinitiation of statin monotherapy. Additionally, patients were required to have a minimum of 90-day supply of statin therapy (either a 90-day prescription or three 30-day prescriptions) and lipid results within 90 days prior to and greater than 30 days after initiating statin therapy. The lipid values closest to the date of statin therapy initiation was defined as the baseline lipid measure. The follow-up lipid value was defined as the average of all lipid measures during the follow-up period, from 30 days after initiation of statin therapy to the date of the last statin prescription at time of discontinuation or end of study (i.e., August 2005). Therapy discontinuation was defined as the lack of a prescription or refill order within 1.5 times the prescription days supply. Thus, if a 30-day statin supply was ordered, then the prescription must be refilled or a new order written within 45 days of the initial prescription to consider the patient persistent on statin therapy.

Two effectiveness outcomes were assessed: 1) percent reduction in LDL-C; and 2) percentage of patients attaining NCEP ATP III LDL-C goal. The outcome measures were computed for each individual statin. For LDL-C goal attainment assessment, patients were stratified based upon NCEP CHD risk groups [4]. CHD and CHD risk equivalent was defined as myocardial infarction, ischemic heart disease, acute coronary syndrome, cerebral vascular accident, transient ischemic attack, peripheral vascular disease, abdominal aortic aneurysm, angina pectoris, atherosclerosis, and diabetes mellitus. The GEMS database did not contain information on inpatient procedures. A count of risk factors was done to assign patients not assigned to the CHD or CHD risk equivalent category to moderate or low CHD risk. Moderate CHD risk patients were defined by the presence of two or more CHD risk factors, including current cigarette smoking, hypertension diagnosis or blood pressure ≥140/90 mmHg, low high-density lipoprotein cholesterol (HDL-C) < 40 mg/dL, and age ≥45 for men and ≥55 for women. Low-risk patients were defined as those with one or no CHD risk factors.

Because inpatient procedure data and data from nonprimary care settings were not available in the database, there was potential that some high-risk patients were misclassified into the moderate risk category due to missing information on inpatient procedures. The fact that physicians started these patients with LDL-C < 130 mg/dL on a statin treatment was considered a strong indicator of their underlying high risk status or a more aggressive LDL-C target goal (<100 mg/dL). The LDL-C goal was defined as <100 mg/dL for high-risk patients, as well as moderate-risk patients who had statin therapy started, and baseline, untreated LDL-C levels <130 mg/dL. Moderate risk patients with LDL-C ≥130 mg/dL at baseline were assigned a goal of