

Predictors of statin adherence, switching, and discontinuation in the USAGE survey: Understanding the use of statins in America and gaps in patient education

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BACKGROUND: Although statins have been shown to reduce cardiovascular disease mortality, less than half of U.S. adults achieve their low-density lipoprotein cholesterol goal. In many patients initiated on a statin, adherence rates decrease over time.

OBJECTIVE: To characterize current and former statin users, identify reasons for the discontinuation or switching of statins, and identify factors associated with adherence.

METHODS: The USAGE survey is a cross-sectional, self-administered Internet-based survey of 10,138 U.S. adults fielded September to October 2011. The following statin users were identified and compared: adherent nonswitchers, adherent switchers, non-adherent switchers, and discontinuers. Univariate and multivariate models using a priori covariates for adherence and discontinuation were examined.

RESULTS: Most participants were current statin users who adhered with their prescribed statin (82.5%, n = 8371). Former statin users or discontinuers (12%, n = 1220) cited muscle pain, a side effect, as the primary reason for discontinuation (60%), followed by cost (16%), and then perceived lack of efficacy (13%). Discontinuers were less satisfied with their physicians' explanation of cholesterol treatment, more likely to use the Internet to research statins, and less likely to undergo frequent cholesterol monitoring. Among adherent statin users, the primary reasons for switching were muscle side effects (33%) and cost (32%). Individuals at risk for non-adherence included those with low household income, those who experienced muscle pain as a side effect while on statin therapy, and those taking medication for cardiovascular disease.

CONCLUSION: Statin-related muscle side effects are common and contribute significantly to rates of discontinuation, switching, and non-adherence. Improved physician patient communication about side effects and benefits of statins are necessary to improve both adherence and outcomes.

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After therapeutic lifestyle modification, statins are the first-line treatment for elevated low-density lipoprotein cholesterol (LDL-C) levels (Expert Panel 2002).¹ Randomized clinical trials and epidemiologic studies have shown that

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statins reduce the rates of myocardial infarction, stroke, and revascularization procedures. Statins also reduce the rate of cardiovascular and all-cause mortality in high-risk patients.²

Despite strong evidence for the cardiovascular benefits of statins, the efficacy demonstrated in clinical trials does not necessarily translate to similar effectiveness in the general population. Clinical trials may select healthier individuals who are more likely to adhere with statin therapy, a bias known as volunteer or self-selection bias.^{3,4} Even in clinical trials, adherence rates are suboptimal, with 5-year discontinuation rates of 33% and 18% in primary and secondary prevention trials, respectively.^{5,6} In most observational studies, long-term adherence with statins has been low, with approximately 50% adherence at 6 months and 25% adherence at 1 year.⁷ In the National Cholesterol Education Program (NCEP) Evaluation Project Utilizing Novel E-Technology (NEPTUNE) II, 67% of participants achieved their LDL-C treatment goal.⁸ Thus, a large percentage of the U.S. population still remains at levels greater than recommended LDL-C target levels.⁹

Barriers to adherence with statins are complex and multilevel occurring at the physician, health care system, and individual levels. Whether patients meet national lipid goals may in part depend on whether physicians are following national guidelines. In previous studies authors reported greater adherence among patients whose statins were prescribed by their primary care provider (PCP). Having a cardiologist, regardless of PCP status, was also associated with greater adherence.¹⁰ Health care system factors associated with increased adherence include lower out-of-pocket costs and good insurance status.¹¹ Previous studies authors reported mixed patient characteristics of patients with low adherence, including age (younger and older adults), nonwhite race, comorbidities, and side effects.^{12,13}

The Understanding Statin Use in America and Gaps in Patient Education (USAGE) Survey was conducted to characterize current and former statin users, identify reasons for the discontinuation or switching of statins, and identify factors associated with adherence.

Methods

Sources of data

The USAGE Survey is a cross-sectional, self-administered Internet-based survey of U.S. adults fielded between September 21, 2011 and October 17, 2011. All participants in the study must have been at least 18 years of age, reported being diagnosed with high cholesterol by a physician, currently or previously on a statin, able to read and write English, and have provided informed consent to participate in the study. Participants were recruited through opt-in e-mail, co-registration with MySurvey.com partners, electronic newsletter campaigns, banner placements, and

both internal and external affiliate networks. Details have been reported previously.¹⁴

Survey

The USAGE survey aimed to better understand statin adherence and the reasons for switching or discontinuing statin therapy, such as side-effects and cost. Example questions included, “Why did you stop the most recent statin medication you were taking?” and “In the past, did you ever stop taking a statin due to muscle-related side effects (such as worsened muscle aches, muscle pain, muscle cramps, or muscle weakness)?” The development and administration of the survey were published previously,¹⁴ and additional information about the USAGE survey can be found at <http://www.statinusage.com>.

Comparisons of interest

Current statin users were defined as patients currently taking a statin, either alone or in combination with a cholesterol-absorption inhibitor, niacin, or calcium channel blocker. Former statin users, or discontinuers, were patients who were previously on a statin, either alone or in combination with another medication, but who were currently not taking any statin.

Patients were then further divided by their level of adherence and whether they had previously switched statins. Adherent participants were defined as taking at least 80% of their current prescribed statin dose in the past month.¹⁵ In the survey we asked two separate questions about adherence: In the past month, “How many times did you miss a dose?” or “take less than the amount prescribed?” adherence was calculated by adding these two variables together. All other current statin users taking less than 80% of their prescribed statin dose were designated as non-adherent. Adherent nonswitchers were those who continued their original statin without having switched statins in the past. Adherent switchers were individuals who changed statins in the past but were then adherent with their new statin. Non-adherent nonswitchers were individuals who never switched statins but were non-adherent on their original statin. Discontinuers (or former statin users) stopped taking their statin altogether.

Statistical analysis

Baseline characteristics were obtained through the survey and computed by the use of univariate analyses. Student *t*-tests and χ^2 tests were used to assess for differences in the means and proportions of characteristics between comparison groups. Two-sided *P* < .05 were considered statistically significant.

A multinomial model was then used for prediction in four groups of patients that were determined a priori: discontinuers vs adherent nonswitchers, non-adherent switchers vs adherent nonswitchers, adherent switchers vs adherent nonswitchers, and non-adherent nonswitchers vs

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