Achieving Target Cholesterol Goals After Stroke

Is In-Hospital Statin Initiation the Key?

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Background: National advisories recommend statin therapy as an element of secondary prevention for patients with ischemic stroke or transient ischemic attack of atherosclerotic origin. Statins are of proven benefit in persons at high risk of vascular disease.

Objectives: To evaluate the effects of in-hospital initiation of statins on 3-month treatment adherence rates and achievement of national guideline target cholesterol goals.

Methods: Data were collected in consecutively encountered patients with ischemic stroke or transient ischemic attack admitted to a university hospital stroke service beginning September 1, 2002. Patients were included in the study if they were not receiving a statin before admission and had an indication for statin therapy. Adherence to statin treatment and achievement of national guideline target cholesterol goals were assessed 3 months after discharge.

Results: From September 1, 2002, through April 30, 2005, 92 (17%) of 552 individuals met the study criteria. Hospital initiation of statin therapy yielded high rates of adherence (93% [86/92]), lowered mean low-density lipoprotein cholesterol levels from 120 to 78 mg/dL (3.1 to 2.0 mmol/L; P < .001), and increased the proportion of patients with low-density lipoprotein cholesterol levels lower than 100 mg/dL (2.6 mmol/L) from 36% to 88% (P < .001) at 3 months.

Conclusions: Statin initiation during hospitalization for an ischemic cerebrovascular event is associated with high rates of adherence to treatment, lowering of low-density lipoprotein cholesterol levels, and higher rates of achieving national cholesterol guidelines.

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Clinical Trial Evidence indicates that, among individuals with a history of prior cerebrovascular disease but no coronary artery disease, statin use is associated with a significant decrease in the risk of major vascular events. To guide clinicians in the appropriate use of lipid-lowering agents for the management of abnormal blood cholesterol levels, national guidelines include target treatment goals geared at reducing overall vascular risk. Most recently, an advisory statement from the Stroke Council of the American Stroke Association recommended that “given early benefits in trials of acute coronary syndromes, statin initiation during hospitalization for first ischemic stroke of atherosclerotic origin is probably justified and may increase rates of long-term use.” However, the effects of in-hospital initiation of statin on achievement of lipid management goals in patients who have had a stroke has not been well documented. We aimed to evaluate 3-month treatment adherence rates and achievement of national guideline target cholesterol goals after in-hospital initiation of statins in patients with ischemic stroke and transient ischemic attack (TIA).

Methods

Demographic, clinical, and laboratory data were collected in consecutive patients with ischemic stroke or TIA admitted to a university hospital stroke service from September 1, 2002, through April 30, 2005. For this study, inclusion criteria were that the patient was not receiving a statin at time of admission and that the patient had 1 of the following indications for statin initiation: (1) acute cerebral ischemic event mechanism attributed to large-vessel atherosclerosis or intracranial branch atherosclerosis or lipohyalinosis (small-vessel disease); or (2) acute cerebral ischemia due to a nonatherosclerotic mechanism (cardiembolism, dissection, hypercoagulability, etc.), but presence of a history of coronary artery disease or of a modified National Cholesterol Education Program coronary artery disease risk equivalent. Stroke mechanism was identified.
During the study, 552 patients were admitted with acute cerebral ischemia, and 92 individuals met the study criteria. Demographic and clinical characteristics of the 92 patients are shown in Table 1. Baseline and 3-month follow-up cholesterol profiles are presented in Table 2. Because of high triglyceride levels (>400 mg/dL [4.5 mmol/L]), LDL-C values could not be obtained reliably in 5 patients at baseline and 2 patients at follow-up. Mean LDL-C decreased from 120 to 78 mg/dL (3.1 to 2.0 mmol/L; P < .001), mean HDL-C was not significantly affected (48 to 47 mg/dL [1.24 to 1.22 mmol/L]; P = .50), mean total cholesterol decreased from 196 to 150 mg/dL (5.1 to 3.9 mmol/L; P < .001), mean triglycerides were not significantly affected (151 to 133 mg/dL [1.7 to 1.5 mmol/L]; P = .11), and non–HDL-C decreased from 145 to 103 mg/dL (3.8 to 2.7 mmol/L; P < .001).

The national cholesterol treatment LDL-C goal of less than 100 mg/dL (2.6 mmol/L) was achieved in 88% of patients at 3-month follow-up, a substantial increase compared with baseline (36% [31/87] to 88% [79/90]; P < .001). The non–HDL-C treatment goal of less than 130 mg/dL was achieved in 86% of patients (45% [41/92] to 86% [79/92]; P < .001) at 3 months. Statin initiation did not significantly affect mean HDL-C or triglyceride levels at 3 months. There was a high level of treatment adherence during the 3-month follow-up, with 86 (93%) of 92 patients who started receiving a statin during hospitalization still taking the medication at follow-up. Of the 6 patients not receiving a statin at 3-month follow-up, 3 were discontinued because of elevated alanine aminotransferase levels, 1 because of elevated creatine kinase levels, and 2 because of patient/physician preference.

In this study of patients with ischemic stroke and TIA who started receiving statin treatment during their initial hospitalization, we found a high rate of adherence to statin therapy 3 months after hospital discharge. This finding is consistent with results of cardiac studies, which have shown that in-hospital initiation of lipid-lowering treatment is associated with a high rate of subsequent use, and underscores the importance of the recent American Stroke Association advisory recommendation supporting in-hospital statin prescription for patients with strokes of atherosclerotic origin.

We also found that statin implementation in patients with stroke and TIA before hospital discharge was associated with a 35% reduction in LDL-C levels and a substantial improvement in the proportion of patients achieving target national guideline LDL-C goals 3 months after discharge.
hospitalization. Similarly, at follow-up, we noted that the non–HDL-C level, which is a secondary cholesterol goal in persons at high risk of vascular disease, also was reduced significantly.

The level of HDL-C is a risk factor for ischemic stroke independent of LDL-C levels. However, we observed that in-hospital statin initiation had no appreciable effect on increasing HDL-C levels at 3 months. This observation is not surprising because statins are known to have little effectiveness in boosting HDL-C levels. It is noteworthy that the mean baseline and 3-month HDL-C levels in the cohort in our study were higher than 40 mg/dL (1.0 mmol/L), the threshold below which risk of vascular events appears to dramatically increase.

In the 3 months after hospitalization, statin therapy was well maintained, with treatment being discontinued in only 6 (7%) patients, a finding consistent with results of cardiac studies in which hospital-initiation protocols were used and far better than results observed in routine clinical practice.

A major limitation of this study is the lack of a control group of patients who did not receive in-hospital statin treatment. However, results from a recent study in patients discharged from the hospital without lipid-lowering treatment after acute ischemic stroke indicated an increase in LDL-C levels from baseline to 3 months (111 to 131 mg/dL [2.9 to 3.4 mmol/L]). This finding may suggest that the significant reduction in LDL-C levels observed in our study likely was caused by statin initiation. Another limitation of this study is the relatively short follow-up of 3 months. However, because the risk of stroke is highest in the short term after an ischemic event, the short-term adherence rates are clinically relevant.

In conclusion, in-hospital initiation of statins in appropriate patients with stroke and TIA is associated with excellent 3-month treatment adherence rates and frequent achievement of target cholesterol goals.

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