Effect of an Educational Program on the Prevalence of Use of Antiplatelet Drugs, Beta Blockers, Angiotensin-Converting Enzyme Inhibitors, Lipid-Lowering Drugs, and Calcium Channel Blockers Prescribed During Hospitalization and at Hospital Discharge in Patients With Coronary Artery Disease

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Background. There is a marked underutilization of antiplatelet drugs, beta blockers, angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs), and lipid-lowering drugs, and an overutilization of calcium channel blockers in elderly patients with coronary artery disease (CAD).

Methods. An ongoing educational program is being given by Dr. Wilbert Aronow on the appropriate utilization of cardiovascular drugs in patients with CAD during hospitalization and at hospital discharge. In a prospective study, charts of 200 unselected patients hospitalized for CAD at least 6 months after the onset of the educational program were analyzed by a medical resident to investigate the appropriate utilization of cardiovascular drugs. The 200 patients included 115 men and 85 women, mean age 70 years, with documented CAD. Of the 200 patients, 127 (64%) had the diagnosis of prior CAD. The use of cardiovascular medications in these 127 patients prior to hospitalization served as a control group.

Results. After the educational program, aspirin, clopidogrel, or warfarin was given to 93% of patients compared with 67% in the control group; beta blockers were given to 81% of patients compared with 56% in the control group; ACE inhibitors or ARBs were given to 70% of patients compared with 42% in the control group. Lipid-lowering drugs if dyslipidemia were given to 88% of patients compared with 52% in the control group; calcium channel blockers were given to 18% of patients compared with 24% in the control group.

Conclusions. In patients with CAD, the educational program increased the use of antiplatelet drugs by 26%, beta blockers by 25%, ACE inhibitors or ARBs by 28%, and lipid-lowering drugs by 36%, and decreased the use of calcium channel blockers by 6%.

Elderly persons have a high prevalence of coronary artery disease (CAD) and a high incidence of new coronary events (1). Elderly patients with CAD should be treated with aspirin, clopidogrel, or warfarin (2–4), beta blockers (2,3,5–8), angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARBs) (2,3,5,8–10), and lipid-lowering drugs, if necessary, to reduce the serum low-density lipoprotein cholesterol to less than 100 mg/dl (2,3,11–18). Patients with CAD and asymptomatic abnormal left ventricular ejection fraction (LVEF) should be treated with beta blockers and ACE inhibitors (5,19,20). Diabetics with CAD should be treated with ACE inhibitors or ARBs (9,10). The American College of Cardiology (ACC)/American Heart Association (AHA) guidelines also state that there are no Class I indications for the use of calcium channel blockers in the treatment of patients with CAD (2,3).

There is a marked underutilization of aspirin, beta blockers, ACE inhibitors, and lipid-lowering drugs and overutilization of calcium channel blockers in older persons with CAD (21,22). In an educational program that has been ongoing for 18 months, Dr. Wilbert Aronow has emphasized to cardiology fellows, medical residents, and attending physicians at Westchester Medical Center/New York Medical College the importance of using antiplatelet drugs, beta blockers, ACE inhibitors, and lipid-lowering drugs, especially statins, in the treatment of all patients with CAD. He also emphasized that patients with asymptomatic abnormal LVEF should be treated with beta blockers plus ACE inhibitors, that diabetics with CAD should especially be treated with ACE inhibitors or ARBs, and that there are no Class I indications for the use of calcium channel blockers in the treatment of patients with CAD.

We are reporting data from a prospective study with an analysis of 200 charts of patients diagnosed with CAD during hospitalization at Westchester Medical Center/New York Medical College investigating the prevalence of use of aspirin, clopidogrel, or warfarin, beta blockers, ACE
Table 1. Prevalence of Coronary Risk Factors in 200 Patients With Coronary Artery Disease

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>148/200</td>
<td>74</td>
</tr>
<tr>
<td>Smoking</td>
<td>74/200</td>
<td>37</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>74/200</td>
<td>37</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>173/200</td>
<td>87</td>
</tr>
<tr>
<td>Family history</td>
<td>47/200</td>
<td>24</td>
</tr>
<tr>
<td>Prior coronary artery disease</td>
<td>127/200</td>
<td>64</td>
</tr>
<tr>
<td>Abnormal left ventricular ejection fraction</td>
<td>71/175</td>
<td>41</td>
</tr>
</tbody>
</table>

Inhibitors, or ARBS, lipid-lowering drugs in patients with dyslipidemia, and calcium channel blockers during hospitalization and at hospital discharge after at least 6 months of an educational program given by Dr. Aronow. We also investigated the use of beta blockers plus ACE inhibitors in patients with CAD and abnormal LVEF and the use of ACE inhibitors or ARBs in patients with CAD and diabetes mellitus following the educational program.

METHODS

In a prospective study, charts of 200 unselected patients hospitalized for CAD at Westchester Medical Center/New York Medical College at least 6 months after the onset of Dr. Aronow’s educational program were analyzed by a medical resident (S.S.) according to a protocol designed by Dr. Aronow (with the analyzed data shown in Tables 1 through 3) to test the effect of an educational program given by Dr. Aronow on the use of cardiovascular drugs during hospitalization and at hospital discharge in patients with documented CAD. Of the 200 patients, 127 patients (64%) had a prior diagnosis of CAD. The medications used by these 127 patients prior to hospitalization served as the control group (Table 2).

The study population included 115 men and 85 women, mean age 70 ± 15 years (range, 37–92 years). Of the 200 patients, 145 (73%) were white, 8 (4%) were African American, and 47 (24%) were of other races. CAD was diagnosed if the patient had coronary revascularization, coronary angiographic evidence of significant CAD, myocardial infarction, or angina pectoris with evidence of myocardial ischemia.

Dyslipidemia was diagnosed if the patient was on lipid-lowering drug therapy for dyslipidemia or had a fasting serum total cholesterol ≥200 mg/dl, a serum low-density lipoprotein cholesterol >100 mg/dl, or a serum high-density lipoprotein cholesterol <40 mg/dl. An abnormal LVEF was <50%.

The educational program given by Dr. Aronow included medical grand rounds, cardiology grand rounds, frequent lectures to cardiology fellows and medical residents, and discussion of individual patients with cardiology fellows and medical residents on the appropriate use of cardiovascular drugs in the treatment of patients with CAD.

RESULTS

Table 1 shows the prevalence of coronary risk factors in 200 patients with documented CAD. Table 2 shows the prevalence of use of cardiovascular medications prior to hospitalization in 127 patients with a prior history of CAD (the control group). Table 3 shows the prevalence of use of cardiovascular medications during hospitalization and at hospital discharge in 200 patients with documented CAD.

DISCUSSION

These data show a very high prevalence of coronary risk factors in patients with documented CAD that need to be treated including hypertension in 74% of patients, smoking in 37% of patients, diabetes mellitus in 37% of patients, dyslipidemia in 87% of patients, and abnormal LVEF in 41% of patients.

The use of aspirin or clopidogrel or warfarin as recommended by the ACC/AHA guidelines (2,3) in patients with the diagnosis of CAD increased from 67% prior to hospitalization to 93% during hospitalization and at hospital discharge. The use of beta blockers as recommended by the ACC/AHA guidelines (2,3) in patients with the diagnosis of CAD increased from 56% prior to hospitalization to 81% during hospitalization and at hospital discharge. The use of ACE inhibitors or ARBs as recommended by the ACC/AHA guidelines (2,3) in patients with the diagnosis of CAD increased from 42% prior to hospitalization to 70% during hospitalization and at hospital discharge. The use of lipid-lowering drugs in patients with dyslipidemia as recommended by the ACC/AHA guidelines (2,3) by the Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (11) in patients with the diagnosis of CAD increased from 52% prior to hospitalization to 88% during hospitalization and at hospital discharge.

Patients with CAD and abnormal LVEF should be treated with beta blockers plus ACE inhibitors (5,19,20). In patients with CAD and abnormal LVEF, beta blockers were administered to 92% of patients and ACE inhibitors or ARBs to 89% of patients during hospitalization and at hospital discharge.

Patients with CAD and diabetes mellitus should be treated with ACE inhibitors (9) or ARBs (10). ACE inhibitors or ARBs were administered to 81% of patients with CAD and diabetes mellitus during hospitalization and at hospital discharge.

The ACC/AHA guidelines state that there are no Class I indications for the use of calcium channel blockers in the treatment of patients with CAD (2,3). The use of calcium channel blockers decreased in patients with CAD from 24%...
prior to hospitalization to 18% during hospitalization and at hospital discharge.

These data obtained from an analysis of 200 randomly selected charts of patients with CAD documented during hospitalization at Westchester Medical Center/New York Medical College show that appropriate utilization of cardiovascular drugs in patients with CAD can be achieved in the vast majority of patients in an academic medical center through a systematic educational program.

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**REFERENCES**


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