Effect of Patients' Awareness of CVD Risk Factors on Health-Related Behaviors

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Objectives: In 2010, the American Heart Association unveiled a strategic plan to reduce cardiovascular deaths by targeting seven components of ideal cardiovascular health. Although education is a sensible first step, it is not known whether awareness correlates with healthy behavior. The objective of the study was to examine the association between awareness of risk factors and ideal cardiovascular health behavior.

Methods: We surveyed patients 40 years and older at five ambulatory clinics. The survey measured demographics, health management behaviors, comorbidities, and awareness of five modifiable cardiac risk factors (smoking, obesity, high cholesterol, hypertension and diabetes mellitus) and one protective factor (exercise). Healthy behavior was defined as follows: diabetes, hemoglobin A1c <8.0%; hypertension, systolic blood pressure <140 mm Hg), high cholesterol, medication adherence; obesity, attempting to lose weight; smoking, abstinence; and exercise, ≥30 minutes/day, ≥3 times per week.

Results: For five modifiable risk factors, awareness was positively associated with healthy behavior in multivariable models: obesity, hypertension, exercise, cholesterol, and diabetes. Awareness was inversely associated with smoking abstention.

Conclusions: Awareness that a specific factor increases the risk for cardiovascular disease was positively associated with healthy behavior regarding most risk factors; however, the association was modest, suggesting that awareness alone does not motivate behavior.

Key Words: behavior, cardiovascular risk factors, primary care, survey

Approximately 15.8 million Americans 20 years old and older have cardiovascular disease (CVD), and it is the leading cause of death in the United States.[1] In 2010, the American Heart Association announced a strategic plan to reduce CVD-related deaths 20% by 2020 by targeting seven components of ideal cardiovascular health. These components include three health behaviors (abstinence from smoking, exercise, and fruit/vegetable consumption) and four clinical measures (ideal body mass index, cholesterol, blood pressure, and blood glucose).[2]

Awareness of one's risk for CVD is a necessary first step for proactive risk reduction; however, little is known about the association between awareness of specific risk factors and healthy behavior regarding those risk factors. Previously we examined awareness of these seven factors in a demographically heterogeneous adult clinical sample and found that patients who reported comorbid diabetes mellitus (DM), hypertension (HTN), or high cholesterol (HCL) were significantly more likely than patients without these conditions to identify their respective condition as a risk for CVD.[3] We examine whether awareness that one has a modifiable risk factor correlates with healthy behavior regarding that risk factor. Such information should be helpful to inform education and outreach strategies in high-risk adult patients. We hypothesized that awareness would be associated positively with adherence.

Methods

The survey methodology was described previously.[3] From March 2009 to August 2009, we administered the

Key Points
- The patients were aware of most cardiac risk factors.
- Awareness of a risk factor was associated with slightly better control.
- Knowledge of the risk factors was most strongly associated with regular exercise and attempts to lose weight.

written Health Attitudes Survey (see online appendix at http://links.lww.com/SMJ/A20) to a convenience sample of patients 40 years old and older at five clinical sites that serve a heterogeneous population. The clinic staff distributed the anonymous survey to consecutive patients at check in, as permitted by clinic patient flow. No incentives were provided and no attempt was made to characterize the patients who did not participate in the survey or did not return it. Baystate Health System's institutional review board approved the study protocol.

The survey, available in English and Spanish, measured demographics (age, race, sex, and education) and the presence of the following comorbidities: HTN, DM, HCL, and obesity. Patients who indicated having one of the comorbidities were asked to indicate their behavior regarding that risk factor by indicating a value (for HTN and DM) and indicate whether they were taking medication (for cholesterol) or attempting to lose weight (for obesity). We asked all of the patients to indicate current and past smoking status and whether they engaged in regular exercise. Finally, patients were asked whether each of the risk factors (smoking, obesity, HCL, HTN, DM, and exercise) increased or decreased their risk of having a heart attack.

Statistical Analysis

The outcomes of interest were healthy behavior regarding each risk factor defined as follows: glycated hemoglobin of <8% among patients with comorbid DM, systolic blood pressure of <140 mm Hg among patients with comorbid HTM, adherence to statin regimen among patients with comorbid HCL, attempts to lose weight among patients with comorbid obesity, 12-month smoking abstinence among all of the patients, and exercising ≥30 minutes/day ≥3 times per week among all of the patients. For each outcome, patients were dichotomized as reporting healthy behavior or not. Multivariable logistic regression was used to calculate the relative odds of healthy behavior as a function of awareness, adjusting for age, sex, race, and education. Estimated probabilities from multivariable models were then averaged over exposure groups to yield adjusted proportions; 95% confidence intervals were estimated using the delta method.[4] All of the analyses were conducted in STATA version 12.1 (StataCorp, College Station, TX).

Results

Of the 2200 surveys distributed, 1702 (77%) were returned and 1526 (90%) had sufficient data for multivariable analysis. The overall response rate was 69%, and the overall characteristics of the sample are summarized in the Table.

Awareness was highest among patients with HCL, with 84% identifying HCL as a risk factor. Awareness was lowest for exercise, with only 59% of all patients recognizing that exercise could reduce the risk of a heart attack. Healthy behavior by awareness status for each risk factor is displayed in Fig. 1. With the exception of cigarette smoking, awareness of a risk

Table. Characteristics of respondents (n = 1526, unless otherwise specified)

Characteristic	N (%)
Age, y	
40–49	472 (31)
50–59	467 (31)
60–69	326 (21)
≥70	261 (17)
Female	938 (62)
Married	747/1493 (50)
Education	
<High school	342 (22)
High school graduate	522 (34)
Some college	394 (26)
≥College	268 (18)
Clinics (5 total)	
Middle class/suburban (2)	531 (36)
Urban (2)	718 (49)
Cardiology practice (1)	223 (15)
Race/ethnicity	
White	872 (57)
Hispanic	415 (27)
Black	185 (12)
Other	54 (4)
Comorbid condition	
Obese (BMI ≥30 kg/m^2)	469/1189 (39)
Smoked within 12 months	321/1403 (23)
Ever told coronary heart disease	115 (8)
Ever told high cholesterol	578 (38)
Ever told hypertension	754 (49)
Ever told diabetes mellitus	364 (24)

BMI, body mass index.

factor's link to CVD was positively associated with healthier behaviors, with absolute awareness-related effects ranging from 3% (glycated hemoglobin <8.0 in patients with DM) to 10% (attempts to lose weight in obese patients). The association reached statistical significance for exercise only, whereas it approached significance for obesity ($P = 0.10$).

Of the 1526 patients available for analysis, 196 (13%) indicated they had CVD. Overall, healthy behavior, particularly in patients taking cholesterol medication, was slightly more common for patients with known CVD, but the differences were not statistically significant. Fig. 2 displays unadjusted and adjusted proportions for behavior regarding specific risk factors in patients who identified themselves as having CVD. In most cases, awareness was only modestly associated with healthy behavior in this subgroup; however, the effect of awareness appears to be strengthened on attempts to lose weight by obese patients. An inverse association was noted between awareness and systolic blood pressure <140 mm Hg. None of these associations was
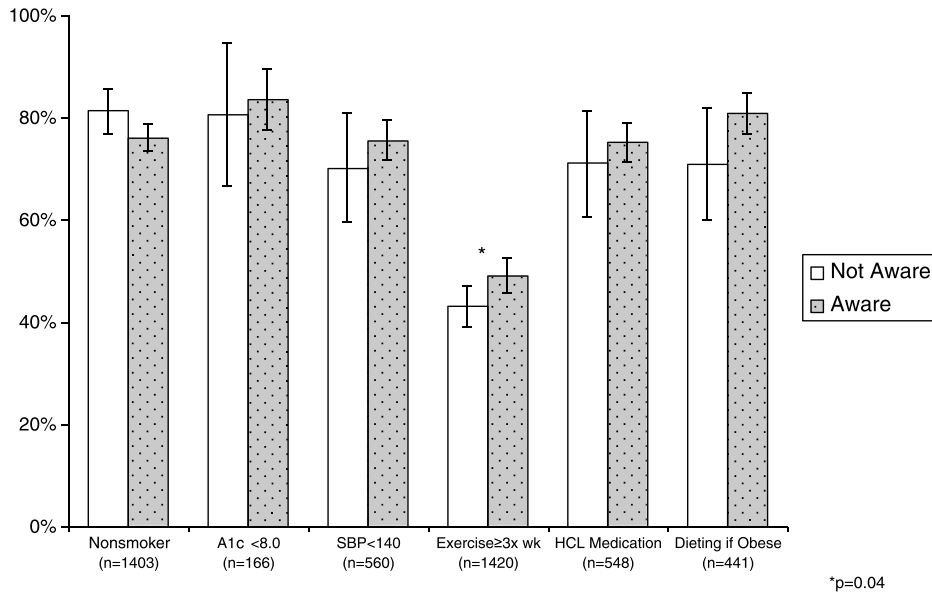
Fig. 1. Proportion in control as a function of knowledge. Proportions are adjusted for age, sex, education, and race (white vs other). A1c, glycated hemoglobin; HCL, high cholesterol; SBP, systolic blood pressure.

statistically significant; however, the study was underpowered to detect differences of this magnitude.

Discussion

In this study of general medical patients in an ambulatory setting, we found that awareness of modifiable cardiac risk factors may be associated with healthier behavior regarding those risk factors; however, most effect sizes were small and the few differences observed were statistically significant. Patients with known CVD were more likely to take medication to lower their cholesterol, but awareness of risk factors had little association with healthy behavior in this group.

According to the Health Belief Model, an individual must perceive his or her health to be at risk or be susceptible to risk to take preventive action.[5] The general awareness of certain CVD risk factors may not be enough to create change because of several intermediate recognition points that are required, including perception of severity, perception of benefits, calls to action, and self-efficacy. Additional factors affecting the ability to change behavior include personality, values, ethnicity, socioeconomic status, family responsibilities, quality of life, cognitive function, and other comorbidities.[6–9]

Several studies have examined risk factors in the setting of an educational intervention. The Study to Help Improve Early Evaluation and Management of Risk Factors Leading to
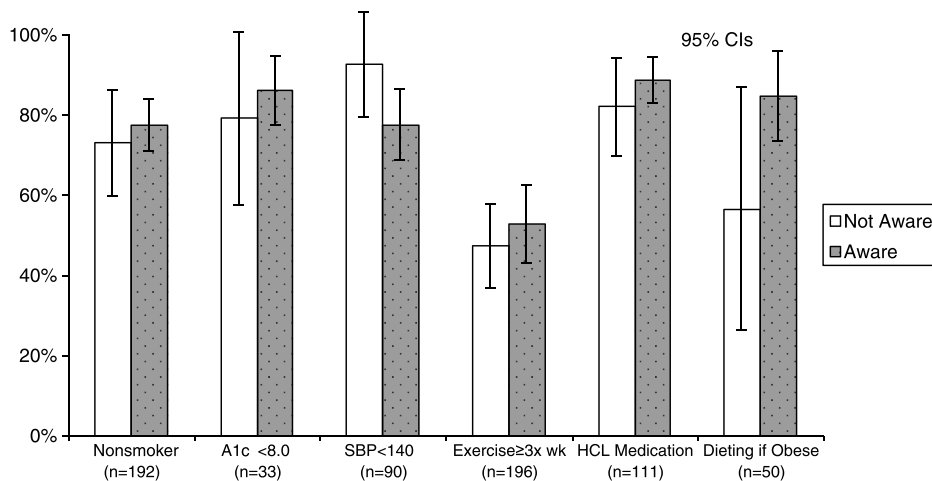

Fig. 2. Proportion in control as a function of knowledge in patients with cardiovascular disease. Proportions are adjusted for age, sex, education, and race (white vs other). A1c, glycated hemoglobin; HCL, high cholesterol; SBP, systolic blood pressure.

Diabetes (SHIELD) study found that among patients with diabetes or who were at risk for diabetes, most knew that diet and exercise could reduce the risk, but relatively few participated in these activities.[9] Those who saw a dietitian or health educator were more likely to make healthy diet choices but less likely to exercise than those who did not see a dietitian or educator. No direct attempt was made to correlate awareness with behavior. Kaczorowski et al studied the effect of volunteer-run cardiovascular risk assessment and education sessions held in community-based pharmacies for adults 65 years old and older and found that those who were randomized to participate in the program had fewer hospital admissions for cardiovascular-related disease; however, neither risk factor awareness nor behaviors were directly assessed.[10] We are not aware of any studies that have addressed the impact of awareness of all cardiovascular risk factors in a single population.

We found that all of the relations between awareness of the influence of a specific factor on CVD and healthy behavior regarding that risk factor effect were modest, with a <10% difference between those who were aware and those who were unaware. For most risk factors, healthy behaviors were exhibited by >75% of patients, leaving little room for improvement with awareness. Compared with past studies,[11] our rates of control for HTN were higher than expected. Because our sample consisted of patients seen in a physician's office, their adherence may have been higher than in the general population. One area in which both groups reported poor behavior was regular exercise. Even among patients with known CVD, the proportion who exercised at least three times per week was >50%. Because awareness rates for exercise were low, this risk factor would appear to offer the greatest opportunity for improvement. Unfortunately, the effects of awareness on exercise were generally modest (5%–6%), implying that merely imparting awareness would not be sufficient to reverse a sedentary lifestyle.

The strengths of our study include its relatively large, demographically diverse sample recruited from an outpatient setting and its anonymous nature, which reduces the likelihood of response bias. The weaknesses include its cross-sectional nature, which precludes causal inference, its reliance on a single geographical region, and our inability to verify self-reported information or characterize the patients who declined participation. For most comparisons, our study was powered to detect a difference of 20%; however, for a few comparisons, statistical power was low. For example, we examined only 79 diabetic patients with CVD, giving us power to detect only large differences (≥36%) in this specific subgroup. Despite these limitations, this study is among the first to elucidate the mediating effects of awareness on overall CVD risk reduction in a single population. We found that healthy behavior was common regarding those risk factors that did not require lifestyle changes and that awareness had little or no effect on behavior regarding these risk factors. For risk factors that required patients to change their lifestyle, both regular exercise and attempts to lose weight were correlated with awareness of the dangers of a sedentary lifestyle and obesity; however, the effect was modest so educational efforts alone may have limited effects on healthy behavior. Future studies should explore other ways to improve patient adherence to lifestyle modifications.

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