

Diagnoses, Symptoms, and Attribution of Symptoms among Black and White Inpatients Admitted for Coronary Heart Disease

ABSTRACT

Objectives. This study examined health care-seeking behaviors to elucidate factors that contribute to differences in patterns of coronary heart disease between African Americans and Whites. The prevalence of diagnosed coronary heart disease, patients' perceptions of symptoms and attribution of symptoms, and predictors of painful symptoms and attribution of cardiac symptoms were examined.

Methods. The study involved 2416 patients admitted with diagnoses of coronary artery disease, ischemic heart disease, or myocardial infarction or to rule out myocardial infarction. Structured interview questions were used to obtain demographic information, symptoms precipitating admission, and patients' attribution of their symptoms. Discharge diagnoses were obtained from hospital records.

Results. Acute myocardial infarction, unstable angina, nonacute ischemic heart disease, and atherosclerosis were more frequent in White patients. For Blacks, the odds of reporting painful symptoms were only 64% of the odds found for Whites when other factors were controlled, and the odds of attributing symptoms to cardiac origins were almost 50% lower for Blacks than for Whites.

Conclusions. The tendency of Blacks to report fewer painful symptoms and to attribute their symptoms to noncardiac origins may contribute to differences in care-seeking and in medical management of heart disease in Blacks. (*Am J Public Health.* 1994;84:951-956)

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Introduction

Coronary heart disease mortality rates for Blacks exceed those of Whites for persons aged 25 through 64 years.¹⁻⁴ These differences have led working groups⁵ and others^{2,3} to call for investigations of factors affecting coronary heart disease in Blacks, particularly individual and environmental factors related to patterns of coronary heart disease that affect care-seeking behavior.⁶⁻⁹ Prominent among factors hypothesized to affect health care-seeking behavior are the patient's perception of symptoms and attributions made concerning the cause of these symptoms.¹⁰

As part of a larger project that addresses differences between Black and White patients and community respondents in seeking health care for coronary heart disease (the Birmingham-Black Health Seeking for Coronary Heart Disease Project), we interviewed patients who had been admitted to the hospital for known or suspected cardiac events. The purpose of this paper is to describe the symptoms that were reported by these patients, the frequency of coronary heart disease diagnoses, and relationships between these symptoms and patients' attribution of symptoms.

Methods

Patient Selection

In 1989 and 1990, hospital inpatients were interviewed in three counties in Alabama: Jefferson County, within which Birmingham is located; St. Clair County; and Talladega County. Patients were recruited from five hospitals located in these counties: the University of Alabama

Hospital, a large teaching hospital in Birmingham; the Department of Veterans Affairs Medical Center in Birmingham; Cooper Green Hospital, a county hospital for the medically indigent in Birmingham; St. Clair County Hospital, a private hospital serving a rural county; and Coosa Valley Hospital, a private hospital located in Talladega County, also a rural county. Patients approached for interview were those diagnosed with coronary artery disease, ischemic heart disease, chest pain, or myocardial infarction or those admitted to rule out myocardial infarction. Only patients who identified themselves as White or Black completed interviews. Of the patients who were approached, 31 (1.3% of the final sample) refused to be interviewed, and 156 patients terminated the interview prior to completion for various reasons. Of the patients approached, 92.3% completed the interview. The number of participants interviewed was as follows: 1140 White men, 347 Black men, 574 White women, and 355 Black women.

Interview and Data Collection Methods

All interviews were conducted by trained and certified interviewers who underwent periodic retraining to ensure consistency in interview methods. Re-

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TABLE 1—Characteristics of Entire Inpatient Sample

	Men			Women		
	White (n = 1140)	Black (n = 347)	P	White (n = 574)	Black (n = 355)	P
Mean age, y (SE)	60.4 (11.0)	57.5 (12.9)	<.001	63.4 (12.5)	61.1 (13.9)	.032
Mean education, y (SE)	11.5 (3.7)	10.1 (5.9)	<.001	10.6 (3.2)	9.5 (3.5)	<.001
Married/living as married, %	83.6	53.5	<.001	52.2	22.6	<.001
Working full or part time, %	37.5	37.1	.888	22.3	21.1	.681
Hypertensive, %	18.4	35.6	<.001	17.8	39.1	<.001
Smokers, %	66.2	54.9	<.001	72.9	76.8	.189
Hypercholesterolemic, %	32.4	21.8	<.001	35.6	26.6	.005
Diabetic, %	3.7	2.9	.476	5.4	2.3	.023
Positive family history of CHD, %	69.3	44.0	<.001	77.9	62.0	<.001
Personal history of CHD diagnosis, %	66.3	49.4	<.001	56.2	57.9	.617
Particular usual care facility, %	88.4	79.9	<.001	89.9	81.1	<.001
Privately insured, %	44.1	35.1	.003	29.0	17.1	<.001
Medicaid insured, %	3.0	10.1	<.001	10.4	24.3	<.001
Medicare insured %	32.2	26.7	.054	31.7	35.1	.277

Note. CHD = coronary heart disease.

search interviews were conducted in the rooms of willing hospital inpatients. The interviews asked for demographic information, the symptoms that precipitated admission, and attributions for these symptoms at the time they occurred. In addition to the structured interview, discharge diagnoses were obtained from hospital medical records.

Statistical Analyses

Participants were stratified by sex and initial comparisons were conducted for key demographic characteristics between races. Chi-square analyses were used to address differences between racial groups in the frequency distributions obtained from demographic and other key questionnaire items. Frequencies of diagnostic category groupings were compared for racial groups. Perceived symptoms and attributions of symptoms were then examined for differences between Blacks and Whites by sex with chi-square analyses. To ensure that results were similar for the entire patient sample and patients with definite coronary heart disease (*International Classification of Diseases*, ninth revision¹¹ [ICD-9] diagnoses 410–414), analyses were completed for both sets of patients. Because chest pain is the primary symptom associated with coronary heart disease and either chest pain or pain

in other areas might motivate patients to seek treatment, we were interested in assessing the factors that were associated with painful symptoms and attribution of symptoms to cardiac origins. Attribution of symptoms was thus examined for the entire patient sample. Multiple logistic regression analyses were used to examine the relationship of selected demographic characteristics to painful symptoms and attribution of symptoms to cardiac origins. Like the symptom and attribution analyses, these multiple logistic regression analyses were completed both for the entire patient sample and separately for the patients with coronary heart disease (ICD-9 diagnoses 410–414) and those in other diagnostic groups.

Results

Participant Characteristics

Characteristics of respondents are summarized in Table 1. A total of 1487 men (1140 Whites and 347 Blacks) and 929 women (574 Whites and 355 Blacks) were interviewed. Of the entire sample, 29.1% were Black and 38.5% were women. While the ratio of White male inpatients to White female inpatients was almost 2 to 1, the numbers of black Male and Female inpatients were comparable.

White participants were older and more educated than their Black counterparts. Fewer Blacks than Whites were married or living as married. Comparable numbers of Whites and Blacks within each sex group reported working full or part time. Differences between the racial groups emerged in self-reported risk factors. Hypertension was reported almost twice as often by Black respondents as by Whites. A higher percentage of White than Black men smoked, and more Whites than Blacks of both sexes reported being hypercholesterolemic. Diabetes was reported very infrequently in all groups. More White than Black respondents reported a positive family history of heart disease. Comparable percentages of Black and White women reported having a history of a coronary heart disease diagnosis, but a lower percentage of Black men than White men reported a previous coronary heart disease diagnosis. Although more than 80% of the entire sample reported having a usual source of care, more Whites than Blacks reported having a usual care source. A higher percentage of White than Black respondents were covered by private insurance, although less than half of the entire sample (less than a third for women) was privately insured. Medicaid coverage was greater among both Black men and women than among Whites. However, despite the Medicare and Medicaid coverage, approximately twice as many Blacks as Whites were uninsured.

Frequency of Coronary Heart Disease Diagnoses

Table 2 summarizes the frequency of discharge diagnoses by sex and racial groups. White men and women were more likely than their Black counterparts to have diagnoses of acute myocardial infarction and unstable angina (ICD-9 diagnoses 410–411) and nonacute ischemic heart disease and atherosclerosis (ICD-9 diagnoses 412–414). Black men and women were more likely than Whites to have other forms of heart disease (ICD-9 diagnoses 420–429) and to not have any cardiac diagnosis.

Symptom Perception and Attribution

Table 3 describes the symptoms that precipitated hospital admission for the entire sample of patients and for those patients who had diagnoses of myocardial infarction, ischemic heart disease, or

atherosclerosis (ICD-9 diagnoses 410-414). In the entire sample, Whites reported more arm pain and numbness than Blacks. When all painful symptom categories were collapsed to examine patients who reported any painful symptom, White men were found to report more overall painful symptoms than Black men (75% vs 68%). The data for women showed similar trends (76% vs 70%), suggesting that White women also experienced more painful symptoms than their Black counterparts. The number of patients reporting any nonpainful symptom, obtained from collapsing across all nonpainful symptom categories, revealed that Blacks reported more nonpainful symptoms than Whites. Restricting the analysis to patients with coronary heart disease diagnoses revealed somewhat different results. More than twice as many White men as Black men reported arm pain and numbness. There were no differences in painful symptom reports between racial groups for women, and neither sex showed differences between racial groups when all of the painful symptom categories were collapsed. Black female coronary heart disease patients reported more overall nonpainful symptoms than did White female coronary heart disease patients, as was true for the entire patient sample, but men reported no overall differences in nonpainful symptoms. Very few patients reported no symptoms associated with their admission.

Table 4 displays the initial attributions that patients made for their symptoms. About one quarter of the White men in the entire sample attributed their symptoms to heart attack and one quarter to angina, and these proportions remained when only the coronary heart disease patients were considered. However, fewer Black men in the entire patient sample attributed their symptoms to heart attack, and fewer Black men in both patient groups thought that their symptoms were due to angina. In the entire patient sample, but not in the coronary heart disease patient sample, Black men were more likely than Whites to attribute symptoms to causes that are not listed in Table 4. For women in the entire patient sample, differences between racial groups in attribution of symptoms to myocardial infarction and angina were similar to those found for the men. However, Black and White women in the coronary heart disease sample did not differ in their attribution of symptoms to myocardial infarction and angina.

TABLE 2—Frequency of Discharge Diagnoses, by Race and Sex

Diagnosis	Men			Women		
	White	Black	P	White	Black	P
Acute myocardial infarction and unstable angina, ^a %	41.8	31.2	.17	48.5	26.0	<.001
Nonacute ischemic heart disease and atherosclerosis, ^b %	79.4	48.2	<.001	69.9	40.8	<.001
Heart disease, other forms, ^c %	48.5	60.1	<.001	58.0	76.4	<.001
No cardiac diagnosis, %	9.3	22.3	<.001	9.6	21.6	<.001

Note. Categories are not exclusive; therefore, columns add to more than 100%.

^aInternational Classification of Diseases, Ninth Revision (ICD-9), codes 410-411.

^bICD-9 codes 412-414.

^cICD-9 codes 420-429.

TABLE 3—Percentage Distribution of Symptoms Precipitating Admission, by Sex and Race

Symptom	Men			Women		
	White	Black	P	White	Black	P
Entire patient sample						
Chest pain/discomfort	70.7	67.3	.242	72.8	67.4	.084
Arm pain/numbness	19.8	9.5	<.001	22.7	15.4	.008
Back pain	3.0	3.5	.634	6.5	3.4	.046
Neck/jaw/ear pain	3.3	1.5	.068	4.7	2.9	.171
Any painful symptoms	74.6	67.9	.015	75.7	70.3	.073
Sweating	8.9	10.7	.312	6.7	10.6	.037
Unconsciousness	1.9	3.8	.044	1.3	3.1	.048
Shortness of breath	26.1	29.2	.261	29.7	38.9	.005
Nausea/vomiting	8.5	11.0	.166	11.2	14.0	.206
Indigestion/fullness	3.3	6.4	.012	3.4	6.0	.066
Other symptoms	30.0	32.1	.459	30.3	32.9	.414
Any nonpainful symptoms	48.6	57.5	.004	51.5	65.7	<.001
No symptoms	2.2	3.5	.169	2.9	1.4	.157
Coronary heart disease patients^a						
Chest pain/discomfort	74.1	78.9	.252	75.0	76.3	.795
Arm pain/numbness	22.1	10.2	.002	24.3	17.2	.159
Back pain	2.5	3.9	.370	6.6	8.6	.521
Neck/jaw/ear pain	3.4	0.8	.155	5.5	4.3	.791
Any painful symptoms	78.2	78.9	.866	77.9	79.6	.742
Sweating	8.5	15.6	.013	7.0	11.8	.142
Unconsciousness	1.2	1.6	.664	0.0	1.1	.255
Shortness of breath	24.3	23.4	.841	23.2	30.1	.181
Nausea/vomiting	8.2	16.4	.054	13.2	15.1	.660
Indigestion/fullness	3.7	7.8	.035	3.7	8.6	.058
Other symptoms	26.9	19.5	.080	26.1	22.6	.499
Any nonpainful symptoms	46.8	51.6	.319	45.2	57.0	.050
No symptoms	2.2	4.7	.105	2.6	1.1	.685

Note. Categories are not exclusive; therefore, columns add to more than 100%.

^aInternational Classification of Diseases, Ninth Revision, codes 410-414.

We also examined separately the attributions made by those patients who reported having chest pain as a symptom, and the findings were very similar to those for the entire patient sample. Black patients were less likely than Whites to attribute their chest pain to cardiac

origins (40.9% vs 61.0% for Black and White men, respectively, $P < .001$; 48.7% vs 57.7% for Black and White women, respectively, $P = .028$). Attribution of chest pain symptoms to indigestion, heartburn, or stomach or esophageal problems was also more common among Black than

TABLE 4—Attribution of Symptoms (%), by Sex and Race

Attribution	Men			Women		
	White	Black	P	White	Black	P
Entire patient sample						
Heart attack or MI	27.5	18.7	.001	21.9	21.7	.936
Angina or heart pain	24.2	12.6	<.001	26.3	17.1	.001
Cardiac origin ^a	51.8	31.3	<.001	48.2	38.9	.006
Flu or other illness	1.8	2.9	.215	2.2	2.9	.506
Indigestion/heartburn, stomach or esophageal problem	11.7	18.7	.001	10.3	15.1	.028
Muscle pain	1.4	0.9	.588	1.6	0.6	.219
Breathing or lung problem	2.1	3.7	.079	2.2	6.0	.003
Liver problem	0	0	...	0	0	...
Gall bladder problem	0.2	0	...	0.4	0.3	.999
Other	24.4	34.8	<.001	29.3	30.6	.688
Coronary heart disease patients^b						
Heart attack or MI	27.7	22.7	.243	23.2	26.9	.469
Angina or heart pain	24.1	11.7	.002	26.5	25.8	.900
Cardiac origin ^a	51.8	34.4	<.001	49.6	52.7	.611
Flu or other illness	1.5	3.1	.255	0.7	0	...
Indigestion/heartburn, stomach or esophageal problem	13.4	27.3	<.001	11.0	17.2	.121
Muscle pain	1.6	0.8	.703	1.5	1.1	.999
Breathing or lung problem	2.1	0.8	.487	1.8	1.1	.999
Liver problem	0	0	...	0	0	...
Gall bladder problem	1.3	0	...	0.4	0	...
Other	23.8	27.3	.395	29.0	23.7	.316

^aReflects attribution to either myocardial infarction (MI) or angina.

^bInternational Classification of Diseases, Ninth Revision, codes 410–414.

White patients (22.6% vs 13.6% for Black and White men, respectively, $P = .001$; 18.6% vs 11.4% for Black and White women, respectively, $P = .011$).

Predictors of Chest Pain and Attribution of Symptoms to Cardiac Origins

Results of the multiple logistic regression analyses for predictors of painful symptoms and attribution of symptoms to cardiac origins are summarized in Table 5. Factors associated with the report of painful symptoms were being White, having a coronary heart disease diagnosis, smoking, not having a positive family history of coronary heart disease, having a particular usual care facility, having private insurance, and having Medicare insurance. To examine further the influence of diagnosis on painful symptom prediction, we conducted additional multiple logistic regression analyses with different diagnostic group classifications (ICD-9 diagnoses 410–411 and 410–429) coded in the coronary heart disease diagnosis variable of our model. The results of these analyses confirm the significant independent contributions of race and having a particular usual care facility.

Factors associated with attributing symptoms to cardiac origins were being White, having a coronary heart disease diagnosis, being more educated, having previously been diagnosed as having coronary heart disease, and having a particular usual care facility. Repeated analyses with our different diagnostic group classifications (ICD-9 diagnoses 410–411 and 410–429) coded in the coronary heart disease diagnosis variable of our model similarly suggested that race is an independent predictor of attribution of symptoms to coronary heart disease origins.

Discussion

The experience of painful symptoms and the attribution of symptoms to cardiac origins are two factors that presumably affect treatment seeking and possibly influence medical management. As in previous studies,^{12,13} the African-American patients in our sample were younger than the White patients. Self-reported risk factor differences emerged between Whites and Blacks in our sample. Black men and women were twice as likely as their White counterparts to be hypertensive. Whites reported higher rates of hypercholesterolemia and family history of heart disease. Differences in access to

TABLE 5—Summary of Multiple Logistic Regression Analyses for Predictors of Painful Symptoms and Attribution of Symptoms to Cardiac Origins, by Sex and Race, Entire Patient Sample

Variable	Painful Symptoms		Attribution to Cardiac Origins	
	OR	95% CI	OR	95% CI
Race: Black	0.635*	0.506, 0.798	0.548**	0.441, 0.681
Sex: female	1.058	0.863, 1.296	1.086	0.893, 1.320
CHD discharge diagnosis ^a	1.487*	1.236, 1.790	1.231**	1.030, 1.473
Age	1.009	0.999, 1.019	0.997	0.988, 1.007
Education	1.014	0.991, 1.038	1.029**	1.004, 1.053
Married status	1.131	0.913, 1.400	0.983	0.801, 1.206
Employment	1.202	0.945, 1.529	0.912	0.722, 1.151
Hypertension	1.078	0.855, 1.358	1.213	0.969, 1.518
Smoking	1.230*	1.002, 1.510	1.164	0.954, 1.418
Hypercholesterolemia	1.017	0.819, 1.262	1.112	0.904, 1.367
Diabetes	0.878	0.540, 1.427	0.830	0.522, 1.318
Positive family history of CHD	0.708*	0.582, 0.862	1.024	0.846, 1.240
Personal history of CHD diagnosis	0.927	0.769, 1.118	2.522**	2.100, 3.029
Particular usual care facility	1.952*	1.610, 2.365	1.381**	1.143, 1.668
Private insurance	1.360**	1.051, 1.759	0.912	0.713, 1.165
Medicare insurance	1.296**	1.001, 1.678	1.137	0.891, 1.451
Medicaid insurance	1.287	0.883, 1.873	0.881	0.622, 1.250

Note. OR = odds ratio; CI = confidence interval; CHD = coronary heart disease.

^aInternational Classification of Diseases, Ninth Revision, codes 410–414.

* $P < .001$; ** $P < .05$.

care also emerged between racial groups. More Whites than Blacks reported that they had a particular source of usual care. The economic advantage of the White patients was also reflected in rates of insurance coverage.

We found that Whites were more likely to have discharge diagnoses of acute myocardial infarction and unstable angina (ICD-9 diagnoses 410–411) and nonacute ischemic heart disease and atherosclerosis (ICD-9 diagnoses 412–414) and that Blacks were more likely to have discharge diagnoses of other forms of heart disease (ICD-9 diagnoses 420–429) and not to have cardiac diagnoses. This finding that coronary heart disease is less common among Blacks than whites, at least among those seen as inpatients, is similar to findings from the Coronary Artery Surgery Study¹⁴ and the Myocardial Infarction Triage and Intervention study.¹²

Symptoms associated with hospital admission also differed between Whites and Blacks. In our overall patient sample, Whites of both sexes reported experiencing slightly more arm pain and numbness than did Blacks. Overall, White men reported more painful symptoms than Black men. More nonpainful symptoms were reported by Blacks than Whites of both sexes. Thus, the symptom patterns of Whites and Blacks seem to differ in a sample of patients admitted for suspected coronary heart disease. Although similar percentages of Whites and Blacks within each sex group experienced the primary symptom of heart disease, that is, chest pain or discomfort, the overall symptom pattern suggests that more nonpainful symptoms may be reported by Blacks than by Whites. The effect of these nonpainful symptom reports on medical decision making is not addressed by our data; however, one might speculate that patients' reports of painful symptoms would influence medical decision making to at least some degree. Conversely, the lack of classic symptoms can also affect medical decision making and the diagnostic workup.

Restricting our symptom analysis to patients with acute diagnoses of coronary heart disease (ICD-9 diagnoses 410–414) produced somewhat different results. Generally, both Blacks and Whites with coronary heart disease reported similar symptoms, although some differences persisted. Significantly fewer painful symptoms and more nonpainful symptoms were reported by Black patients.

In addition to differences between Whites and Blacks in the perception of

symptoms, we found differences in attribution of symptoms. Approximately half of the White men and women in our overall patient sample had attributed their symptoms to cardiac origins, whereas fewer than one third of Black men and slightly more than one third of Black women had thought that their symptoms were related to their hearts. Correspondingly, Blacks were more likely to attribute their symptoms to a host of other origins. Restricting our analysis to patients with acute coronary heart disease diagnoses revealed similar differences in attribution for male patients; for women, however, the pattern of symptom attribution was similar for Blacks and Whites. Analyses of data for only those patients who reported chest pain showed that again, Blacks less commonly attributed their symptoms to cardiac origins and more commonly attributed them to noncardiac origins. These differences in attribution may influence the care-seeking behavior of patients, which, in turn, may influence medical decision making that is associated with patients' perceptions of their symptoms. Since the patients we studied are the patients who made it to the hospital, several key questions remain. In addition to the selective nature of our inpatient sample, selective attrition due to factors such as sudden death may have biased our results.

As the results of the multiple logistic regression analyses emphasize, race was independently associated with both perception of painful symptoms and attribution of symptoms to cardiac origins. For Blacks, the odds of reporting painful symptoms were only 64% of the odds found for Whites when other factors were controlled, and the odds of attributing symptoms to cardiac origins were almost 50% lower for Blacks than for Whites. It is possible that ethnic background may account for differences in symptom perception and attribution in a number of different ways. First, it may be that there are physiological mechanisms that result in lower rates of perceived pain. Second, cultural and ethnic background may be associated with pain tolerance.¹³ Berkavovic and Telesky suggest that a historical stoic response to illness may persist among Blacks.¹⁵ This and other cultural factors may affect the perception of symptoms.¹⁶ Finally, reports indicate that Blacks are less knowledgeable than Whites about heart disease symptoms,¹⁷ suggesting that they may be less aware of heart disease, less alert to painful symptoms, and less likely to attribute symptoms to

cardiac origins. Alternatively, these reports may reflect differences between Blacks and Whites in the presentation of cardiac disease.

In addition to race, our multiple logistic regression analyses found other variables that were associated with painful symptoms. The association of diagnosis with painful symptom reports is as might be predicted: patients with coronary heart disease discharge diagnoses were more likely to report painful symptoms. Several other relationships also emerged, although these relationships were not consistent across models. Smoking was the only risk factor associated with painful symptom reports, and having a family history of heart disease was associated with not having painful symptoms. Having a particular usual care facility was associated with having painful symptoms in all of the multiple logistic regression analyses. Whether or not a person has a particular usual care facility would not seem to directly affect the experience of cardiac symptoms, although it is possible that persons who have more overt symptoms, including pain, are more likely to seek out a usual care provider. Alternatively and perhaps more likely, it may be that persons who seek primary care are those who do not deny their symptoms and are therefore more likely to report painful symptoms when they occur. Patients with private insurance and Medicare insurance were more likely than their uninsured counterparts to have painful symptoms, again possibly reflecting either the seeking of insurance coverage for those experiencing pain or less denial about pain among those privately insured.

Like reports of painful symptoms, diagnosis was associated with attribution of symptoms to cardiac origins. As one might expect, patients with coronary heart disease diagnoses, whether at discharge or prior to admission, were more likely to attribute symptoms to cardiac origins. Patients with more education were more likely to attribute their symptoms to cardiac origins, perhaps reflecting more knowledge about what symptoms are associated with coronary heart disease or a greater willingness to accept the possibility that they have coronary heart disease. Having a particular usual care facility was also associated with attribution of symptoms, perhaps for the same reasons that it is related to reporting painful symptoms.

It should be noted that there are several limitations in our data and the inferences that can be made from them. The methods that we used resulted in our

examining inpatients who not only had made it to treatment but who were admitted and then stabilized, thus excluding those who never made it to treatment or who were turned away from treatment. The cross-sectional design also limits the causal inferences that can be made. The reliance on self-report data, with their inherent biases, is also a limitation. Severity of symptoms and comorbidity may be related to symptom patterns and attribution, but these factors were not examined. Finally, these data were obtained largely from patients who reside in Alabama, and the generalizability of the findings to patients from other regions may be limited.

Despite these limitations, our results suggest that among our sample of patients who sought and were admitted for treatment, race was independently associated with both perception of painful symptoms and attribution of symptoms to cardiac origins. When factors other than race were controlled, African-American patients were less likely than Whites to report either experiencing painful symptoms or attributing their symptoms to cardiac origins. While cultural factors and physiological mechanisms may account for these differences in perception, knowledge about symptoms of coronary heart disease may also account for our findings. Lowered awareness of coronary heart disease and its symptoms might be expected to lead to less alertness to painful symptoms and less likelihood of attributing symptoms to cardiac origins. If this proves to be the case, as has been suggested by preliminary reports,^{18,19} then educational interventions may be indicated for overcoming these discrepancies. In addition, these findings may suggest

that health care providers should be educated about racial differences in symptom perception and attribution. □

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References

1. Gillum RF. Coronary heart disease in black populations, I: mortality and morbidity. *Am Heart J*. 1982;104:839.
2. Watkins LO. Epidemiology of coronary heart disease in black populations: methodologic proposals. *Am Heart J*. 1984;108:635-640.
3. *Report of the Secretary's Task Force on Black and Minority Health*. Washington, DC: US Dept of Health and Human Services; 1985. GPO publication 017-090-00078-0.
4. Castaner A, Simmons BE, Mar M, Cooper R. Myocardial infarction among black patients: poor prognosis after hospital discharge. *Ann Intern Med*. 1988;109:33-35.
5. Johnson KW, Payne GH. Report of an NHLBI working conference on coronary heart disease in black populations: preface. *Am Heart J*. 1984;108:633-634.
6. Adams L, Africano E, Doswell W, et al. Summary of workshop I: working group on epidemiology. *Am Heart J*. 1984;108:699-702.
7. James SA. Socioeconomic influences on coronary heart disease in black populations. *Am Heart J*. 1984;108:669-672.
8. Kasl SV. Social and psychologic factors in the etiology of coronary heart disease in black populations: an exploration of re-

search needs. *Am Heart J*. 1984;108:660-669.

9. Caldwell J, Eaker E, Edozien J, et al. Summary of workshop III: working group on socioeconomic and sociocultural influences. *Am Heart J*. 1984;108:706-710.
10. King JB. Illness attributions and the Health Belief Model. *Health Educ Q*. 1984;10:287-312.
11. *Manual of the International Classification of Diseases, Injuries, and Causes of Death*. 9th revision. Geneva, Switzerland: World Health Organization; 1977.
12. Maynard C, Litwin PE, Martin JS, et al. Characteristics of black patients admitted to coronary care units in metropolitan Seattle: results from the Myocardial Infarction Triage and Intervention Registry (MITI). *Am J Cardiol*. 1991;67:18-23.
13. Strogatz DA. Use of medical care for chest pain: differences between Blacks and Whites. *Am J Public Health*. 1990;80:290-294.
14. Maynard C, Fisher LD, Passamani ER, Pullum R. Blacks in the Coronary Artery Surgery Study: risk factors and coronary artery disease. *Circulation*. 1986;74:64-71.
15. Berkanovic E, Telesky C. Mexican-American, Black-American and White-American differences in reporting illnesses, disability and physician visits for illnesses. *Soc Sci Med*. 1985;20:567-577.
16. Bailey EJ. Sociocultural factors and health care-seeking behavior among Black Americans. *J Natl Med Assoc*. 1987;79:389-392.
17. Folsom AR, Sprafka JM, Luepker RV, Jacobs DR. Beliefs among black and white adults about causes and prevention of cardiovascular disease: the Minnesota Heart Survey. *Am J Prev Med*. 1988;4:121-127.
18. Kannel WB, Abbott BD. Incidence and prognosis of unrecognized myocardial infarction: an update on the Framingham Study. *N Engl J Med*. 1984;311:1144-1147.
19. Lewis CE, Raczynski JM, Oberman A, Cutter GR. Natural history of coronary heart disease in blacks. In: Saunders E, Brest AN, eds. *Cardiovascular Diseases in Blacks*. Philadelphia, Pa: F.A. Davis Co; 1991;29-45.