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## **Factors Associated With Prolonged Prehospital Delay of African Americans With Acute Myocardial Infarction**

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# FACTORS ASSOCIATED WITH PROLONGED PREHOSPITAL DELAY OF AFRICAN AMERICANS WITH ACUTE MYOCARDIAL INFARCTION

By Angela D. Banks, RN, PhD, and Kathleen Dracup, RN, DNSc. From School of Nursing, University of San Francisco (ADB) and School of Nursing, University of California, San Francisco (KD), San Francisco, Calif.

- **BACKGROUND** Delays in seeking treatment for signs and symptoms of acute myocardial infarction are longer for African Americans than for whites.
- **OBJECTIVE** To determine factors associated with prolonged delay and the extent to which perceived racism influences prehospital delay in African Americans with acute myocardial infarction.
- **METHODS** Sixty-one African Americans with acute myocardial infarction were interviewed within 1 month of hospital admission. Delay times were calculated on the basis of the interviews. Independent *t* tests and  $\chi^2$  tests were used to determine factors associated with prolonged delays.
- **RESULTS** Median delay was 4.25 hours and did not differ significantly between women and men (4.42 vs 3.50 hours). Most patients (69%) experienced their initial signs and symptoms at home, often witnessed by family members or friends (70%). Delay was longer for insured patients than for uninsured patients (4.45 vs 0.50 hours). Single, widowed, or divorced patients had longer delay times than did married patients (5.33 vs 2.50 hours), and patients with diabetes delayed longer than did those without diabetes (7.29 vs 3.50 hours). Perceived racism did not differ significantly between patients who delayed seeking treatment and those who did not.
- **CONCLUSIONS** Median delay times were substantially longer than the recommended time of less than 1 hour, reducing the benefit from reperfusion therapies. Education and counseling of patients and their families should be a major strategy in optimizing patients' outcomes and decreasing the time to definitive treatment. (*American Journal of Critical Care*. 2006;15:149-157)

Cardiovascular disease is the No. 1 cause of death and disability in men and women in most industrialized countries.<sup>1</sup> To date, cardiovascular disease claims more lives of African Americans than any other ethnic group. It is the leading cause of death for African American men and women, accounting for more than 100 000 deaths annually in this population.<sup>2</sup> In 2002, cardiovascular disease accounted for 492.5 deaths among African American men and 368.1 among African American women per 100 000.<sup>2</sup>

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Prompt treatment with reperfusion therapy, either thrombolysis and/or percutaneous coronary intervention, decreases myocardial damage and is a critical determinant of survival in patients with acute myocardial infarction.<sup>3-5</sup> The benefit is greatest for patients who receive treatment within the first hour after the onset of signs and symptoms; however, many patients are not eligible for reperfusion therapy because of excessive delay in seeking treatment.<sup>6</sup> In previous studies,<sup>7-9</sup> median delay times from the onset of acute symptoms to arrival at the hospital were 3 to 6.4 hours for African Americans<sup>7,8</sup> and 2.3 hours for whites.<sup>9</sup> In the study by Clark et al,<sup>7</sup> mean delay times were 13.1 (SD 27.5) and 12.7 (SD 25.7) hours for African American men and women, respectively, compared with 3.3

(SD 2.9) hours for white men and women. These excessive delay times in seeking medical care may contribute to the higher morbidity and mortality rates in African Americans who have acute myocardial infarction.<sup>7,10</sup>

Investigators have attempted to determine patients' characteristics that are associated with longer delay times. The assumption is that individuals at risk for increased delay can be identified and interventions to decrease delay times can be instituted. To date, 5 studies<sup>7,8,11-13</sup> on delay times in African Americans have indicated that African Americans delay substantially longer than do whites when seeking medical care for cardiac symptoms. Four of these studies<sup>7,8,11,12</sup> were done more than a decade ago, and the factors associated with prolonged delay were not identified in any of them. The findings of a more recent study<sup>13</sup> support the premise that African Americans continue to delay significantly longer than do whites (3.25 vs 2.0 hours) in seeking treatment. African American race was a significant predictor of delay time longer than 1 hour, and African Americans were less likely than whites to access the emergency medical system during the first hour after the onset of signs and symptoms.<sup>13</sup>

One factor that may lead to increased delay in African Americans is perceived racism, because patients would anticipate negative experiences in the health-care system. Perceived racism refers to the subjective experience of prejudice or discrimination.<sup>14</sup>

Research indicates that African Americans are far more likely than whites to report being treated worse than other races when seeking healthcare and to report being emotionally upset and/or experiencing physical signs and symptoms because of unequal treatment based on race.<sup>15</sup> Although little is known about the extent to which perceived discrimination leads to increased risk of disease,<sup>16</sup> research has indicated that experiences with racism enhance the autonomic nervous system, resulting in increased hypertension, cardiovascular disease, and elevated levels of anxiety and depression among African Americans.<sup>17</sup> Additionally, perceived racism creates stress by impeding access to healthcare services.<sup>18</sup>

Delay in seeking treatment for the signs and symptoms of acute myocardial infarction is often categorized into 3 stages: patient delay, transportation delay, and hospital delay. In the study reported here, prehospital delay was defined as the time between the onset of acute signs and symptoms of acute myocardial infarction and the time of arrival at the hospital (ie, a combination of patient delay and transportation time). Hospital delay is the time from a person's arrival at the hospital emergency department to the beginning of definitive treatment.<sup>19</sup>

The aims of the study were to determine the factors associated with prolonged prehospital delay and

the extent to which perceived racism influences prehospital delay in African Americans with acute myocardial infarction.

## Methods

A descriptive design was used. After approval was granted by the appropriate institutional review board and all other participating sites, patients were recruited from 5 hospitals in the San Francisco and East Bay areas between April 2003 and June 2004. Patients were eligible for inclusion if they were African American and had had an acute myocardial infarction, were 18 years or older, were able to speak and understand English, were alert and oriented, were living independently in the community, and were in stable hemodynamic condition. The diagnosis of acute myocardial infarction was based on elevated levels of cardiac enzymes and at least 1 of 4 criteria: a history of ischemic symptoms, development of pathological Q waves on electrocardiograms, electrocardiographic evidence of changes indicative of ischemia (ST elevation or depression), and documented coronary artery intervention (eg, coronary angioplasty).<sup>20</sup> Of the 64 patients who met the criteria, 3 refused participation.

The 61 patients willing to participate in the study were asked to sign a written consent. All interviews were performed by the same person (A.D.B.) A total of 58 patients were interviewed in the hospital. The mean time between hospital admission and interview was 2.6 days (SD 1.1). Three patients were interviewed in their doctor's office within 1 month of the acute myocardial infarction. Medical chart reviews were used to collect discharge data.

For each patient, the time of onset of signs and symptoms was obtained by interviewing the patient, and the time of admission to the hospital was obtained from the patient's medical record. In order to help patients establish the time of onset, a benchmark technique was used: each patient was asked to verify the time of onset in relationship to an event that occurred, daily routine, or break in routine.<sup>11</sup>

Information about patients' age, sex, marital status, educational status, employment status, and annual household income was collected by review of the patients' medical charts and interviews with the patients. Clinical data on the following were also abstracted from the medical chart: history of angina, hypertension, stroke, diabetes, hypercholesterolemia, and smoking; physical activity; Killip classification at the time of admission to the hospital; peak troponin level; and previous myocardial infarction. The presence of pain as an acute symptom of myocardial infarction was measured on a scale of 0 to 10, with 0 being no pain and 10 being the

most severe pain. Patients were asked to rank the pain they experienced before arrival at the hospital.

### Instruments

*Response to Symptom Questionnaire.* Burnett et al<sup>21</sup> developed the Response to Symptom Questionnaire to obtain information about patients' delay in seeking treatment and the factors contributing to the delay. The purpose of the questionnaire was to determine factors that distinguished individuals who responded early from individuals who responded later. The instrument is divided into 6 different domains:

1. Context in which the signs and symptoms of acute myocardial infarction first appeared (ie, where the patient was when the signs and symptoms began),
2. Antecedents of the signs and symptoms (ie, what the patient was doing when the signs and symptoms occurred),
3. Affective or emotional response to the signs and symptoms (ie, severity of pain),
4. Behavioral response to the signs and symptoms (ie, first thing the patient did when the signs and symptoms were first noticed),
5. Cognitive responses to the signs and symptoms (ie, attribution of the signs and symptoms, appraisal of the seriousness of the signs and symptoms), and
6. The response of others to the patient's signs and symptoms (ie, behavioral or emotional responses of others).

The responses are evaluated by the score for each item on the questionnaire, not by a total score.

For our study, signs and symptoms were measured by using the modified Response to Symptom Questionnaire.<sup>22</sup> The original instrument was modified by adding items to assess additional cognitive (eg, assessment of signs and symptoms experienced, knowledge of the signs and symptoms of acute myocardial infarction), emotional (eg, fear concerning the consequences of the signs and symptoms, embarrassment about seeking help), and social (eg, not wanting to trouble others) factors associated with a patient's decision to seek help. This modification was based on the growing body of evidence that cognitive, emotional, and social factors are more important determinants of prehospital delay than is knowledge about the appropriate responses to signs and symptoms.<sup>21</sup> The modified Response to Symptom Questionnaire has items to assess factors associated with the onset of acute signs and symptoms of myocardial infarction, the response of others to the signs and symptoms, and the response of the patient to the signs and symptoms. This instrument is descriptive, and the individual items are used as subunits of analysis. Reilly et al<sup>23</sup> established con-

tent validity of the modified version with an expert panel of 3 nurses who had master's degrees.

*Perception of Racism Scale.* The Perception of Racism Scale<sup>24</sup> was developed and pilot tested for use in a study of low-birth-weight infants and preterm delivery in African American women. The scale consists of 20 items, with 4 possible points per item and a total possible score of 80 points. A higher score on the scale indicates a higher perception of racism.<sup>24</sup> Of the 20 items, 14 refer specifically to the healthcare system and the patient's experience with healthcare professionals (eg, "Racial discrimination in the emergency room or in an urgent care facility is common"), and 6 refer to experiences of discrimination in society (eg, "I am not affected by discrimination"). The scale does not contain subscales, and patients are asked to answer on the basis of their lifetime experience. Reported reliability for the total scale was 0.91.

This instrument was slightly modified for the purpose of determining perceived racism in cardiac patients. The wording of the scale was modified to address the issues of men and women with acute myocardial infarction. For example, "A pregnant white woman is treated with more respect than a pregnant African American woman" was changed to read, "Whites are treated with more respect than African Americans when seeking healthcare." The modified scale uses the same response options as the original scale in addition to a neutral choice. The addition of a neutral choice changes the score for each response to 5 possible points and a total score of 100 points. The modified scale was pilot tested on 60 African Americans 31 to 80 years old living in San Francisco and the East Bay areas. Reliability was assessed by using the Cronbach  $\alpha$  and was 0.89 for the total questionnaire, indicating strong internal consistency.

Five African American experts in the field of nursing determined content validity for the modified instrument. Of the 5, 4 had doctoral degrees and 1 had a master's degree. The experts were provided with a written definition of racism and were asked to rate the relevancy of the 20-item instrument and determine if each item seemed to measure aspects of racism in healthcare. The experts were also asked if the concept label and definition of racism fit the whole set of items. They used a 4-point rating scale (4 = very relevant, 3 = quite relevant, 2 = somewhat relevant, 1 = not at all relevant). They independently rated the instrument for content, clarity, and representativeness of perceived racism. The consensus was 87%, indicating that all items were representative of racism. Of the 5 experts, 2 thought that item 16 ("African Americans receive more welfare benefits than whites") was not a

clear representation of racism; however, the item was retained in the questionnaire.

A principal components analysis was conducted to obtain evidence of the construct validity of the 20-item modified Perception of Racism Scale. In a principal components analysis, factors are extracted by rank ordering the items in terms of which items are most highly associated with the construct being measured.<sup>25</sup> A principal components analysis was performed on the pilot instrument, and all but 1 of the 20 items had factor loadings of .37 or higher. Item 16 had a factor loading less than .37, but it was retained in the questionnaire because 3 of the 5 experts rated it as relevant or somewhat relevant.

### Data Analysis

A database was created and analyzed by using SPSS version 11.5 (SPSS Inc, Chicago, Ill). Frequencies and descriptive statistics were used to describe the sample. Mean delay times tend to be skewed because of patients who wait days before seeking medical assistance. Therefore, the median delay time was used as a more accurate representation of the pre-hospital delay.

Independent *t* tests and  $\chi^2$  tests were used to compare characteristics of patients to detect differences in delay times. The relationship between perceived racism and delay was also examined by using the Pearson correlation. Because delay time was positively skewed, a logarithmic transformation was used to obtain a normal distribution. The transformed value was used in all analyses. Values were then transformed back and reported in their original form for presentation in tables so that the values would be meaningful. Statistical significance was set a priori at .05.

## Results

### Characteristics of the Sample

The mean age of the 61 patients who participated was 60 years (SD 12). All were African American; 52% of the patients were women, and only 25% were married. The mean number of years of education completed was 12 (SD 2.1). A total of 37 patients (61%) earned less than \$15 000, and 24 (39%) earned more than \$15 000. The mean annual income was \$20 000.

Patients enrolled in the study were in relatively stable condition at the time of admission to the emergency department, as evidenced by the Killip classification: 46 patients (75%) were class I and 13 (21%) were class II. A total of 30 patients (49%) had a history of angina, 33 (54%) had a history of acute myocardial infarction, 51 (84%) had a history of hypertension, 13 (21%) had a history of stroke, 46 (75%) had a history of hyper-

**Table 1** Initial response to signs and symptoms of acute myocardial infarction among 61 patients

Patients' initial response	No. of patients (%)
Wished or prayed signs and symptoms would go away	11 (18)
Relaxed	10 (16)
Pretended nothing was wrong	2 (3)
Told someone	21 (34)
Tried not to think about it	1 (2)
Took medication	5 (8)
Called a physician	2 (3)
Told someone who was nearby	1 (2)
Called the emergency department	1 (2)
Was transported to the hospital by someone	3 (5)
Drove to a physician's office or the hospital	1 (2)
Other response	3 (5)
<b>Initial response of others</b>	
They comforted me	1 (2)
They suggested I rest or take medication	23 (38)
They suggested I get medical help	5 (8)
They called 911	7 (11)
They took me to the hospital	7 (11)
Never told anyone about my signs and symptoms	18 (30)

cholesterolemia, and 27 (43%) had a history of diabetes. Mean peak troponin level was 14  $\mu\text{g/L}$  (SD 17). A total of 17 patients (28%) experienced an inferior myocardial infarction, 7 (11%) an anterior myocardial infarction, and 34 (56%) a non-Q wave myocardial infarction. A combination of other sites accounted for the remaining 3 (5%) patients.

Mean delay time from onset of symptoms to arrival at the hospital was 13.51 hours (SD 19.51). Median time was 4.25 hours. Patients described a variety of initial responses to experiencing the onset of signs and symptoms of acute myocardial infarction (Table 1). The most common response was to tell someone, which occurred in 21 patients (34%). A total of 18 patients (30%) never told anyone about their signs and symptoms, and 7 (11%) sought medical help by calling 911.

### Characteristics Related to Delay

Differences in response time according to patients' characteristics are summarized in Table 2. Single, widowed, or divorced patients delayed longer than did married patients, (median 5.33 vs. 2.50 hours,  $P = .04$ ) and patients insured for emergency department visits delayed longer than patients without insurance (median 4.45 vs 0.50 hours,  $P = .03$ ). No significant differences were noted in a variety of clinical characteristics (summarized in Table 3) except for diabetes. Patients with diabetes delayed longer than

**Table 2** Comparison of prehospital delay time (decision time plus transportation time) by sociodemographic characteristics and social context

Sociodemographic characteristic	No. of patients	Delay time, hours				P
		Median	Mean	SD	Range	
Total	61	4.25	13.51	19.51	0.17-73.0	
Sex						.86
Male	29	3.50	13.84	21.19	0.17-73.0	
Female	32	4.42	13.21	18.21	0.17-72.1	
Age, y						.99
<55	21	4.08	13.9	21.4	0.17-73.0	
>55	40	4.41	13.3	18.7	0.17-72.1	
Education						.89
High school or less	30	4.29	13.6	18.8	0.17-72.1	
More than high school	31	4.08	13.4	20.5	0.17-73.0	
Marital status						.04
Single/widowed/divorced	46	5.33	16.4	21.4	0.17-73.0	
Married	15	2.50	4.47	6.71	0.17-24.5	
Employment						.29
Yes	9	3.50	9.20	14.8	1.1-48.1	
No	52	4.29	14.3	20.3	0.17-73.0	
Annual income, \$						.92
<15 000	37	4.50	15.7	20.9	0.17-73.0	
>15 000	24	3.87	10.1	17.1	0.17-73.0	
Emergency department insurance						.03
Yes	52	4.45	15.2	20.5	0.17-73.0	
No	9	0.50	3.95	8.08	0.17-25.0	
Living alone						.29
Yes	17	4.58	16.7	21.4	0.17-72.1	
No	44	4.08	12.3	18.9	0.17-73.0	
<b>Social factors</b>						
Location at onset of signs and symptoms						.009
Home	42	4.54	16.4	21.4	0.17-73.0	
Other	19	0.50	7.17	12.8	0.17-49.0	
Witness to signs and symptoms						.02
Alone	18	24.3	26.6	25.9	0.17-73.0	
Family member/friends	43	3.50	8.03	12.9	0.17-49.0	
Response of others to signs and symptoms						.008
Suggested help or calling 911	12	0.38	8.73	18.6	0.17-49.0	
Other behavior	49	4.58	14.7	14.7	0.17-73.0	

\*Significance testing based on log-transformed means.

did patients who did not have diabetes (median 7.29 vs 3.50 hours,  $P=.02$ ).

### Attribution

Patients were asked what they thought the problem was when they first noticed their signs or symptoms. Only 20 (33%) ascribed the signs and symptoms to the heart; 14 (23%) thought they had indigestion; 12 (20%) thought they had a breathing problem, and the remaining 15 (25%) were either unsure or thought the signs or symptoms were related to something else. Although the median delay time of patients who identified their signs or symptoms as cardiac was shorter than that of patients who attributed their signs or

symptoms to other causes (1.8 vs 4.3 hours;  $P=.13$ ), the difference was not significant.

### Social Context

The factors related to the social context in which the signs or symptoms occurred are presented in Table 2. Most patients (42 or 69%) were at home when they began to have signs and symptoms. Another 10 (16%) were at work, in a vehicle, visiting friends, or in a public place. The remaining 9 (15%) were in other places. Patients who experienced their signs and symptoms at home delayed significantly longer than did those who were not at home. Median delay times were 4.54 and 0.50 hours, respectively ( $P=.009$ ).

**Table 3** Comparison of prehospital delay time (decision time plus transportation time) by patients' clinical characteristics

Characteristic	No. of patients	Delay time, hours				P*
		Median	Mean	SD	Range	
History of angina						.61
Yes	30	4.21	10.7	16.4	0.17-72.1	
No	31	4.25	16.2	22.1	0.17-73.0	
Hypercholesterolemia						.52
Yes	46	4.29	16.5	19.8	0.17-73.0	
No	15	4.08	16.2	19.0	0.17-72.1	
Hypertension						.63
Yes	51	4.33	14.3	20.3	0.17-73.0	
No	10	3.50	9.54	15.3	0.17-48.1	
History of acute myocardial infarction						.64
Yes	33	4.33	16.4	23.1	0.17-73.0	
No	28	4.17	10.1	13.9	0.17-49.0	
Diabetes						.02
Yes	26	7.29	19.2	22.9	0.17-73.0	
No	35	3.50	9.32	15.5	0.17-72.1	
History of percutaneous transluminal coronary angioplasty						.97
Yes	23	6.50	13.0	18.3	0.17-72.1	
No	38	3.79	13.8	20.1	0.17-73.0	
History of coronary artery bypass graft surgery						.37
Yes	8	9.04	10.8	9.61	0.58-25.0	
No	53	4.08	13.9	20.6	0.17-73.0	
History of stroke						.29
Yes	13	3.08	6.50	8.79	0.17-24.5	
No	48	4.33	15.4	21.2	0.17-73.0	
Current smoker						.34
Yes	18	4.45	16.2	22.6	0.17-73.0	
No	43	3.50	12.4	18.2	0.17-72.1	

\*Significance testing based on log-transformed means.

A total of 43 patients (70%) were with family, friends, or coworkers when the patients began to experience signs and symptoms of acute myocardial infarction. Of the 61 patients, 18 (30%) were alone at the time of onset of signs and symptoms and delayed longer in seeking care than did patients who were not alone. Median delay times were 24.3 hours for those who were alone and 3.50 hours for those who were not alone ( $P = .02$ ). The responses of others to patients' symptoms varied; for 12 patients (20%), the others present suggested that the patients seek medical help or call 911. Patients who were counseled to seek immediate medical care or call emergency medical services had significantly shorter median delay times than did patients who did not receive this advice (0.38 vs 4.58 hours, respectively;  $P = .008$ ).

### Cognitive and Emotional Responses

Men and women delayed for different reasons, but the No. 1 reason for the entire sample was waiting to see if the signs and symptoms would go away. Severity of

pain influenced patients' decision to seek care sooner. Mean delay times were 4.1 hours for patients who ranked their pain as greater than 7 (54%) and 5.30 hours for patients who ranked their pain as less than 7 (46%). However, 23 patients (38%) experienced no pain; of these, 15 were women (65%), and 8 were men (35%).

### Perceived Racism

The mean score on the modified Perception of Racism Scale was 65.3 (SD 12.1), with a range of 40 to 87. The influence of perceived racism on prehospital delay time was assessed by using the Pearson correlation. The  $r$  value was -0.158 ( $P = .22$ ), indicating no significant relationship between perceived racism and delay.

### Discussion

Our results contribute to the growing body of knowledge about prehospital delay in African Americans. We focused on the factors associated with prolonged delay time, and this study was the first one in which the relationship between cognitive, emotional,

and social factors and seeking help for signs and symptoms of acute myocardial infarction in this population was examined. An additional strength of the study is the large percentage (52%) of women in the study sample, although this percentage was not purposive. Samples in previous studies have had few African Americans and a small proportion of women compared with men. The median prehospital delay in our sample of African Americans (4.25 hours) was significantly longer than the median delay (2.3 hours) reported in a recent large study<sup>9</sup> of predominately white patients with acute myocardial infarction.

We found that single, widowed, or divorced patients; insured patients; and patients with diabetes were the most likely to have prolonged delay times. Other investigators<sup>13,21</sup> also found that single patients delay longer, perhaps because these patients lack someone to consult about their signs and symptoms in a timely manner. Several investigators<sup>26-28</sup> have also reported that patients with diabetes delay longer than do patients without diabetes. A possible explanation for patients who have diabetes is that neuropathy is a common complication of the disease and is associated with reduced pain sensitivity, which may result in prolonged prehospital delay.

The finding that insured patients delayed longer than uninsured patients was unexpected. This finding is in contrast to the results of another study<sup>26</sup> in which patients with insurance had shorter median prehospital delay times than did patients without insurance. Our results may reflect the fact that uninsured patients in our sample lacked a primary provider, had limited access to care, and were accustomed to seeking medical care in the emergency department for chronic as well as acute problems. In general, in previous studies of African American patients with acute myocardial infarction, patients were recruited from a single setting, whereas we recruited patients from 5 different hospitals. Perhaps, the effect of insurance in a single-site study is different than the effect in a multisite study.

Some investigators<sup>27,29,30</sup> have found that women delay longer than men do, whereas other researchers<sup>13,31,32</sup> have found no difference between men and women. Investigators<sup>28,33</sup> have also found that older age is a significant predictor of prehospital delay time. However, neither sex nor age contributed to longer prehospital delay time in our patients. Lower levels of education were associated with prolonged prehospital delay times in an Australian study,<sup>34</sup> but educational level was not a predictor of prolonged prehospital delay in our sample.

Additionally, in contrast to others, we found no difference in prehospital delay time for patients with or without a variety of clinical variables such as history of

hypertension,<sup>35</sup> history of angina,<sup>35,36</sup> history of acute myocardial infarction,<sup>35,37</sup> history of percutaneous coronary intervention,<sup>35</sup> or history of coronary artery bypass graft surgery.<sup>28,33</sup> In some instances, the lack of significant differences in clinical characteristics may be related to our relatively small sample size and large SDs.

We also evaluated the cognitive, emotional, and social factors associated with prehospital delay. In our study, 29 patients (48%) thought their signs or symptoms were serious; however, their response time was longer than that of the 32 patients (52%) who thought their signs or symptoms were not serious. The median delay times were 4.3 hours for patients who appraised their signs or symptoms as serious and 4.2 hours for those who appraised their signs or symptoms as not serious. These results are in contrast to those of Dracup and Moser,<sup>22</sup> who found that attributing signs and symptoms to the heart and appraising signs and symptoms as serious were predictors for shorter delay times. However, in our study, even though 48% of the patients in the sample viewed their signs and symptoms as serious, their median delay time was longer than that of patients who viewed their signs and symptoms as not serious.

A possible explanation for this finding is that the patients in our sample did not view their signs and symptoms as life threatening or serious enough to warrant prompt medical care. This finding may also indicate a lack of knowledge about the signs and symptoms of acute myocardial infarction, which may impede a patient's ability to make appropriate decisions about seeking medical care when an acute myocardial infarction occurs. Another explanation may be that the African Americans in our sample were in denial about the importance of their signs and symptoms. Inasmuch as denial is a psychological coping strategy used by patients having signs and symptoms of an acute myocardial infarction, it allows patients to engage in behavior with little conscious awareness of the consequences, resulting in long-term adverse cardiovascular outcomes.<sup>38</sup>

Social factors that contributed to prolonged delay times included experiencing the signs and symptoms at home, being alone during the onset of the signs and symptoms, and choosing a variety of other behaviors instead of seeking medical help or calling 911.

Investigators<sup>39,40</sup> have hypothesized that negative experiences with the healthcare system and a high level of perceived racism can act as stressors and induce psychophysiological reactions that adversely affect cardiovascular health, making African American patients reluctant to promptly seek help for signs and symptoms of cardiac problems. Our finding of a non-significant relationship between perceived racism and

delay time was surprising. A potential explanation is the instrument used to assess perceived racism. However, psychometric testing of the instrument indicated that it is a reliable and valid tool, and patients' verbal responses after completing the questionnaire reflected their belief that the instrument adequately tapped the concept being tested. Therefore, we hypothesize that racism truly did not exist in this population in an urban area in California as it related to their healthcare experiences.

## Limitations

Our study has several limitations. We studied a small convenience sample of African American patients who came to the hospital with signs and symptoms of acute myocardial infarction. Therefore, the generalizability of the findings is limited to patients who survived to reach the hospital. Patients who did not seek treatment and those who died before arrival at the hospital were not available for participation. The sample consisted of African Americans with very low incomes who were living in a single geographic area of the United States and may not have been representative of all African Americans. The mean income in this sample was \$20 000. Because of the low income of almost all the patients, determining if race, socioeconomic status, or both played a significant role in the prolonged delays in seeking treatment was difficult.

Despite these limitations, our results have several clinical implications for education and counseling of African Americans. Because African Americans have a higher morbidity and mortality rate with coronary artery disease than other ethnic groups do,<sup>10,41</sup> and a worse outcome compared with other minorities,<sup>41,42</sup> the message should emphasize early arrival at the hospital at the immediate onset of signs or symptoms of acute myocardial infarction. Our finding that some African Americans have prolonged delay times regardless of the seriousness of their signs and symptoms suggests that this population is at high risk for delay and should be the target of intensive education and counseling in the community. Healthcare professionals need to also increase the awareness of African Americans that the optimal benefit of cardiovascular interventions can only be achieved with prehospital delay times of less than 1 hour, emphasizing that time to reperfusion is a critical determinant of mortality in acute myocardial infarction.<sup>3,35</sup>

In our sample, the No. 1 reason for delays in seeking medical help was waiting to see if the signs or symptoms would go away. Therefore, educational interventions should highlight this finding as a possible response in African Americans, directing education and counseling to both patients and their families. Involving families in the African American community

is pivotal because healthcare is often viewed as a family responsibility, not just that of an individual healthcare provider.<sup>43</sup> Therefore, the provider can often solicit patients' family members as partners in persuading and promoting preventive care. Additionally, educational outreach programs and partnerships with leaders in the church can play a key role in heightened awareness among healthcare providers in the African American community. Because religion is an important aspect in African American culture, members of the clergy play an integral role in the community.<sup>43</sup> They are also trusted and respected by and familiar with patients' family members to such a degree that clergy members can be helpful to providers and health educators as liaisons between a family and a provider.<sup>43</sup> Moreover, although it is necessary for African Americans to be educated about the importance of seeking prompt medical care, it is also clear that for such educational programs to be effective, medical care for this population should be readily available and affordable.<sup>41</sup>

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## REFERENCES

1. Elsaesser A, Hamm CW. Acute coronary syndrome: the risk of being female. *Circulation*. 2004;109:565-567.
2. American Heart Association. Heart Facts 2005: All Americans/African Americans, 2005. Available at: <http://www.americanheart.org/downloadable/heart/1106668161495AllAmAfAmHeartFacts05.pdf>. Accessed January 4, 2005.
3. Berger PB, Ellis SB, Holmes DR, et al. Relationship between delay in performing direct coronary angioplasty and early clinical outcome in patients with acute myocardial infarction: results from the Global Use of Strategies to Open Occluded Arteries in Acute Coronary Syndromes (GUSTO-IIb) trial. *Circulation*. 1999;100:14-20.
4. De Luca G, Suryapranata H, Zijlstra F, et al. Symptom-onset-to-balloon time and mortality in patients with acute myocardial infarction treated by primary angioplasty. *J Am Coll Cardiol*. 2003;42:991-997.
5. Fu Y, Goodman S, Chang W, Van de Werf F, Granger CB, Armstrong PW. Time to treatment influences the impact of ST-segment resolution on one-year prognosis: insights from the Assessment of the Safety and Efficacy of a New Thrombolytic (ASSENT-2) trial. *Circulation*. 2001;104:2653-2659.
6. Dracup K, Moser DK, McKinley S, et al. An international perspective on the time to treatment for acute myocardial infarction. *J Nurs Scholarsh*. 2003;35:317-323.
7. Clark LT, Bellam SH, Shah AH, Feldman JG. Analysis of prehospital delay among inner-city patients with symptoms of myocardial infarction: implications for therapeutic intervention. *J Natl Med Assoc*. 1992;84:931-937.
8. Cooper RS, Simmons B, Castaner A, Prasad R, Franklin C, Ferlinz J. Survival rates and prehospital delay during myocardial infarction among black persons. *Am J Cardiol*. 1986;57:208-211.
9. Luepker RV, Raczynski JM, Osganian S, et al. Effect of community intervention on patient delay and emergency medical service in acute coronary heart disease: the Rapid Early Action for Coronary Treatment (REACT) trial. *JAMA*. 2000;284:60-67.
10. Clark LT, Ferdinand KC, Flack JM, et al. Coronary heart disease in African Americans. *Heart Dis*. 2001;3:97-108.
11. Eil K, Haywood LJ, Sobel E, de Guzman M, Blumfield D, Ning JP. Acute chest pain in African Americans: factors in the delay in seeking emergency care. *Am J Public Health*. 1994;84:965-970.

12. Ghali JK, Cooper RS, Kowaty I, Liao Y. Delay between onset of chest pain and arrival to the coronary care unit among minority and disadvantaged patients. *J Natl Med Assoc.* 1993;85:180-184.
13. Zerwic JJ, Ryan CJ, DeVon HA, Drell MJ. Treatment seeking for acute myocardial infarction symptoms: differences in delay across sex and race. *Nurs Res.* 2003;52:159-167.
14. *Understanding and Reducing Socioeconomic and Racial/Ethnic Disparities in Health: Intervention Strategies from Social and Behavioral Sciences.* Washington, DC: The National Academies Press; 2000.
15. Gizlice Z, Ngui EM. Relationships Between Health and Perceived Unequal Treatment Based on Race: Results from the 2002 North Carolina BRFSS Survey. Raleigh, NC: North Carolina Department of Health and Human Services, State Center for Health Statistics; September 2004;1-12. Report No. 144. Also available at: <http://www.schs.state.nc.us/SCHS/brfss/publications.html>. Accessed January 3, 2006.
16. Williams DR, Neighbors HW, Jackson JS. Racial/ethnic discrimination and health: findings from community studies. *Am J Public Health.* 2003;93:200-208.
17. Brownley KA, Light KC, Anderson NB. Social support and hostility interact to influence clinic, work, and home blood pressure in black and white men and women. *Psychophysiology.* 1996;33:434-445.
18. Northridge M, Gabriel N, Rosenthal J, Sherard D. Environmental equity and health: understanding complexity and moving forward. *Am J Public Health.* 2003;93:209-214.
19. Zerwic JJ. Patient delay in seeking treatment for acute myocardial symptoms. *J Cardiovasc Nurs.* April 1999;13:21-32.
20. Alpert JS, Thygesen C. Myocardial infarction redefined. *J Am Coll Cardiol.* 2000;36:959-969.
21. Burnett RE, Blumenthal JA, Mark DB, Leimberger JD, Califf RM. Distinguishing between early and late responders to symptoms of acute myocardial infarction. *Am J Cardiol.* 1995;75:1019-1022.
22. Dracup K, Moser DK. Beyond sociodemographics: factors influencing the decision to seek treatment for symptoms of acute myocardial infarction. *Heart Lung.* 1997;26:253-262.
23. Reilly A, Dracup K, Dattolo J. Factors influencing prehospital delay in patients experiencing chest pain. *Am J Crit Care.* 1994;3:300-306.
24. Green NL. Development of the Perceptions of Racism Scale. *Image: J Nurs Sch.* 1995;27:141-146.
25. DeVillis RF. *Applied Social Research Methods Series.* Vol 26. Newbury Park, Calif: Sage; 1991.
26. Gibler WB, Armstrong PW, Ohman EM, et al. Persistence of delays in presentation and treatment for patients with acute myocardial infarction: the GUSTO-I and GUSTO-III experience. *Ann Emerg Med.* 2002;39:123-130.
27. Sheifer SE, Rathore SS, Gersh BJ, et al. Time to presentation with acute myocardial infarction in the elderly: associations with race, sex, and socioeconomic characteristics. *Circulation.* 2000;102:1651-1656.
28. Williams DO. Treatment delayed is treatment denied. *Circulation.* 2004;109:1806-1808.
29. Meischke H, Larsen MP, Eisenberg JM. Gender differences in reported symptoms for acute myocardial infarction: impact on prehospital delay time interval. *Am J Emerg Med.* 1998;16:363-366.
30. Murphy SA, Chen C, Cannon CP, Antman EM, Gibson CM. Impact of gender on angiographic and clinical outcomes after fibrinolytic therapy in acute myocardial infarction. *Am J Cardiol.* 2002;90:766-770.
31. Goff DC Jr, Feldman HA, McGovern PG, et al. Prehospital delay in patients hospitalized with heart attack symptoms in the United States: the REACT trial. Rapid Early Action for Coronary Treatment (REACT) Study Group. *Am Heart J.* 1999;138(6 pt 1):1046-1057.
32. Goldberg RJ, Yarzebski J, Lessard D, Gore JM. Decade-long trends and factors associated with time to hospital presentation in patients with acute myocardial infarction: the Worcester Heart Attack Study. *Arch Intern Med.* 2000;160:3217-3223.
33. De Luca G, Suryapranata H, Ottervanger JP, Antman EM. Time delay to treatment and mortality in primary angioplasty for acute myocardial infarction: every minute of delay counts. *Circulation.* 2004;109:1223-1225.
34. Dracup K, McKinley S, Moser D. Australian patients' delay in response to heart attack symptoms. *Med J Aust.* 1997;166:233-236.
35. Goldberg RJ, Gurwitz JH, Gore JM. Duration of, and temporal trends (1994-1997) in, prehospital delay in patients with acute myocardial infarction: the second National Registry of Myocardial Infarction. *Arch Intern Med.* 1999;159:2141-2147.
36. Meischke H, Eisenberg MS, Larson MP. Prehospital delay interval for patients who use emergency services: the effect of heart-related medical conditions and demographic variables. *Ann Emerg Med.* 1993;22:1597-1601.
37. Gurwitz JH, McLaughlin TJ, Willison DJ, et al. Delayed hospital presentation in patients who have had acute myocardial infarction. *Ann Intern Med.* 1997;126:593-599.
38. Allan R, Scheidt S. The empirical basis for cardiac psychology. In: Allen R, Scheidt S, eds. *Heart and Mind: The Practice of Cardiac Psychology.* Washington DC: American Psychological Association; 1996:63-123.
39. Wyatt S, Williams DR, Calvin R, Henderson F, Walker E, Winters K. Racism and cardiovascular disease in African Americans. *Am J Med Sci.* 2003;6:315-331.
40. Krieger N, Sidney S. Racial discrimination and blood pressure: the CARDIA study of young black and white adults. *Am J Public Health.* 1996;86:1370-1378.
41. Ferdinand K. Coronary heart disease and lipid-modifying treatment in African American patients. *Am Heart J.* 2004;147:774-782.
42. Gillum RF. Sudden cardiac death in Hispanic and African Americans. *Am J Public Health.* 1997;87:1461-1467.
43. Witt D, Brawer R, Plumb J. Cultural factors in preventive care: African-Americans. *Prim Care.* 2002;29:487-493.