

Sudden Cardiac Death in Hispanic Americans and African Americans

ABSTRACT

Objectives. The goal of this study was to estimate rates of sudden cardiac death in US Hispanics and African Americans.

Methods. Data on coronary deaths occurring outside of the hospital or in emergency rooms were examined for 1992.

Results. In 1992, 53% (8194) of coronary heart disease deaths among Hispanic Americans 25 years of age and older occurred outside of the hospital or in emergency rooms. The percentage was lower among Hispanics than among non-Hispanic Whites and Blacks. Age-adjusted rates per 100 000 were lower in Hispanics than in non-Hispanic Whites or Blacks (Hispanic men, 75; White men, 166; Black men, 209; Hispanic women, 35; White women, 74; Black women, 108). The percentages dying outside of the hospital or in emergency rooms were higher in young persons, those living in nonurban areas, and those who were single.

Conclusions. The percentage and rate of coronary deaths occurring outside of the hospital or in emergency rooms were lower in Hispanics than in non-Hispanics; African Americans had the highest rates. Further research is needed on sudden coronary death in Hispanic Americans and African Americans. (*Am J Public Health.* 1997;87:1461-1466)

Richard F. Gillum, MD

Introduction

Heart disease is the leading cause of death in Hispanic Americans.¹ In White and Black Americans, more than half of cardiac deaths occur outside of the hospital²⁻⁴; however, little is known about the epidemiology of sudden cardiac death in Hispanic Americans. Deaths attributed to coronary heart disease occurring outside of the hospital or in emergency rooms have been used as an indicator of sudden cardiac death from fatal cardiac arrest.^{2,5} This report describes the epidemiology of cardiac deaths occurring outside of the hospital or in emergency rooms among Hispanic Americans in 48 states and the District of Columbia.

Methods

Place of Death

Data from the National Center for Health Statistics were used to enumerate deaths for several cause-of-death categories by location and by status of decedent when death occurred in a hospital or medical center.⁶ Deaths were excluded from analyses if there were missing hospital or patient status data (e.g., 0.04% of records coded for ischemic heart disease). Other data obtained from the death certificate included Hispanic origin, age, sex, race (recoded as White, Black, or other), and population classification of county of occurrence. A check box was provided with the following question: "Was decedent of Hispanic origin? (Specify no or yes—if yes specify Cuban, Mexican, Puerto Rican, etc.)" Data on Hispanic origin from 48 states (New Hampshire and Oklahoma were excluded) and the District of Columbia were considered sufficiently comparable to be used for analysis.⁷ In these states in 1992, 8720

deaths from coronary heart disease (1.6% of total coronary deaths) were excluded from analysis because of unknown Hispanic origin. In 1990, these 48 states and the District of Columbia (hereafter referred to as the United States) accounted for 99.6% of the Hispanic population of the United States. (Data for death rates in Blacks include New Hampshire.) Educational attainment was available for 40 states and the District of Columbia.⁷

Cause of Death

Cause of death was categorized according to the ninth revision of the *International Classification of Diseases* (ICD-9). The categories selected for the present analyses were as follows: coronary heart disease (ischemic heart disease plus unspecified arteriosclerotic cardiovascular disease; ICD-9 codes 410 through 414, 429.2) and diseases of the heart (ICD-9 codes 390 through 398, 402, 404 through 429).

Analysis

Resident population data used to compute rates were estimates based on 1990 census counts.¹ As a means of eliminating possible confounding by variations in age distribution, age-specific analyses were performed. In this paper, results are often presented only for the 55- to 64-year age group, which has a high rate of premature coronary death. Age-adjusted rates were computed by the

The author is with the National Center for Health Statistics, Centers for Disease Control and Prevention, Hyattsville, Md.

Requests for reprints should be sent to Richard F. Gillum, MD, Office of Analysis, Epidemiology and Health Promotion, National Center for Health Statistics, Centers for Disease Control and Prevention, 6525 Belcrest Rd, Room 730, Hyattsville, MD 20782.

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TABLE 1—Death from Coronary Heart Disease, by Place of Death, Hispanic Origin, Race, Sex, and Age: United States, 1992

Race/Sex Group and Age, y	Out of Hospital or in Emergency Room, No. Deaths ^a (% ^b)	In Hospital, No. Deaths ^a (% ^b)
Hispanic men		
25-34	48 (89)	6 (11)
35-44	193 (78)	56 (22)
45-54	528 (69)	238 (31)
55-64	976 (61)	625 (39)
65-74	1 239 (53)	1 103 (47)
75-84	1 047 (49)	1 083 (51)
85+	742 (56)	591 (44)
Hispanic women		
25-34	9 (64)	5 (36)
35-44	29 (59)	20 (41)
45-54	119 (52)	109 (48)
55-64	320 (46)	378 (54)
65-74	656 (45)	818 (55)
75-84	974 (45)	1 206 (55)
85+	1 314 (57)	990 (43)
Non-Hispanic White men		
25-34	548 (84)	101 (16)
35-44	3 782 (82)	810 (18)
45-54	10 650 (77)	3 151 (23)
55-64	21 519 (68)	9 936 (32)
65-74	37 314 (58)	26 955 (42)
75-84	42 161 (55)	34 079 (45)
85+	27 291 (62)	16 605 (38)
Non-Hispanic White women		
25-34	156 (75)	51 (25)
35-44	706 (71)	291 (29)
45-54	2 118 (63)	1 218 (37)
55-64	6 520 (57)	4 923 (43)
65-74	19 036 (53)	16 964 (47)
75-84	41 973 (56)	32 795 (44)
85+	67 251 (69)	30 469 (31)
Non-Hispanic Black men		
25-34	156 (81)	37 (19)
35-44	781 (81)	178 (19)
45-54	1 874 (78)	539 (22)
55-64	3 301 (71)	1 325 (29)
65-74	4 515 (65)	2 399 (35)
75-84	3 491 (59)	2 395 (41)
85+	1 875 (62)	1 166 (38)
Non-Hispanic Black women		
25-34	50 (64)	28 (36)
35-44	339 (72)	131 (28)
45-54	811 (65)	435 (35)
55-64	1 842 (60)	1 224 (40)
65-74	3 287 (57)	2 467 (43)
75-84	4 284 (58)	3 150 (42)
85+	4 120 (62)	2 565 (38)

^a48 states and the District of Columbia for Hispanics and 49 states and the District of Columbia for Whites and Blacks.

^bPercentage of total coronary heart disease deaths in age group.

heart disease deaths occurred outside of the hospital or in emergency rooms (52.2% of total heart disease deaths in the 48 reporting states and the District of Columbia). In 1992, 8194 coronary heart disease deaths (53.1% of total coronary deaths) occurred outside of the hospital or in emergency rooms. Table 1 shows the percentage of coronary heart disease deaths occurring outside of the hospital or in emergency rooms by ethnicity, sex, and age. Among Hispanics, a lower percentage of coronary deaths occurred outside of the hospital or in emergency rooms than among Whites and Blacks, chiefly as a result of a lower percentage dying out of hospital (e.g., Hispanic vs non-Hispanic White men in the 55- to 64-year age group, $\chi^2 = 39$, $df = 1$, $P < .0001$). This pattern was also observed for diseases of the heart (data not shown). In the 55- to 64-year age group, the percentages dying outside of the hospital or in emergency rooms were 71% in Black men and 60% in Black women; both percentages were significantly higher than those for Whites ($P < .001$). The percentages dying outside of the hospital or in emergency rooms were higher in men than in women (e.g., Hispanics 55 to 64 years of age, $\chi^2 = 45$, $df = 1$, $P < .0001$) and higher in younger persons than in older persons (e.g., Hispanic men, $\chi^2 = 189$, $df = 6$, $P < .0001$; Hispanic women, $\chi^2 = 95$, $df = 6$, $P < .0001$) in each ethnic group.

Among Hispanic subgroups, the percentage dying outside of the hospital or in emergency rooms from heart disease in the 55- to 64-year age group did not differ significantly among Mexican Americans (53.6%), Cubans (55.1%), Puerto Ricans (55.3%), and other Hispanics (59.1%) ($\chi^2 = 5$, $df = 3$, $P = .2$). In the same age group, the percentages dying outside of the hospital or in emergency rooms from coronary heart disease were lower in Mexican Americans (54.0%) and Cubans (54.3%) than in Puerto Ricans (58.8%) and other Hispanics (62.0%) ($\chi^2 = 10$, $df = 3$, $P = .02$).

In all Hispanics 55 to 64 years of age, size of county of occurrence was related to percentage of coronary heart disease death outside of the hospital or in emergency rooms ($\chi^2 = 25$, $df = 4$, $P < .0001$), as shown in Figure 1. As among non-Hispanics ($\chi^2 = 754$, $df = 4$, $P < .0001$), the percentage was highest in counties with populations of less than 100 000 (including rural areas). However, at every population level, the percentage dying outside of the hospital or in emergency rooms was lower for Hispan-

direct method; the 1940 US total population was used as the standard. Population estimates were not available for computation of 1992 death rates for Hispanic subgroups at the time of analysis. The results of chi-square tests are given for comparisons of proportions. For comparisons of death rates, confidence intervals

were computed assuming that events followed a Poisson distribution.⁶

Results

Out-of-Hospital and Emergency Room Deaths

In persons of Hispanic origin 25 years of age and older in 1992, 10 229

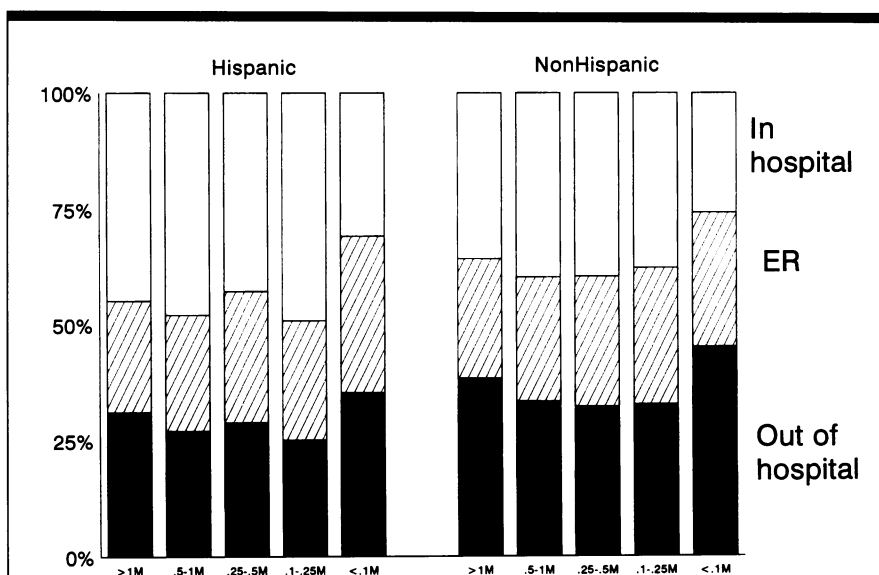
ics than for non-Hispanics (Mantel-Haenszel weighted odds ratio [OR] = 0.72, 95% confidence interval [CI] = 0.66, 0.79).

For Hispanics, educational attainment showed no consistent association with percentage dying outside of the hospital or in emergency rooms. Among Hispanic men with less than 9 years of education and those with 9 or more years of education, the percentages dying outside of the hospital or in emergency rooms were similar at 55 to 64 years of age ($\chi^2 = 0.6$, $df = 1$, $P = .4$); in the 65- to 74-year age group, percentages were higher in more educated men ($\chi^2 = 10$, $df = 1$, $P = .002$). Among Hispanic women, the percentages dying outside of the hospital or in emergency rooms did not differ significantly between groups at 55 to 64 years of age ($\chi^2 = 3.2$, $df = 1$, $P = .07$) or at 65 to 74 years of age ($\chi^2 = 0.6$, $df = 1$, $P = .4$). No significant associations were seen for Black men or women 55 to 64 years of age.

Among Hispanic men and women in the 55- to 64-year and 65- to 74-year age groups, the percentage dying from coronary heart disease outside of the hospital or in emergency rooms was lowest among married persons (e.g., 55- to 64-year-old men, $\chi^2 = 14$, $df = 3$, $P = .003$; 55- to 64-year-old women, $\chi^2 = 16$, $df = 3$, $P = .001$) (Table 2). In Black men 55 to 64 years old, the percentage dying outside of the hospital or in emergency rooms was higher among never married, widowed, and divorced men than among married men ($\chi^2 = 17$, $df = 3$, $P = .0005$). A much greater percentage of deaths occurred in emergency rooms among married men than among other men, suggesting a greater use of emergency medical services in married men. No consistent pattern was seen in Black women ($\chi^2 = 7.16$, $df = 3$, $P = .07$).

Death Rates

Among men, Hispanics had a lower age-adjusted rate (per 100 000) of total coronary heart disease death than non-Hispanic Whites (148 vs 265). Of this difference, 78% was accounted for by the lower rates of coronary death outside of the hospital or in emergency rooms (non-Hispanic White men, 166; Hispanic men, 75). Only 22% of the difference was due to lower hospital death rates (non-Hispanic White men, 99; Hispanic men, 73). In each age group, Hispanic men had lower rates of out-of-hospital or emergency room coronary heart disease death than White men. Although the absolute



Note. ER = emergency rooms; M = million.

FIGURE 1—Percentage of deaths from coronary heart disease in men 55 to 64 years of age, by Hispanic origin and population of the county where death occurred: United States, 1992.

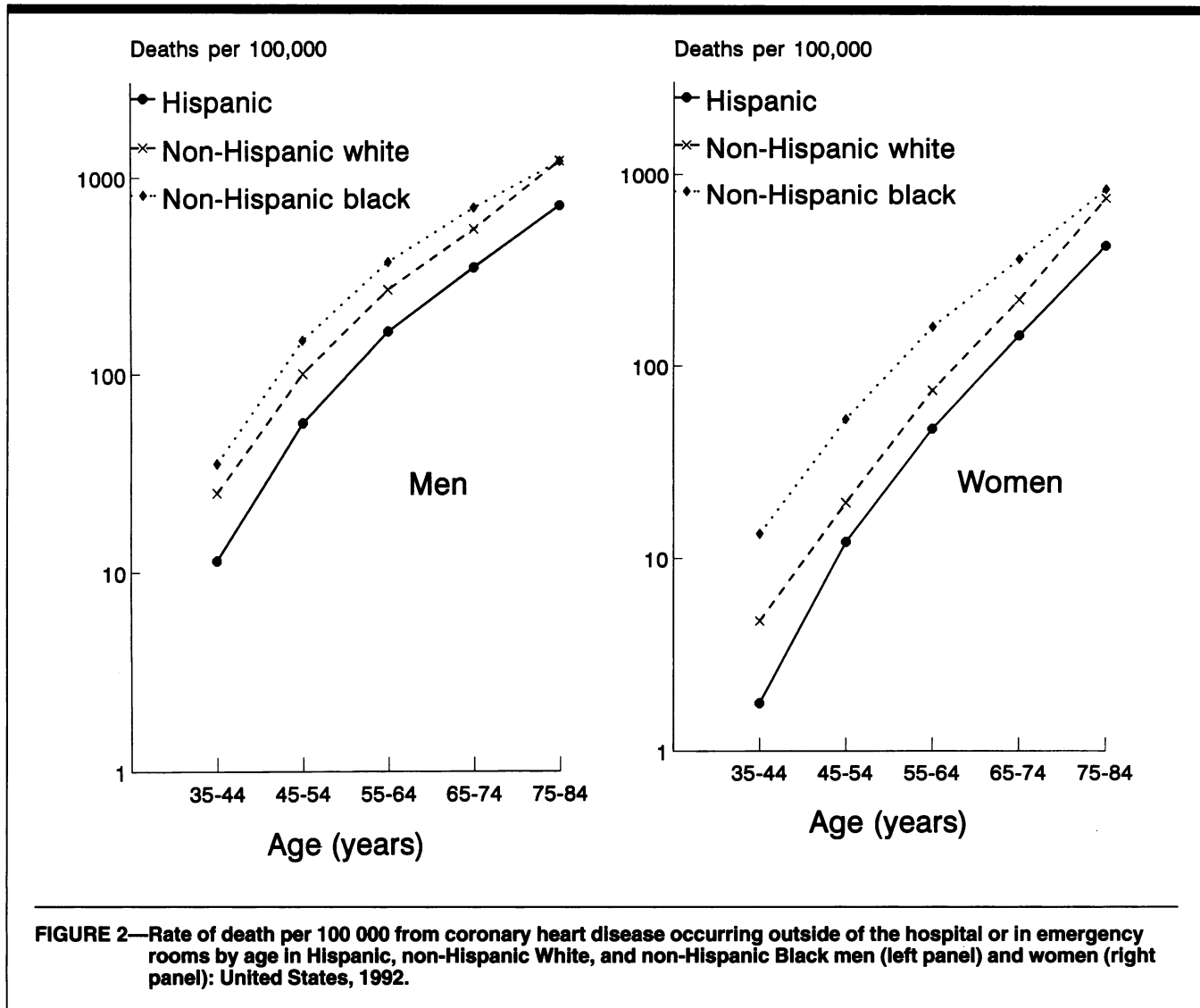
TABLE 2—Percentage of Deaths from Coronary Heart Disease, by Place of Death, Marital Status, and Sex in Hispanics 55 to 64 Years of Age: United States, 1992

	Never Married	Widowed	Divorced	Married
Men				
Out of hospital or in emergency rooms	69.5	61.6	67.9	57.9
In hospital	30.5	38.4	32.1	42.1
Women				
Out of hospital or in emergency rooms	52.9	53.1	55.9	38.9
In hospital	47.1	46.9	44.1	61.1

difference was greatest at advanced ages, the semilogarithmic plot in Figure 2 shows that the proportional difference was similar at each age. Black men had the highest death rates in each age group except the 75- to 84-year group. In the 55- to 64-year age group, the rate (per 100 000) of coronary deaths occurring outside of the hospital or in emergency rooms was 164 (95% CI = 154, 175) in Hispanic men, as compared with 268 (95% CI = 264, 272) in non-Hispanic White men and 381 (95% CI = 368, 394) in Black men.

Among women, Hispanics had a lower age-adjusted death rate (per 100 000) for total coronary heart disease than non-Hispanic Whites (81 vs 127). Of this

difference, 85% was due to the lower rate of coronary deaths outside of the hospital or in emergency rooms (non-Hispanic White women, 74; Hispanic women, 35). Only 15% of the total difference was accounted for by lower hospital coronary heart disease death rates (White women, 53; Hispanic women, 46). The pattern of age-specific rates was similar to that of men (Figure 2), except that hospital death rates were even more similar in Hispanics and non-Hispanic whites at each age (data not shown). Black women had the highest death rates in each age group except the 75- to 84-year group (Figure 2). In the 55- to 64-year age group, the rate of coronary death outside of the hospital or in emergency rooms was 47 (95% CI = 42,



52) in Hispanic women, as compared with 75 (95% CI = 73, 77) in non-Hispanic White women and 163 (95% CI = 155, 171) in Black women. In terms of both out-of-hospital or emergency room deaths and hospital deaths, rates rose exponentially with age and were higher in men than in women.

Discussion

This study provides data on sudden death in the Hispanic population of the coterminous United States. Possible explanations for lower percentages and rates of coronary death outside of the hospital or in emergency rooms among Hispanics than among non-Hispanics include (1) data artifact, (2) different care seeking or emergency medical service use patterns, and (3) different natural history of coronary heart disease in Hispanic Americans. Classification of Hispanic origin on death

certificates had high agreement with census records (89.7%) and interviews with next of kin or other informants (98.9%).^{8,9} Agreement varied little by sex. However, since 88.5% of disagreements were cases in which the origin on the death certificate was non-Hispanic and the origin on the questionnaire was Hispanic, the number of deaths and death rates of Hispanics might be as much as 20% greater than that estimated by death certificate data.⁹ However, this could explain only about a third of the excess coronary death rate in non-Hispanic Whites relative to Hispanics 55 to 64 years of age. The percentage and rate of out-of-hospital or emergency room deaths might have been further underestimated if Hispanics dying outside of the hospital or in emergency rooms were more likely to be misclassified as non-Hispanic Whites than those dying in the hospital. Census population undercounts of Hispanics

would inflate rather than deflate coronary heart disease death rates. The findings were essentially unchanged when varying groups of ICD-9 codes were used. Data artifact is unlikely to explain all of the observed findings in Hispanics.

A higher propensity to seek care for cardiac symptoms by calling emergency medical services among Hispanics than non-Hispanics cannot be ruled out; however, this explanation seems unlikely given that the percentage of deaths in emergency rooms among Hispanics was similar to that among other groups (Figure 1). Delay from chest pain onset to hospital arrival in acute myocardial infarction patients was longer in Hispanics than in Whites or Blacks.¹⁰

One report provides evidence for a different natural history of coronary heart disease following symptom onset in Hispanics relative to non-Hispanics. In men 45 to 64 years of age in Puerto Rico, about

50% of coronary heart disease deaths occurred outside of the hospital, as compared with 67% in Framingham.¹¹ Coronary heart disease incidence was reported to be lower among men in the Puerto Rico Heart Health Program than among non-Hispanic White men in Framingham.^{11,12} Additional unpublished data, obtained from the Puerto Rico Heart Health Program (P. Sorlie, PhD, written communication, October 1995), were consistent.

Available data suggest lower coronary death rates in Hispanics than in non-Hispanics.¹¹⁻¹⁷ However, population-based data from a few studies on coronary heart disease incidence in Hispanics in the coterminous United States do not suggest lower incidence or hospital case fatality rates in Hispanics than in non-Hispanic Whites.¹⁸⁻²² A lower rate of out-of-hospital coronary death, as observed in the present study and previously hypothesized for Mexican Americans,²¹ is consistent with the pattern of similar or higher acute myocardial infarction hospitalization and case fatality rates but lower overall coronary mortality rates reported for Hispanics in comparison with non-Hispanic Whites. A single report of a higher rate of sudden coronary death in Hispanics than in non-Hispanic Whites or Blacks used a definition of sudden death not comparable with that of the present study and earlier reports that included deaths of hospitalized (43% of sudden death cases) persons.²³ Furthermore, in that study, data were missing on mode of death for 25% of cases, and only a small number of coronary deaths in Hispanics were sampled (n = 133). Data are lacking on rates of survival after cardiac arrest in Hispanics.

Risk factors for sudden cardiac death that may be less prevalent in Hispanics than non-Hispanic Whites include prevalent myocardial infarction in Mexican Americans, along with heavy cigarette smoking.^{15,16,18,24} The prevalence of other risk factors for sudden death is either greater in Hispanics or similar in Hispanics and non-Hispanic Whites (e.g., diabetes, low high-density lipoprotein cholesterol, low socioeconomic status) or poorly characterized in Hispanics (e.g., left ventricular hypertrophy).^{15,16,18,25} However, lifetime exposure rates in Hispanics could be lower than in non-Hispanic Whites if acculturation in recent decades were associated with adverse risk factor changes.

The current finding of higher rates of sudden coronary death in Blacks than in

Whites is consistent with a growing body of evidence. For several decades, isolated reports have suggested a higher rate of sudden cardiac death among Blacks than among Whites, as reviewed elsewhere.^{2,4,26,27} Overall ischemic heart disease death rates have declined more rapidly in White men than in other sex-race groups; as a result, age-adjusted death rates are now higher in Black men than in White men.²⁷ In two studies, African Americans had higher cardiac arrest rates and poorer outcomes following cardiac arrest than Whites, a difference not attributable to emergency medical service response time after call for assistance.^{28,29} Greater patient or bystander delay in summoning emergency medical services and greater comorbidity among Blacks than among Whites have been suggested as explanations. The role of lower socioeconomic status in Blacks than in Whites in terms of racial differences in cardiac arrest outcomes remains unclear.^{30,31}

Further research is needed to replicate and provide explanations for the intriguing epidemiologic pattern of sudden cardiac death in Hispanic Americans and African Americans reported here. Cohort studies and cardiac registers in communities with large Hispanic populations should examine the incidence rates of sudden cardiac death and the percentage of cardiac deaths that are sudden. The validity of classification of Hispanic status on death certificates of persons dying in vs outside of the hospital should be examined to aid in interpreting vital statistics data. Emergency medical service studies should determine the incidence of cardiac arrest, resuscitation, and survival rates in Hispanics and non-Hispanic Whites and Blacks. If such studies confirm that the pattern reported here is not due to artifact, medical care and biologic mechanisms for the relative paucity of sudden vs nonsudden cardiac death in Hispanics should be sought. Studies of acute myocardial infarction patients and the next of kin of those suffering sudden cardiac death should examine ethnic differences in event triggers and in care seeking for acute cardiac symptoms. Cohort and case-control studies and case series should examine the relative frequency of pump failure and arrhythmia as early complications of myocardial infarction in Hispanics and non-Hispanics. Autopsy studies should examine the pathologic substrate of sudden death and fatal acute myocardial infarction in Hispanics and non-Hispanics. Key to the reduction of sudden cardiac

death in all ethnic groups is the prevention, both primary and secondary, of coronary heart disease and the improvement of survival among persons suffering cardiac arrest.^{2-5,27,32} Targeted interventions for primary and secondary prevention of sudden cardiac death are needed for high-risk groups such as African Americans. □

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