DISPARITIES IN HYPERTENSION-RELATED MORTALITY AMONG SELECTED HISPANIC SUBGROUPS AND NON-HISPANIC WHITE WOMEN AGES 45 YEARS AND OLDER – UNITED STATES, 1995–1996 AND 2001–2002

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Objectives: To compare hypertension-related mortality (HRM) age-standardized and age-specific rates for Hispanic subgroup and non-Hispanic White (NHW) women; to identify underlying causes of HRM by Hispanic subgroup and age; and to examine relative percent change in HRM among Hispanic subgroups and NHW women.

Design: Secondary data analyses of 1995–1996 and 2001–2002 national vital statistics multiple cause mortality files.

Setting: United States—50 states and District of Columbia.

Subjects: Mexican American (MA), Puerto Rican (PR), Cuban (CA) and NHW female decedents ages ≥45 years with hypertension listed as one of up to 20 conditions resulting in death.

Main Outcome Measures: Age-standardized death rates (ASDR per 100,000) for HRM and relative percent change to examine trends (2-year intervals).

Results: During 1995–1996, the ASDR (per 100,000) for HRM was highest among PR (248.5) followed by NHW (188.7), MA (185.4), and CA women (139.7). During 2001–2002, PR (215.5) and MA (205.5) had higher ASDR for HRM than NHW (171.9) and CA women (104.6). The relative percent increase from 1995–1996 to 2001–2002 was 10.8% ($P<.01$) among MA, while CA (−25.1%, $P<.01$), PR (−13.3%, $P<.01$) and non-Hispanic Whites (−8.5%, $P<.01$) showed a decrease.

Conclusions: HRM was highest among PR and MA women, increased significantly for MA women between 1995–1996 to 2001–2002, and declined for CA, PR and non-Hispanic White women. Public health efforts should focus on strengthening heart health protection communication and hypertension control programs for PR and MA women and their healthcare providers. (*Ethn Dis*. 2007;17:434–440)

Key Words: Hypertension, Mortality, Epidemiology, Hispanics/Latinos, Women

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NOTE: In this paper, the terms Latino and Hispanic are used interchangeably.

INTRODUCTION

Hypertension is a powerful determinant of premature death and disability from cardiovascular disease and other causes.[1] Mortality data by Latino origin have been available from almost all states since 1990 but these data are not readily available by both subgroup and gender.[2–6] Age-adjusted mortality rates for the first and third leading causes of death–heart disease and stroke–are lower for Hispanic than non-Hispanic White (NHW) women, although the proportion of deaths due to cardiovascular disease is similar.[7–8] However, stroke death rates have not decreased as rapidly for Hispanics as for NHWs and non-Hispanic Blacks (NHB).[9] Stroke death rates below 65 years of age, and age-adjusted years of potential life lost before age 75, are greater for Latinas than NHW women.[10–11] Cerebrovascular disease mortality varies by Hispanic subgroup with age-adjusted stroke death rates highest among Puerto Rican (PR) women than Cuban (CA) or Mexican American (MA) women.[11] Cerebrovascular disease mortality rates are lower in the United States than in countries of origin for most US Hispanic immigrants, with the exception of Puerto Rico.[12]

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Since the 1982–1984 Hispanic Health and Nutrition Examination Survey (HHANES), few studies on hypertension, particularly studies using blood pressure measurements, among Latino subgroups other than Mexican-Americans have been conducted. Self-reported hypertension is not as useful for surveillance of hypertension trends among MA as compared to NHW and NHB, since validity of self-reported hypertension is lowest among persons who have not had a medical visit in the past year.[13] HHANES found 15.5% of CA women had high blood pressure compared to 14.1% of MA women and 11.5% of PR women.[14] More recent studies suggest that MA have similar or lower rates of hypertension than NHW.[15] The National Health and Nutrition Examination Survey (NHANES) found Hispanics to have the second highest rates of stage 1 and stage 2 hypertension, lower

than NHBs but higher than NHWs.[16] Little is known about the current burden of hypertension and its impact on mortality among subgroups of Latinas. Given the unfavorable cardiovascular disease risk profile experienced by Latinas,[8,9] analyses of hypertension-related mortality and its underlying causes may provide some insight into factors associated with cardiovascular disease. The purposes of this paper are to: 1) compare age-standardized and age-specific death rates for HRM by Hispanic subgroup to NHW; 2) identify underlying causes of HRM by Hispanic subgroup and age; and 3) examine relative percent change (1995–1996 to 2001–2002) in HRM among Hispanic subgroups of women and non-Hispanic White women.

METHODS

National vital statistics multiple-cause mortality files from 1995–1996 and 2001–2002 were analyzed for all Hispanic and non-Hispanic White female decedents, at least 45 years of age, with hypertension listed as one of up to 20 conditions resulting in death. Patterns for combined year periods of 1995–1996 and 2001–2002 were examined using the number of deaths of decedents of all ages with hypertension, the age distribution, percentage of persons with hypertension reported as the underlying cause of death, and relative percent change for age-standardized death rates (ASDR per 100,000) for HRM among Mexican American (MA), Puerto Rican (PR), and Cuban (CA) women.

The International Classification of Diseases (9th revision or ICD-9 for 1995–1996; ICD-10 for 2001–2002) was used to code diseases and conditions reported on death certificates.[17–18] The underlying cause of death is the disease (or injury) that initiated the sequence of events leading directly to death. For these analyses, hypertension-related mortality is defined as either mention of hypertension as the underlying cause or as a contributory (any of the possible 20 conditions on the death certificate) cause of death. Hypertension codes used include essential hypertension, hypertensive heart disease, hypertensive renal disease, and hypertensive heart and renal disease, and secondary hypertension (ICD-9 codes 401–405.9 for years 1995–1996 and ICD-10 codes I10.0–I15.0 for years 2001–2002).

Age-standardized death rates (ASDR), using the United States 2000 standard population[19] for hypertension as a multiple cause (any listing) were estimated for groups defined by Hispanic subgroup of women using combined data for 1995–1996 and 2001–2002. Census Bureau projections of the US resident population by age, race, and Hispanic subgroup were used to calculate age and Hispanic subgroup-specific death rates per 100,000 US population. The racial/ethnic subgroups used were: Mexican American (MA), Puerto Rican (PR), Cuban (CA), and non-Hispanic White (NHW).[20–21] The change in HRM from 1995–1996 to 2001–2002 among Hispanic subgroups of women was examined using relative percent change of age-standardized death rates and 95% confidence intervals.

Multiple-cause mortality data were limited to all deaths occurring in the 50 states and the District of Columbia among US residents. Deaths of US citizens and members of the Armed Forces occurring outside the United States are not included. Women <45 years of age accounted for <2% of hypertension-related mortality (HRM).

RESULTS

During 2001–2002, 6,703 Mexican, 1,628 Puerto Rican and 1,030 Cuban women died of hypertension-related causes. In 1995–1996, the age-standardized HRM death rate per 100,000 was highest among PR (248.5) followed by NHW (188.7), MA (185.4), and CA (139.7) women (Table 1). In 2001–2002, PR (215.5) and MA (205.5) had higher HRM ASDR than NHW (171.9) and CA women (104.6). MA women show a relative percent increase of 10.8% (99%CI=8, 14) while a decrease is seen for Cuban (−25.1%, 99%CI=−18, −35), Puerto Rican (−13.3%, 99%CI=−10, −17)) and Non-Hispanic White women (−8.9%, 99%CI=−6, −11).

Age-specific patterns of hypertension-related mortality are shown in Table 1 for Hispanic subgroup and non-Hispanic White women. Hypertension-related mortality increased for MA women 45–64 years of age (+11.6%, 99%CI=7, 21) and at least 85 years of age (+43.2%, 95%CI=40, 47), but declined for MA women between the ages of 65–84 years (−9.7%, 99%CI=−8, −12). Among PR women, HRM death rates increased 50.1% (99%CI=46, 55) for those aged 85 years and older, and decreased −39.4% (99%CI=−33, −48) among those 65–84 years of age, and −1.3% (99%CI=−1, −2) among 45–64 years. HRM rates decreased for all age groups of CA women; the greatest decreases were among those 65–84 years of age (−35.5%, 99%CI=−27, −46). Among NHW, HRM increased 11% (99%CI=6, 22) among 45–64 year olds and 9.8% (99%CI=9, 11) among those at least 85 years of age, but decreased −25.5% (99%CI=−20, −32) among those 65–84 years of age.

Among Hispanic women with hypertension-related death during 2001–2002, the most common underlying cause of death was diseases of the circulatory system (66.5%), including coronary heart disease (37.8%) and stroke (19.0%) (Table 2). This distribution of disease categories differed by Hispanic subgroup. For example, coronary heart disease was listed more often as an underlying cause of death among

Table 1. Age-standardized and age-specific hypertension-related death rates*† among Hispanic subgroups of women and non-Hispanic White women aged ≥45 years – United States, 1995–1996 and 2001–2002

Ethnic Groups/Age Groups	Age-standardized and age-specific death rates (per 100,000) 1995–1996	2001–2002	Relative percent change (%) (95% confidence interval)
Cuban American (age-standardized)	104.6*	139.7*	−25.1 (−18, −35)
45–64	32.2	29.3	−8.9 (−5, −17)
65–84	234.0	150.9	−35.5 (−27, −46)
≥85	1075.7	580.8	−20.9 (−40, −53)
Puerto Rican (age-standardized)	215.5*	248.5*	−13.3 (−10, −17)
45–64	59.1	58.4	−1.3 (−1, −2)
65–84	484.8	293.8	−39.4 (−33, −48)
≥85	1270.0	1906.5	+50.1 (+46, +55)
Mexican American (age-standardized)	205.5*	185.4*	+10.8 (+8, +14)
45–64	36.3	40.6	+11.6 (+7, +21)
65–84	312.4	282.1	−9.7 (−8, −12)
≥85	1411.5	2021.3	+43.2 (+40, +47)
Non-Hispanic White (age-standardized)	171.9*	188.7*	−8.9 (−6, −11)
45–64	29.4	32.7	+11.0 (+6, +22)
65–84	316.0	235.5	−25.5 (−20, −32)
≥85	1558.2	1711.0	+9.8 (+9, +11)

* Direct age-standardization was calculated using the United States 2000 standard population
† ICD codes used for either the underlying cause or contributory cause of death were 401–405.9 (ICD-9) for years 1995–1996, and I10.0–I15.0 (ICD-10) for years 2001–2002.

women with HRM for CA (72.5%) and PR (67.5%) than MA women (63.8%). Diabetes was listed more often as the underlying cause of death among women with HRM for MA (16.1%) than PR (13.0%) and CA women (8.3%). Stroke was listed more often as a cause of death among women with HRM for MA (19.9%) compared to PR (15.1%) and CA (11.9%).

Table 2. Distribution of major disease categories* coded as the underlying cause of death among Hispanic female decedents with hypertension, by Hispanic subgroup:– United States, 2001–2002

Underlying Cause of Death Disease Category (NCHS 113 codes†)	Total (*N*=9,361) %	Hispanic Subgroup‡ Mexican (*n*=6,703) %	Puerto Rican (*n*=1,628) %	Cuban (*n*=1,030) %
Neoplasms (20–43)	6.6	7.2	4.4	7.3
Diabetes Mellitus (46)	13.7	16.1	13.0	8.3
Diseases of the Circulatory System (55–75)	66.5	63.8	67.5	72.5
Coronary heart disease (55–68)	37.8	36.3	41.6	45.4
Hypertension (56)	9.7	8.5	11.3	12.1
Cerebrovascular disease (70)	19.0	19.9	14.6	15.0
All other codes	13.2	12.9	15.1	11.9
TOTAL	100.0	100.0	100.0	100.0

* Disease category is listed if coded for at least 5% of all decedents within each age group
† NCHS 113, National Center for Health Statistics major disease categories
‡ ''Central/South Americans'' and ''Other Hispanics'' are not included in the total.

Hypertension-related mortality (HRM) comprised a greater proportion of deaths among Cuban American and Puerto Rican female decedents with hypertension than Mexican Americans, while the proportion of deaths due to stroke was highest among Mexican Americans.

DISCUSSION

Our findings are consistent with prior studies and confirm distinct patterns of HRM by subgroup: PR have the highest age-standardized HRM rates among Latinos.[22] HRM comprised a greater proportion of deaths among CA and PR female decedents with hypertension than MA, while the proportion of deaths due to stroke was highest among MA.

Latinas, especially PR women, are disproportionately affected by known precursors to hypertension including overweight, diabetes, low HDL cholesterol, metabolic syndrome and depression.[23–27] Latinos are also more likely to have multiple conditions, such as diabetes and hypertension, and more fatal/severe outcomes from multiple conditions.[28–30] These factors are exacerbated when they intersect with low-socioeconomic status and race/ethnicity.[31] For example, a study of hypertension in Puerto Rico found that the prevalence of high blood pressure among darker-skinned Puerto Ricans is associated with the social aspects of skin color rather than biological differences.[32]

Improved rates of detection and control of hypertension, medication and lifestyle modification and patient

education relating to risk factor reduction are associated with the decline in mortality from cardiovascular and cerebrovascular diseases in the United States over recent decades.[33–37] However, control of hypertension remains generally poor nationwide, with MAs having the lowest rates of hypertension control.[9,15,31,38–40] Rates of hypertension control in Cuba are the highest in the world, and cardiovascular disease (CVD) rates are declining.[33] People with uncontrolled hypertension are three to four times more likely to develop coronary heart disease, seven times more likely to have a stroke and at higher risk for congestive heart failure, myocardial infarction, end-stage renal disease, and peripheral vascular disease.[41]

Hypertension treatment is similar for all demographic groups, but important barriers to blood pressure control in some minority patients include socioeconomic factors and lifestyle.[42] Lower education and health literacy of patients, lower health insurance coverage, and fewer physician visits during the post-reproductive years, as well as poor communication between provider and patient, may partly explain lower rates of awareness, treatment and control.[9,15,43–44] Despite the widespread availability of evidence-based guidelines for treating hypertension, physicians may not be prescribing first-line drugs for their patients with high blood pressure.[45] One study found higher guideline adherence rates for NHB and Hispanics than NHW; however Hispanics were the least likely to have their drug therapy intensified compared to other racial/ethnic groups resulting in lower blood pressure control.[46] Differences in the prevalence of diabetes and frequency of clinic visits may explain the lower Hispanic rate of intensification of antihypertensive medications in response to repeatedly uncontrolled blood pressure.[28]

In addition to having higher rates of diabetes and uncontrolled hypertension, Latinas also experience higher rates of other risk factors associated with hypertension and cardiovascular disease (eg, overweight, sedentary lifestyle, low HDL cholesterol, metabolic syndrome).[8,24–26,47–50] Forty-eight percent of MA women are overweight compared to 40% of PR and 32% of CA women[51–52] and this is associated with higher levels of poverty.[29,53] Latinas at least 40 years of age report lower rates of participation in moderate physical activity, and higher rates of sedentary activity than NHW women.[54–55] Latinas are less likely to smoke than other racial/ethnic women; however, differences in rates of current tobacco use exist by subgroup. CA and MA women are less likely to be current tobacco users than PR women.[53,56] In contrast, adult Latinas are more likely to consume alcohol than NHB women but less likely than NHW women.[57] Latinas are also less likely than NHW women to engage in preventive screening practices, less likely to be diagnosed in the early stages of chronic conditions, less likely to know about their illnesses, and less likely to have received pertinent health information.[58–59] PR and MA women are more likely to report fair or poor health compared to NHW and CA women.[60–62]

HRM differences by Hispanic subgroup may be partly explained by the higher rates of poverty among PR and MA women compared to CA women. Compared to NHW (12.9%) and NHB women (18.4%), Latinas are the least likely to have health insurance: 39% of MAs, 19% of PRs and 21% of CAs.[37] MA and PR women are the least likely to have completed high school and college and to be employed compared to CA women and other racial/ethnic groups.[3] Persons with less than a high school education tend to have a higher burden of cardiovascular disease risk factors.[9] Patients with higher levels of education are more likely to have controlled hypertension, to use healthcare services and to understand the connection between nutrition and blood pressure levels.[37,43]

Despite a general trend for lower healthcare utilization among non-elderly Latinos, Medicare data show higher rates of hospitalization for congestive heart failure for Hispanics than NHWs suggesting a significant burden within this population.[53,63] Indeed, the Brain Attack Surveillance in Corpus Christi project (BASIC) clearly demonstrated an increased incidence of intracerebral hemorrhage, subarachnoid hemorrhage, ischemic stroke and TIA at younger ages among MAs compared with NHWs.[64]

Lowering blood pressure in patients with diabetes and hypertension is associated with a decrease in cardiovascular events, renal failure, adult outpatient visits and use of prescription drugs.[15,48–49,65] Among Latinas, high prevalence of hypertension and diabetes, coupled with the accumulated effects of poverty, lower rates of health insurance coverage, adverse environmental contexts and behavioral risk factors[25] may contribute to decreased functional status.[29,66–67] These factors may constitute precursors to hypertension-related conditions and CVD among Latinas.

Since hypertension is frequently mentioned as a health condition, but not as an underlying cause of death,[68] this study included both hypertension as an underlying cause or a contributory cause of death. When hypertension is listed as the underlying cause of death, it is often due to the lack of good diagnostic information to be attributed to coronary heart disease.[69,70] Providers may not have reported the ICD-9 hypertension code related to the death of the individual, resulting in misdiagnosed or undiagnosed hypertension. The ICD category, ''symptoms, signs, and ill-defined conditions,'' is used more frequently for Latinos compared to other racial/ethnic groups and suggests the possibility of greater underreporting of hypertension for Latina decedents.[71]

Data limitations include lack of information on health insurance coverage, income and related variables on

death certificates, unreliable educational and occupational data due to high rates of missing information, and the potential for racial/ethnic misclassification of Latinos. For example, the US National Death Index (NDI) significantly underestimates Hispanic mortality rates, particularly for women. When underascertainment is taken into account, elderly MA women have an 18% higher mortality rate than NHW women.[72] This study has improved upon prior studies by presenting data separately by Latino subgroup and not aggregating all Latinos.

Hypertension has been described as one of the most important modifiable risk factors for cardiovascular disease.[48] Yet, it has been understudied in Latinas who will soon represent one out of every four women.[20] To achieve the goal of *Healthy People 2010* to eliminate health disparities in the areas of diabetes, heart disease and stroke, new data are needed on hypertension-related mortality by Hispanic subgroup, sex, age, birthplace and socioeconomic status. Specifically, more research is needed to better understand the improvements in HRM rates observed for all Cuban age groups, all but the 85 years of age and older Puerto Rican groups, and the 65–84 age group of Mexican and NHW women. More effective CVD prevention programs and policies are essential to reduce CVD mortality disparities.[49] Improving provider-patient communication, access to health information, and early screening for hypertension-related conditions are central prevention strategies. Literacy and language-appropriate media campaigns to inform Latinas of the symptoms of hypertension and diabetes, as well as the risks associated with overweight and low physical activity, are crucial to modify the risk of HRM and CVD.

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