VARIATIONS IN HIP FRACTURE HOSPITALIZATION RATES AMONG DIFFERENT RACE/ETHNICITY GROUPS IN NEW YORK CITY

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Hip fractures are a major cause of death and disability among the elderly. Although previous studies have shown hip fracture rates to be highest among Whites, and lowest among Blacks, less is known about how these differences are affected by gender and age. We determined the hip fracture hospitalization rates for non-Hispanic Whites, Blacks, Hispanics, and Asians in New York City from 1988 to 2002 using Statewide Planning and Resource Cooperative System data from the New York state Department of Health. We found that hip fracture hospitalization rates for those aged 50 and older were higher for women than men, with a risk ratio of 1.75 (95% confidence interval [CI] 1.73–1.77). Annual age-adjusted hip fracture hospitalization rates among White, Black, Hispanic, and Asian women were 459, 137, 143, and 174 per 100,000, respectively. The corresponding rates for men were 230, 109, 87, and 104, respectively. For both genders, and all race/ethnicity groups, the rates increased sharply with age. Although overall, women had higher rates compared to men, these differences varied by race and age. For Whites and Asians, women had higher rates for all age groups older than 50 years. For Hispanics aged 50–59, men had a higher rate than did women, but this gender relationship reversed after age 60. For Blacks, however, men had higher rates than women until age 70, after which women had higher rates. These results demonstrate that race/ethnicity, as well as age and gender, influence the incidence of hip fractures. Moreover, Asians, with their low bone mass, showed no increased hip fractures, compared to non-Hispanic Blacks and Hispanics. Further study is needed to explain this paradox. (*Ethn Dis.* 2004;14:280–284.)

Key Words: Hip Fractures, Hospitalization, Race/Ethnicity

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INTRODUCTION

Hip fractures are a major cause of death and disability among the elderly.[1] One of every 6 White women will have a hip fracture during her lifetime,[2] and the event has serious consequences, including significant impairment of survival, a high prevalence of prolonged disability, and increased likelihood of institutionalization.[3,4] Risks for hip fracture after the age of 45 years are greater for women than men, and increase with age.[5] Strong evidence links hip fractures with low bone mass among those older than 50 years.[6] Bone mass decreases with age in both men and women. Whites have significantly lower bone mass than Blacks at all ages. This racial difference in bone mass is associated with differences in risk for hip fracture, regardless of age and gender.

Previous epidemiological studies have demonstrated that White women had a 2-fold increased risk for hip fractures, compared with Black[7] and/or Mexican-American women.[8] Asians appear to have lower bone mass than Whites (although the difference is decreased after adjusting for body size).[9,10] Therefore, Asians might be expected to have similar, or higher, hip fracture rates compared to Whites. However, the incidence of hip fractures among Japanese appears to be lower than among Caucasians.[11] A study of California Hospital Discharge Data found a consistently lower risk of hip fractures after the age of 60 years in Hispanic, Black and Asian women, compared to White women.[12]

Since there is no community-based survey, or hip fracture registry, hospitalization data may be the best source from which to estimate hip fracture rates. It has been reported that 85% to 100% of all patients with hip fractures are hospitalized.[13] To explore the influence of race/ethnicity and gender on hip fracture, we examined the New York hospital discharge data from 1988 to 2002 to estimate hip fracture rates among Whites, Blacks, Hispanics, and Asians.

METHODS

The database for the study was the New York Department of Health's acute-care discharge database, containing the Statewide Planning and Resource Cooperative System (SPARCS) data from 1988 to 2002. The SPARCS is a legislatively mandated discharge database and contains discharge data abstract for at least 95% of all New York state acute care hospitalizations, excluding hospitalizations at psychiatric and federal hospitals. The SPARCS database is a rigorous reporting system for New York. Data are edited monthly to identify errors, and audit reports are generated following monthly updates.[14] The discharge information from SPARCS includes patient's disposition, age, gender, race, admission status, physician and hospital identifiers, principal diagnosis, up to 14 secondary diagnoses, principal procedure code, and up to 14 other procedure codes. Diagnoses and procedures are coded using the International Classification of Disease, Ninth Revision, Clinical Modification (ICD-9-CM). Data records in the system are abstracted from medical records by trained

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medical records personnel in each hospital, and the New York Department of Health is responsible for verifying the accuracy of reported information. Data on race/ethnicity are based on demographic information obtained from the medical records and coded to describe the ethnic origin of patients, such as Spanish/Hispanic origin, or not of Spanish/Hispanic origin. We categorized race/ethnicity as non-Hispanic Whites (Whites), non-Hispanic Blacks (Blacks), non-Hispanic Asians (Asians), and Hispanics. Because of the lack of personal identifiers, it is impossible to identify multiple hospitalizations for each patient.

This study includes all admissions to the hospitals in the 5 boroughs of New York City. The hospitalizations with a principal diagnosis of ICD-9 820.0–820.9 were used to define diagnoses of hip fractures. For the purpose of this study, we included only patients aged 50 and older.

Population estimates were based on 1990 and 2000 US Census data for New York City, and the total population was estimated based on the average of these. Age-adjusted hip fracture hospitalization rates were calculated, specific for gender and race/ethnicity (Whites, Blacks, Hispanics, and Asians), using the 2000 US population as the standard, with 5-year intervals of age. Age-specific hip fracture rates were also estimated for each age group (50–59, 60–69, 70–79, and ≥80 years). Relative risk ratios and 95% confidence intervals of hip fractures among Blacks, Hispanics, and Asians, compared to Whites, were estimated. Furthermore, relative risk ratios of hip fractures of women, compared to men, were computed for each race/ethnicity group.

To measure the trend of hip fracture over years, the age-adjusted hip fracture rates from 1988 to 2002 were estimated. The denominator of each single year was calculated by the point estimation based on the 2 census years (1990 and 2000).

RESULTS

Between 1988 and 2002, there were 92,276 hip fracture hospitalizations among patients aged 50 and older in New York City, with an average of 6,152 patients hospitalized annually. Over the 15-year study period, annual age-adjusted hip fracture hospitalization for women and men were 336.2 and 192.4 per 100,000, respectively, with the ratio of women to men being 1.75, with 95% confidence interval of 1.73–1.77.

Age-adjusted, gender- and race-specific annual hip fracture hospitalization rates are displayed in Table 1. For both women and men, hip fracture rates were highest among Whites. Blacks, Hispanics, and Asians had rates about one-third or half those of Whites. While hip fracture hospitalization rates were higher for women than for men in all race/ethnicity groups, the largest gender difference was found among Whites (risk ratio 1.99, 95% confidence interval 1.94–2.03) and smallest for Blacks (risk ratio 1.26, 95% confidence interval 1.29–1.42).

Categorized into 10-year age groups, hip fracture hospitalization rates for each age group by race are displayed in Table 2. Compared with Whites, Blacks, Hispanics, and Asians had sharply lower hip fracture hospitalization rates at all age groups, and for both genders.

Table 3 revealed that while age-specific hospitalization rates were higher for women than for men in all age groups among Whites and Asians, this was not the case for Blacks and Hispanics. For Blacks, hip fracture hospitalization rates were higher for men than for women among those aged 50 to 69 years. For Hispanics, the rate for men was greater than for women aged 50–59, and after that, women had higher hospitalization rates.

The trends of hip fracture hospitalization rates from 1988 to 2002 are displayed in Figure 1. For both women and men, the hip fracture hospitalization rates were highest among Whites. Although the rates decreased over the years, no significant trend was detected except for White women, with the annual percentage of decrease of 4.4% (P=.037, 95% confidence interval 0.3% to 8.4%).

Table 1. Annual age-adjusted hip fracture hospitalization rate (per 100,000) and number of hospitalization by gender and race, and relative risk (RR) with 95% confidence interval (CI) with Whites as reference, New York City, 1988–2002

	Whites	Blacks	Hispanics	Asians
Women	459.0	137.4	143.1	173.6
Number	53,125	4,258	3,062	1,203
RR (95% CI)	1	0.30 (0.283–0.326)	0.31 (0.28–0.34)	0.38 (0.34–0.42)
Men	230.3	109.4	87.2	104.0
Number	14,576	1,794	1,073	545
RR (95% CI)	1	0.48 (0.46–0.51)	0.38 (0.34–0.43)	0.45 (0.39–0.50)
Ratio women/men	1.99	1.26	1.64	1.67

Table 2. Annual hip fracture hospitalization rates (per 100,000) by age, gender and race/ethnicity, New York City, 1988–2002

	Whites	Blacks	Hispanics	Asians
		Women		
50–59 years	45.9	14.4	10.0	11.9
Number	1,179	218	141	58
RR, 95% CI*	1	0.31 (0.22–0.40)	0.22 (0.13–0.31)	0.26 (0.13–0.39)
60–69	171.1	50.6	43.0	52.2
Number	4,125	559	393	161
RR, 95% CI	1	0.30 (0.23–0.37)	0.25 (0.18–0.32)	0.31 (0.21–0.41)
70–79	612.6	171.1	175.5	228.4
Number	13,636	1,185	893	390
RR, 95% CI	1	0.28 (0.24–0.32)	0.29 (0.21–0.37)	0.37 (0.28–0.47)
≥80	2196.3	678.4	749.0	881.6
Number	34,185	2,296	1,635	594
RR, 95% CI	1	0.31 (0.29–0.34)	0.34 (0.30–0.39)	0.40 (0.34–0.45)
		Men		
50–59	34.5	27.6	14.4	10.3
Number	801	303	160	47
RR, 95% CI	1	0.80 (0.70–0.89)	0.42 (0.32–0.51)	0.30 (0.15–0.46)
60–69	89.6	53.3	29.9	27.2
Number	1,769	393	197	75
RR, 95% CI	1	0.59 (0.50–0.67)	0.33 (0.22–0.43)	0.30 (0.19–0.40)
70–79	281.1	139.7	104.0	116.2
Number	4,094	517	295	159
RR, 95% CI	1	0.50 (0.43–0.58)	0.37 (0.28–0.46)	0.41 (0.30–0.51)
≥80	1102.1	451.8	426.2	563.1
Number	7,912	581	421	264
RR, 95% CI	1	0.41 (0.34–0.49)	0.38 (0.30–0.46)	0.51 (0.42–0.60)

* Relative risk (RR) and 95% confidence interval (CI) were estimated using Whites as reference.

DISCUSSION

From 1988 to 2002, in New York City, Whites had the highest hip fracture hospitalization rates for those aged 50 years or older. Asians, Blacks, and Hispanics had similar hip fracture hospitalization rates, although the rates among women were slightly higher among Asians, compared to Blacks and Hispanics, especially among those aged 70 years and older. In addition, among Whites and Asians, women had higher hospitalization rates than men after age 50, but this difference was not found among Blacks and Hispanics. In fact, Hispanic men, aged 50–59 years, had higher rates than similarly aged Hispanic women. This finding also occurred among Black men and women, aged 50–59 years.

Earlier reports revealed similar increasing, rates of hip fracture hospitalization among Whites and Blacks older than 50 years.[15] Hip fracture hospitalization rates for White women were 1.5 to 4 times that of Black women after the age of 40 years, and approximately double that of White men after the age 50 years. Another study, based on a summary of hospitalizations from California, revealed a consistently lower risk for hip fracture after age 60 in Hispanic, Black, and Asian women, compared to White women. Overall age-adjusted hip fracture rates among Hispanic, Black, and Asian women were 49.7, 57.3, and 85.4, respectively, and 140.7 for White women. These differences were not found in men.[12] Later, a comparison of hip fracture incidence among native Japanese, Japanese Americans, and American Caucasians, revealed that age-specific hip fracture rates among persons of Japanese ancestry were approximately half those among Caucasians of both sexes.[11]

Strong evidence links hip fractures with low bone mass among the elderly.[16,17] The observed higher hip fracture hospitalization rates among Whites are consistent with this finding. Whites generally have lower bone mineral density, compared to Blacks and Hispanics.[18] However, the relatively lower hip fracture hospitalization rates for Asians compared to Whites seem paradoxical—Asians have bone mineral density lower than that of Whites on average, although the difference is magnified by differences in body size.[19–22] Therefore, Asians might be expected to have hip fracture rates as high as, or higher than, those for Whites. Findings from previous studies, as well as this current study, suggest that factors other than bone mass might contribute to the observed differences in hip fracture rates. For example, perhaps a shorter hip axis length might protect Asian women from hip

Table 3. Relative ratios and 95% confidence interval (CI) of hip fracture hospitalization rate of women over men by age and race, New York City, 1988–2002

	Whites	Blacks	Hispanics	Asians
50–59 years	1.33	0.52	0.69	1.16
95% CI	1.24–1.44	0.39–0.66	0.54–0.83	1.03–1.29
60–69	1.91	0.95	1.44	1.92
95% CI	1.83–2.02	0.86–1.05	1.33–1.56	1.78–2.07
70–79	2.18	1.22	1.69	1.97
95% CI	2.15–2.22	1.16–1.28	1.63–1.74	1.89–2.05
80	1.99	1.50	1.76	1.57
95% CI	1.97–2.01	1.45–1.55	1.70–1.82	1.49–1.65

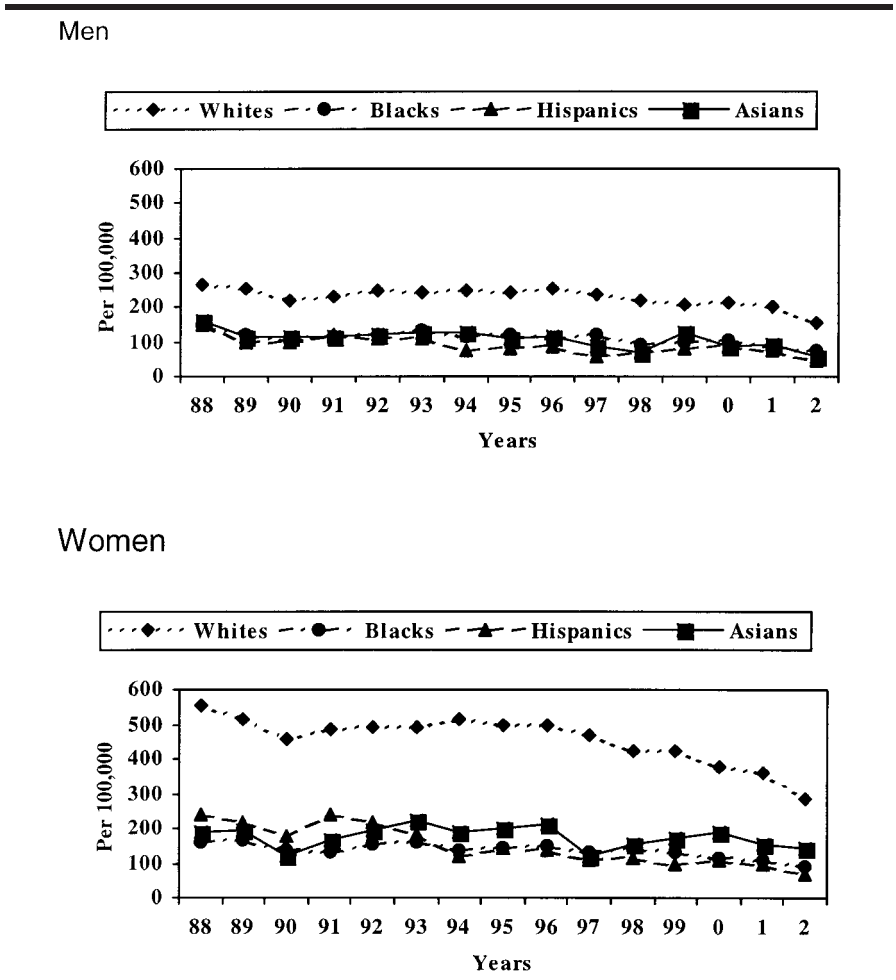

Fig 1. Trends of age-adjusted hip fracture rates by race and gender, New York City, 1988–2002

fracture.[23] The mean hip axis lengths of Asian and Black women are significantly shorter than that of White women.[22,23]

Overall, hip fracture rates are higher for men before the age of 40 years, becoming higher in women after the age of 45 years.[24] This male-female hip fracture rate "crossover" had been reported in Whites at around age 45, but is much older for non-Whites.[13,15] In this study, the "crossover" in both Whites and Asians occurred before the age of 50 years, but was 60 years for Hispanics, and 70 years for Blacks. The later crossover among Hispanics and Blacks suggests that reduced bone density and osteoporosis may affect hips later in their lives, compared to Asians and Whites. Hip fractures occurring to those younger than 45 years, when osteoporosis and low bone mass are rare, are most likely due to injury and trauma,[25] which probably accounts for the higher risk for men, especially Black men, compared to women.

Our estimated rates, based upon hospitalization rates, are subject to errors of ascertainment of both the number of cases (the numerator), and the total susceptible population (the denominator). The number of cases may have been under- or over-estimated by misclassification of disease or ethnicity. Although general validity studies have been performed for SPARCS data, we were unable to validate the specific ICD codes. In addition, the number of cases would be underestimated if patients were treated outside of a hospital, even though approximately 85%–100% of all patients with hip fractures are hospitalized.[13] On the other hand, the number of cases may have been overestimated if there were re-admissions, or admissions for a second fracture. Previous studies have found that the incidence rate of second hip fracture is 9% in a 10-year period,[26] suggesting that refracture would increase the rate by less than 1% per year in patients with prior fractures. The 1990 and 2000 US Census data were used as denominators for estimating the hospitalization rate, while the numerator was from 1988 to 2002. The denominator was generally calculated on 2-point estimation, and based on the assumption that the population changes during the period were linear. Nevertheless, given the large data base, the results of this report would be important for healthcare service and policy.

In addition, among Whites and Asians, women both had higher hospitalization rates [for hip fracture] than men after age 50, but this difference was not found among Blacks and Hispanics.

In summary, hip fracture hospitalization rates in New York City, from 1988 to 2002, were highest among Whites. Even with generally lower bone mass, Asians had hip fracture hospitalization rates similar to those for Blacks and Hispanics.

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