



©David Wells/The Image Works

# 1 National Patterns of Stroke Hospitalizations

## Medicare Study Population

Within the study population for this *Atlas*, there were an average 27,759,446 Medicare beneficiaries per year during 1995–2002 (**Table 1.1**). Beneficiaries were excluded from the *Atlas* if they were members of a health maintenance organization (HMO); died before July 1 of any of the covered years; were younger than 65 years on July 1 of any of the covered years; lived outside the United States, Puerto Rico, or the U.S. Virgin Islands; or were reported to have a racial/ethnic designation other than black, Hispanic, or white.

As seen in **Table 1.1**, just under 60% of the beneficiaries were women. The distribution of beneficiaries by age group indicates that just over half (52.6%) were in the youngest age group (65–74 years), 34.8% were in the middle age group (75–84 years), and 12.6% were in the oldest age group (≥85 years). The distribution of beneficiaries by race/ethnicity indicates that 7.8% were black, 1.5% were Hispanic, and 87.7% were white.

**Table 1.1 Average annual number and percent distribution of Medicare beneficiaries ages 65 and older, by gender, race/ethnicity, and age group, 1995–2002\***

	Number <sup>†</sup>	Percentage
<b>Gender</b>		
Total	27,759,446	100.0
Women	16,407,237	59.1
Men	11,352,209	40.9
<b>Race/Ethnicity</b>		
Blacks	2,174,185	7.8
Women	1,342,166	4.8
Men	832,019	3.0
Hispanics <sup>‡</sup>	426,647	1.5
Women	237,359	0.9
Men	189,288	0.7
Whites	24,363,649	87.7
Women	14,363,649	51.7
Men	10,000,000	36.0
<b>Age Group (years)</b>		
65–74	14,598,204	52.6
75–84	9,658,919	34.8
≥85	3,502,323	12.6

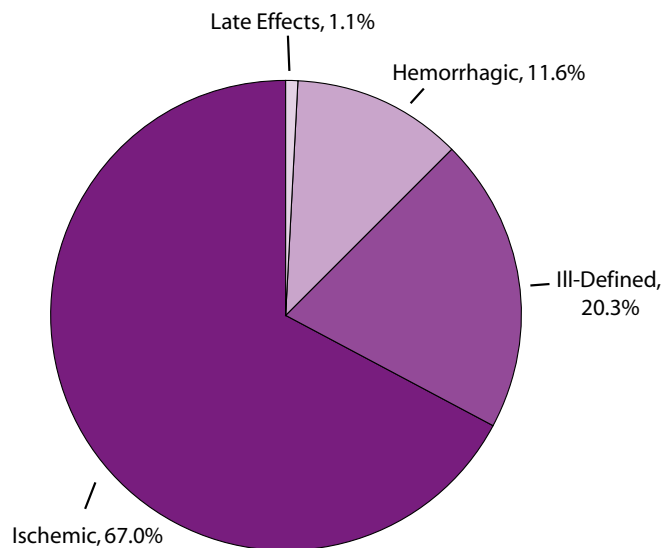
\* Data exclude managed care enrollees; residents outside the United States, Puerto Rico, or the U.S. Virgin Islands; those younger than 65 years; and those who died by July 1 of each year (1995–2002).

† Average number of beneficiaries per year, 1995–2002.

‡ Hispanics may be underrepresented in this *Atlas*. See Appendix B for more details.

Stroke hospitalizations for Medicare beneficiaries during the study period are shown by various categories such as age group and stroke subtype (Table 1.2). A total of 3,807,605 hospitalizations for stroke occurred during 1995–2002, with an average of 475,951 per year. Just over one-third (34.3%) of the stroke hospitalizations occurred in the youngest age group (65–74 years), the largest percentage (43.5%) occurred in the middle age group (75–84 years), and 22.2% occurred in the oldest age group (≥85 years). Two-thirds (67.0%) of the stroke hospitalizations were classified as ischemic, 11.6% as hemorrhagic, 20.3% as ill-defined, and 1.1% as late effects from stroke. (See also Figure 1.1.)

**Figure 1.1 Percentage of stroke hospitalizations, by stroke subtype—Medicare beneficiaries ages 65 and older, 1995–2002**



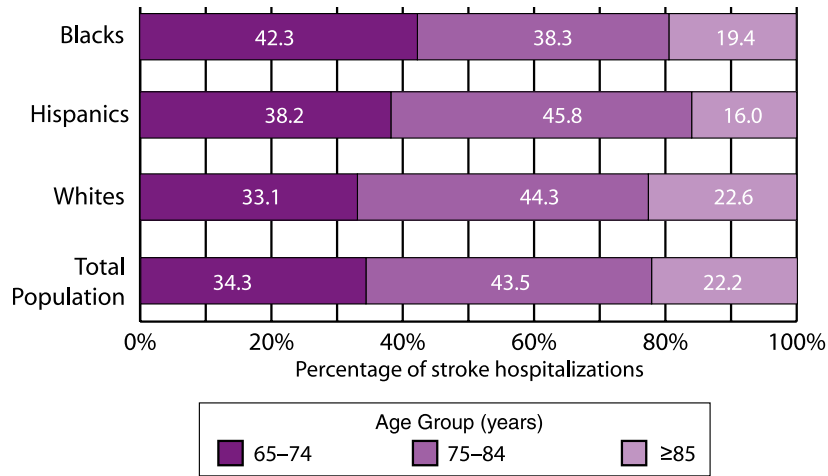
**Table 1.2 Number and percentage of stroke hospitalizations, by race/ethnicity, gender, age group, year, and stroke subtype—Medicare beneficiaries ages 65 and older, 1995–2002**

	Number	Percentage*
<b>Race/Ethnicity/Gender</b>		
Total	3,807,605	100.0
Women	2,142,466	56.3
Men	1,665,139	43.7
Blacks	373,584	9.8
Women	233,015	6.1
Men	140,569	3.7
Hispanics†	51,661	1.3
Women	27,016	0.7
Men	24,645	0.6
Whites	3,281,427	86.2
Women	1,826,017	48.0
Men	1,455,410	38.2
<b>Age Group (years)</b>		
65–74	1,306,695	34.3
75–84	1,656,777	43.5
≥85	844,133	22.2
<b>Year</b>		
1995	508,830	13.4
1996	513,622	13.5
1997	508,548	13.4
1998	481,932	12.7
1999	459,825	12.1
2000	445,183	11.7
2001	447,166	11.7
2002	442,499	11.6
<b>Stroke Subtype</b>		
Hemorrhagic	441,856	11.6
Ischemic	2,549,811	67.0
Ill-Defined	773,859	20.3
Late Effects	42,079	1.1

\* Percentage may not be equal to 100 because of rounding.

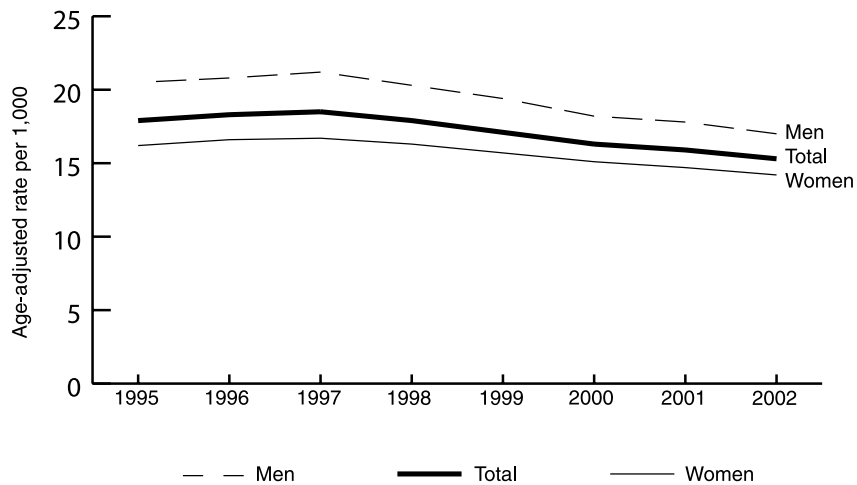
† Hispanics may be underrepresented in this *Atlas*. See Appendix B for more details.

**Figure 1.2 Percent distribution of stroke hospitalizations, by race/ethnicity and age group—Medicare beneficiaries ages 65 and older, 1995–2002**



The age distribution for stroke hospitalizations differed across racial/ethnic groups (**Figure 1.2**). For blacks, the highest percentage of strokes (42.3%) occurred in the youngest age group (65–74 years), with lower percentages in the two older age categories. Whites (44.3%) and Hispanics (45.8%), on the other hand, had the highest percentages in the middle age group (75–84 years).

**Figure 1.3 Trends in age-adjusted stroke hospitalization rates, by gender—Medicare beneficiaries ages 65 and older, 1995–2002**

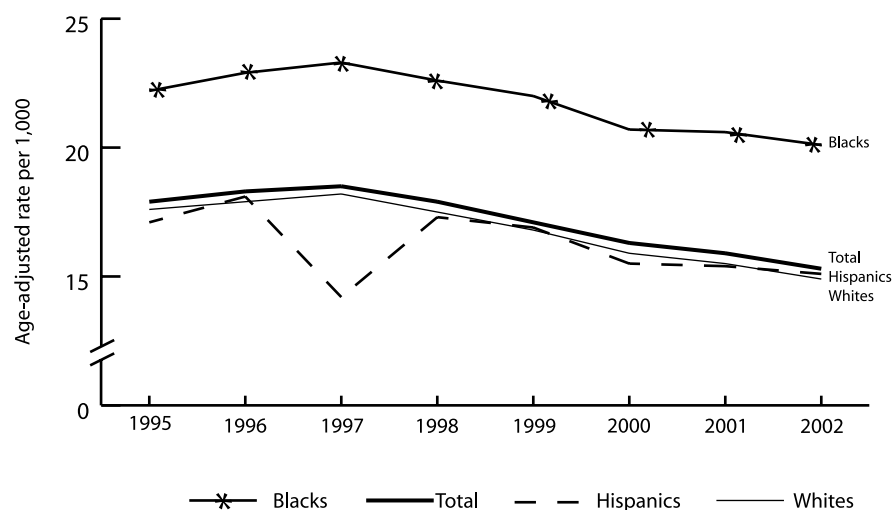


## Trends in Stroke Hospitalizations

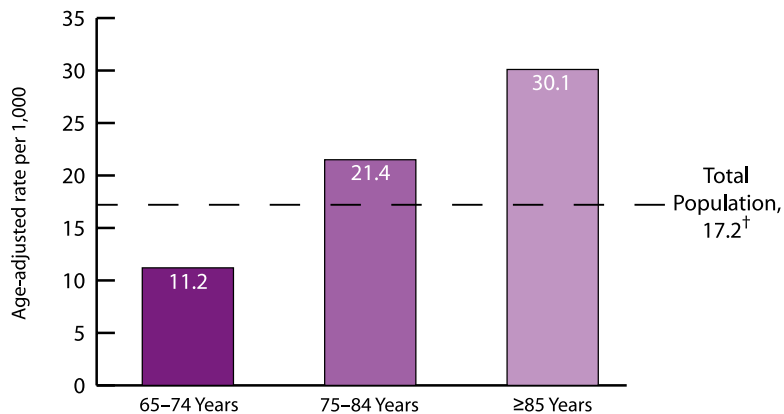
During 1995–2002, the age-adjusted stroke hospitalization rate per 1,000 decreased slightly, from 17.5 to 15.0 (**Figure 1.3**). The rate was higher for men than for women throughout the study period, and both genders experienced very small declines in stroke hospitalization rates during this time.

Slight decreases in age-adjusted stroke hospitalization rates were observed for each race/ethnicity during 1995–2002 (**Figure 1.4**). Throughout this time, blacks experienced rates 25% higher than the total population. Rates for whites and Hispanics closely followed the trend for the total population. However, in 1997, the curve for Hispanics deviated downward for just 1 year. This change is most likely a data anomaly resulting from a change to the Medicare race/ethnicity codes that occurred in that year (Arday SL, Arday DR, Monroe A, Zhang MD. HCFA's racial and ethnic data: current accuracy and recent improvements. *Health Care Financing Review* 2000;21[4]:107–16).

**Figure 1.4 Trends in age-adjusted stroke hospitalization rates, by race/ethnicity—Medicare beneficiaries ages 65 and older, 1995–2002**



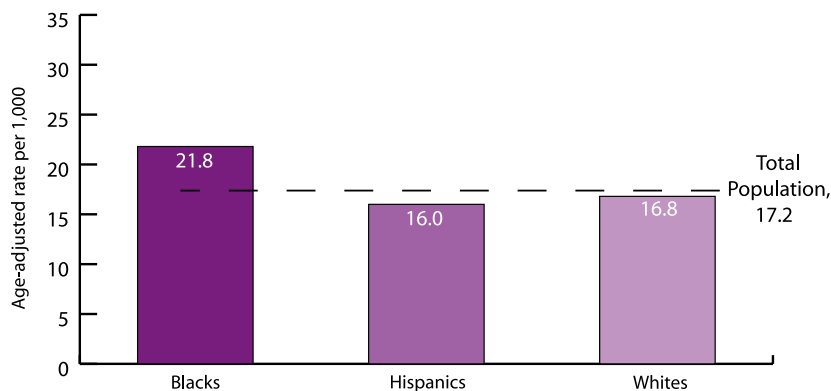
**Figure 1.5 Stroke hospitalization rates,\* by age group—  
Medicare beneficiaries ages 65 and older, 1995–2002**



\* Stroke hospitalization rates are the average annual rates for 1995–2002.

† The stroke hospitalization rate for the total Medicare population is age-adjusted to the 2000 U.S. standard population, aged ≥65 years.

**Figure 1.6 Age-adjusted stroke hospitalization rates,\* by race/ethnicity—  
Medicare beneficiaries ages 65 and older, 1995–2002**



\* Average annual stroke hospitalization rates per 1,000 Medicare beneficiaries are directly age-adjusted using the 2000 U.S. standard population aged ≥65 years.

## Stroke Hospitalization Rates, by Gender, Race/Ethnicity, and Age

Stroke hospitalization rates increased sharply with increasing age (**Figure 1.5** and **Table 1.3**). The rate (30.1 per 1,000) for the oldest age group (≥85) was almost three times higher than the rate (11.2 per 1,000) for the youngest age group (65–74 years).

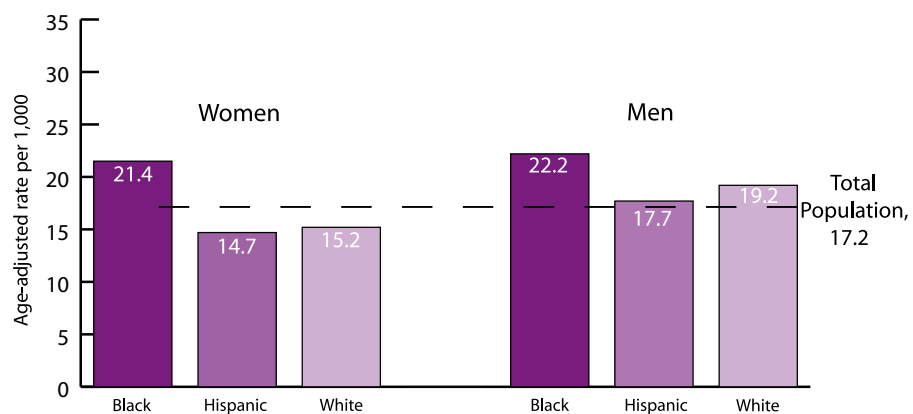
Stroke hospitalization rates were highest among blacks (21.8 per 1,000), while the rates for Hispanics (16.0 per 1,000) and whites (16.8 per 1,000) were similar (**Figure 1.6** and **Table 1.3**). These race/ethnicity patterns were maintained within each gender group (**Figure 1.7**). Both black women and black men had substantially higher rates than their Hispanic and white counterparts. Within each racial/ethnic group, the stroke hospitalization rates were somewhat higher for men than for women.

**Table 1.3 Age-adjusted stroke hospitalization rates per 1,000 Medicare beneficiaries ages 65 and older, by race/ethnicity, gender, age group, year, and stroke subtype, 1995–2002**

Stroke Hospitalization Rate	
Race/Ethnicity/Gender	
Total	17.2
Women	15.7
Men	19.4
Blacks	21.8
Women	21.4
Men	22.2
Hispanics	16.0
Women	14.7
Men	17.7
Whites	16.8
Women	15.2
Men	19.2
Age Group (years)*	
65–74	11.2
75–84	21.4
≥85	30.1
Year	
1995	17.9
1996	18.3
1997	18.5
1998	17.9
1999	17.1
2000	16.3
2001	15.9
2002	15.3
Stroke Subtype	
Hemorrhagic	2.0
Ischemic	11.5
Ill-Defined	3.5
Late Effects	0.2

\* Not age-adjusted.

**Figure 1.7 Age-adjusted stroke hospitalization rates,\* by gender and race/ethnicity—Medicare beneficiaries ages 65 and older, 1995–2002**

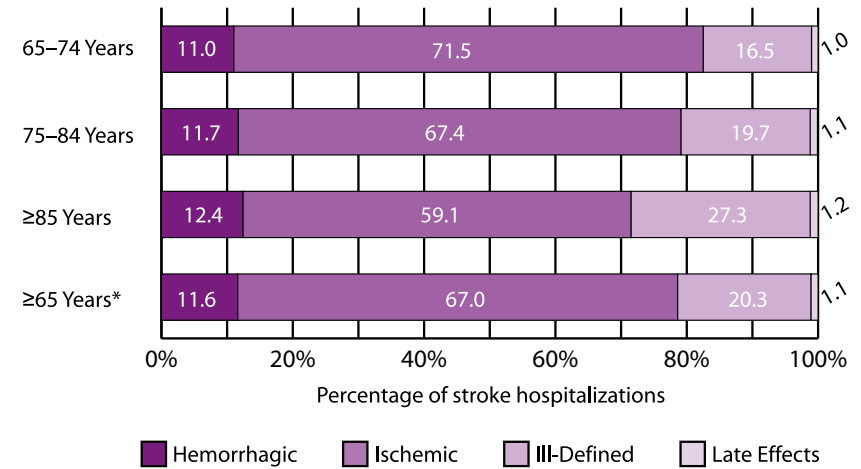


\* Average annual stroke hospitalization rates per 1,000 Medicare beneficiaries are directly age-adjusted using the 2000 U.S. standard population aged ≥65 years.

## Stroke Subtypes, by Gender, Race/Ethnicity, and Age

The distribution of stroke subtypes varied somewhat by age group (**Figure 1.8**). The percentage of hemorrhagic strokes increased from 11.0% in the youngest age group (65–74 years) to 12.4% in the oldest age group (≥85 years). The percentage of ischemic strokes decreased with increasing age, while the percentage of ill-defined strokes increased with increasing age. The percentage of late effects from stroke was similar for each age group.

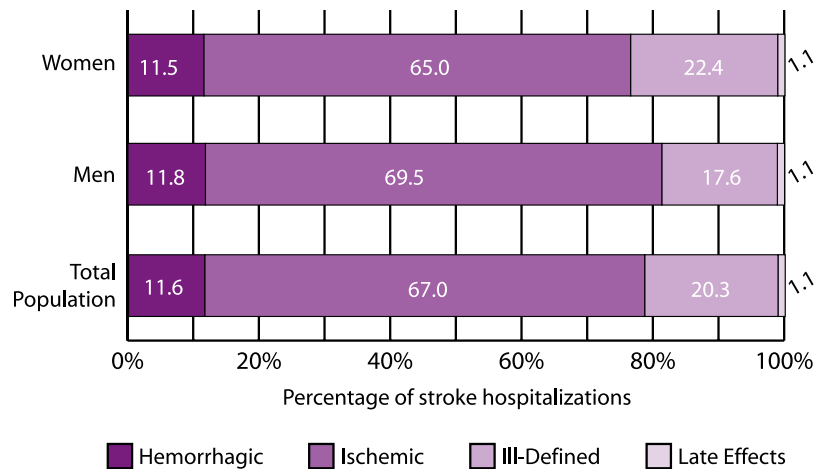
**Figure 1.8** Percent distribution of stroke hospitalizations, by age group and stroke subtype—Medicare beneficiaries ages 65 and older, 1995–2002



\* Combination of all three age groups.

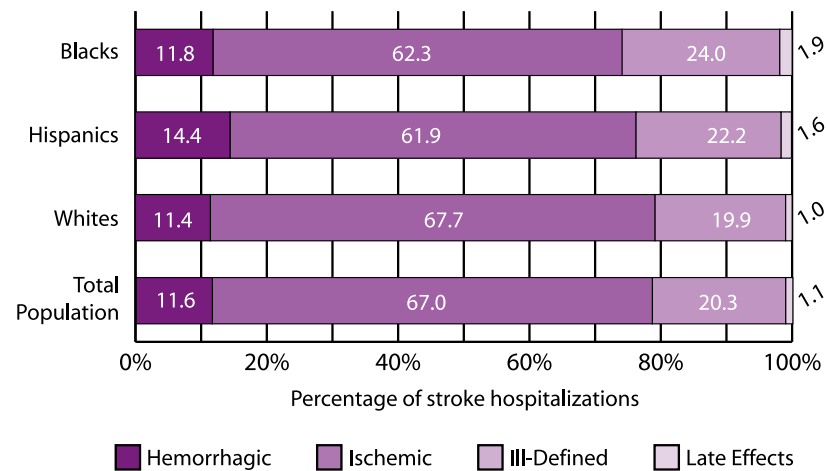


**Figure 1.9 Percent distribution of stroke hospitalizations, by gender and stroke subtype—Medicare beneficiaries ages 65 and older, 1995–2002**



The distribution of stroke subtypes by gender is shown in **Figure 1.9**. The percentage of hemorrhagic strokes was about the same for women (11.5%) and men (11.8%). The percentage of ischemic strokes was somewhat higher for men (69.5%) than for women (65.0%), while the percentage of ill-defined strokes was higher for women (22.4%) than for men (17.6%).

**Figure 1.10 Percent distribution of stroke hospitalizations, by race/ethnicity and stroke subtype—Medicare beneficiaries ages 65 and older, 1995–2002**



The distribution of stroke subtypes for different racial/ethnic groups is shown in **Figure 1.10**. Hispanics had the highest percentage of hemorrhagic strokes (14.4%). Whites had the highest percentage of ischemic strokes (67.7%) and the lowest percentages of both hemorrhagic (11.4%) and ill-defined strokes (19.9%). Blacks had the highest percentage of ill-defined strokes (24.0%).

## Stroke Hospitalizations, by Discharge Status and 30-Day Mortality

Among Medicare beneficiaries hospitalized for stroke, 51.0% were discharged home, 21.1% were discharged to a skilled nursing facility, 17.6% to other care facilities, and 8.8% died before being discharged (Table 1.4 and Figure 1.11).

**Table 1.4. Percentage of stroke hospitalizations, by discharge status and 30-day mortality, for selected characteristics—Medicare beneficiaries ages 65 and older, 1995–2002**

Characteristic	Discharge Status (%)					Mortality (%)
	Home	Skilled Nursing Facility	Other Care Facility	Other Discharge Outcomes	Died Before Discharge	Died Within 30 Days*
<b>Age Group (years)</b>						
65–74	63.3	12.1	16.7	1.4	6.6	9.0
75–84	50.7	21.1	18.1	1.6	8.6	13.1
≥85	32.5	35.1	18.2	1.7	12.5	23.0
<b>Gender</b>						
Women	46.5	24.4	18.2	1.6	9.2	14.9
Men	56.7	16.8	16.8	1.5	8.2	12.6
<b>Race/Ethnicity</b>						
Blacks	45.2	22.3	21.6	1.8	9.0	12.9
Hispanics	57.6	15.7	15.8	1.9	9.1	13.0
Whites	51.6	21.0	17.1	1.5	8.7	13.9
<b>Stroke Subtype</b>						
Hemorrhagic	24.0	22.0	22.0	1.9	30.1	38.1
Ischemic	57.5	19.1	16.3	1.5	5.6	9.9
Ill-Defined	45.0	26.6	19.6	1.5	7.3	13.4
Late Effects	49.4	30.7	16.2	1.7	2.0	6.8
<b>Total</b>	<b>51.0</b>	<b>21.1</b>	<b>17.6</b>	<b>1.6</b>	<b>8.8</b>	<b>13.9</b>

\* Died within 30 days of admission to the hospital for a stroke.

The percentage of stroke hospitalizations discharged home decreased with increasing age, was higher among Hispanics compared with blacks and whites, and was approximately two times higher among people who experienced ischemic strokes (57.5%) compared with those with hemorrhagic strokes (24.0%) (Table 1.4, Figure 1.12, and Figure 1.13).

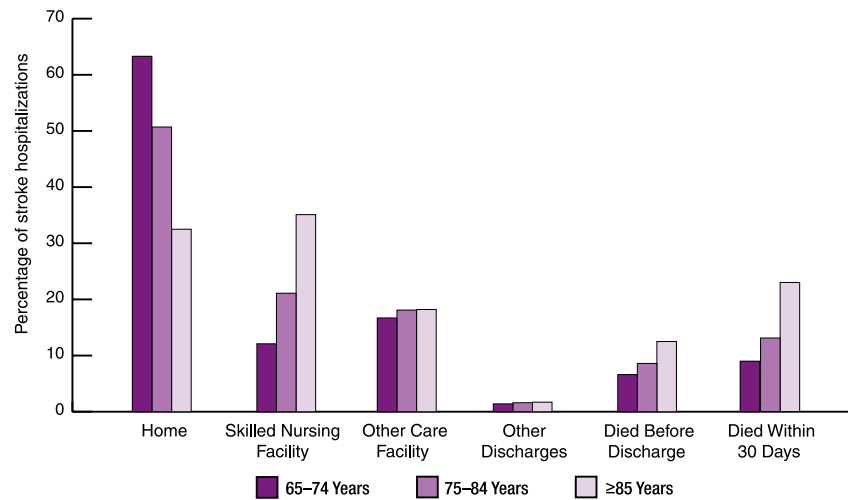
The percentage of Medicare beneficiaries hospitalized for stroke who died before discharge or were discharged to skilled nursing facilities or other care facilities increased with age (Table 1.4 and Figure 1.12).

The pattern of discharge status by race/ethnicity indicates that blacks had the lowest percentage of stroke hospitalizations discharged home (45.2%) and the highest percentage of stroke hospitalizations discharged to other care facilities (21.6%). Hispanics, on the other hand, had the highest percentage of stroke hospitalizations discharged home (57.6%) and the lowest percentages discharged to skilled nursing facilities (15.7%) and other care facilities (15.8%). Whites were in the intermediate range for each of the three major discharge destinations (Table 1.4 and Figure 1.12).

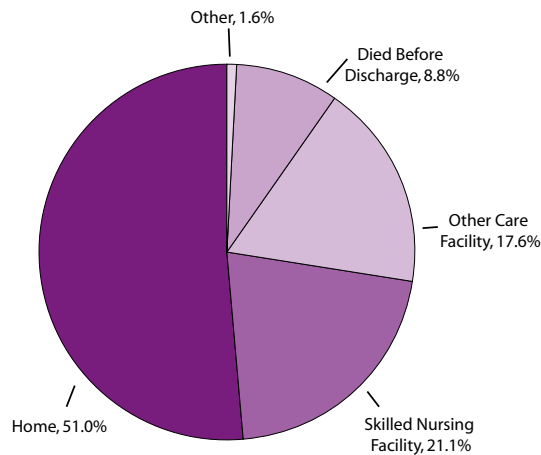
The overall 30-day mortality among Medicare beneficiaries hospitalized with stroke was 13.9%. The percentage increased with increasing age and was similar for the three racial/ethnic groups (blacks: 12.9%; Hispanics: 13.0%; whites: 13.9%) (Table 1.4, Figure 1.12, and Figure 1.13).

Note: For Figures 1.12 and 1.13, the exact percentage for each bar is listed in Table 1.4.

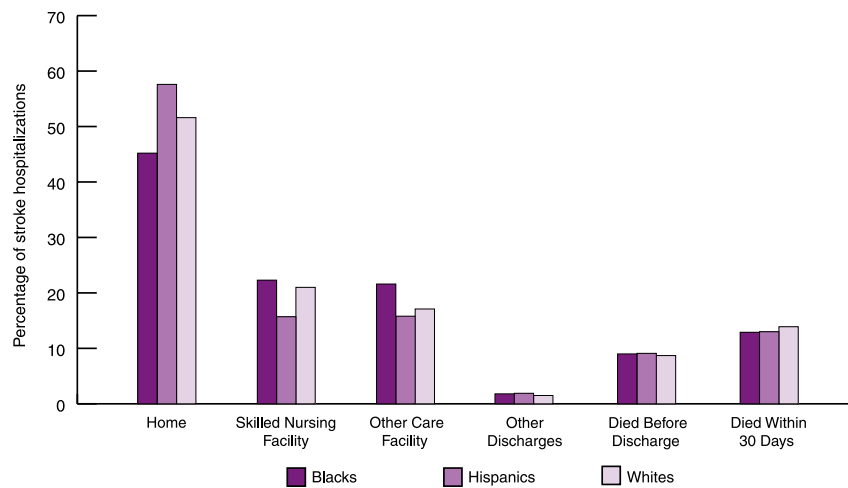
**Figure 1.12 Percentage of stroke hospitalizations, by discharge status, 30-day mortality, and age group—Medicare beneficiaries ages 65 and older, 1995–2002**



**Figure 1.11 Percentage of stroke hospitalizations, by discharge status—Medicare beneficiaries ages 65 and older, 1995–2002**



**Figure 1.13 Percentage of stroke hospitalizations, by discharge status, 30-day mortality, and race/ethnicity—Medicare beneficiaries ages 65 and older, 1995–2002**

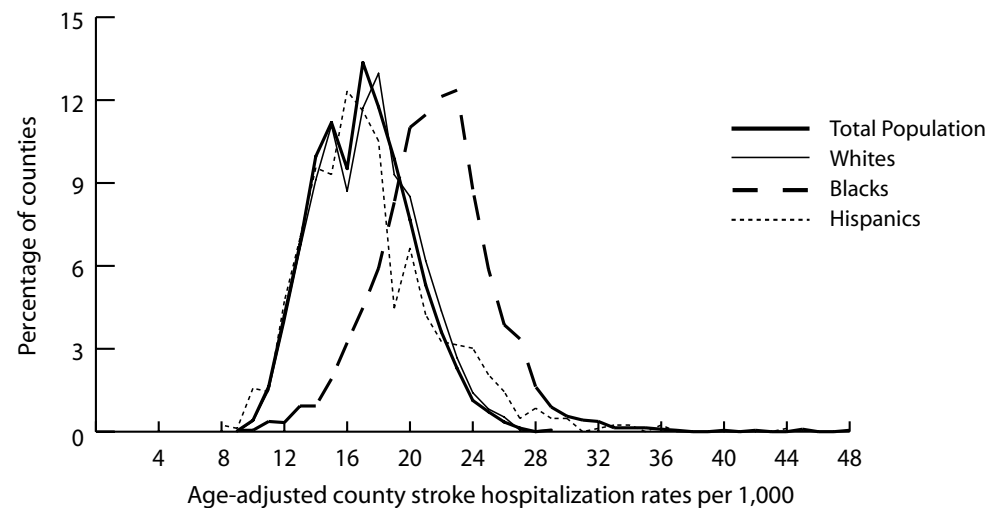


## Frequency Distributions of County Stroke Hospitalizations, by Race/Ethnicity

County distributions of stroke hospitalization rates highlight the geographic disparities in the burden of stroke for each racial and ethnic group during 1995–2002 (**Figure 1.14**). Examination of the tails of the distribution indicates that some of the county rates for blacks and Hispanics are much higher than the rates for whites.

The peaks in the curve for each racial/ethnic group indicate the most common county stroke hospitalization rates for the corresponding racial/ethnic group. For blacks, the peak occurs at much higher rates of stroke hospitalizations compared with whites and Hispanics. This emphasizes the heavy excess burden of stroke among blacks compared with whites and Hispanics.

**Figure 1.14** Frequency distributions of county stroke hospitalization rates,\* by race/ethnicity—Medicare beneficiaries ages 65 and older, 1995–2002



\* Stroke hospitalization rates are spatially smoothed to enhance the stability of rates in counties with small populations.



James Gathany/CDC