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# Patterns of Hospital Use by Patients with Diagnoses Related to HIV Infection

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## Synopsis .....

*The authors analyzed the use of hospitals by patients with a diagnosis of human immunodeficiency virus (HIV) infection, using data from the National Hospital Discharge Survey. In the period 1984-90, the rates of both discharges and days of care for HIV-infected patients rose dramatically. For 1988-90, black males had the highest HIV-related discharge rate, followed by white males and black females, whose rates were similar.*

*The discharge rate for patients with HIV-related diagnoses increased more in the Northeast than in*

*the three other regions of the country. By 1990 the rate for the Northeast was nearly triple the rate for other major regions. More than half of female and black patients with HIV-related diagnoses were hospitalized in the Northeast.*

*Private insurance was the principal expected source of payment for the care of half of the HIV-infected patients discharged in 1985, but for only a third in 1990. Medicaid covered 40 percent of the patients with HIV-related diagnoses discharged in 1990. Larger proportions of female than male patients and of black patients than white patients were covered by Medicaid.*

*Acquired immunodeficiency syndrome was the diagnosis coded for most patients with an HIV-related diagnosis, but in larger proportions for patients who were male or white patients. Nonspecific HIV diagnoses were coded for larger proportions of female and black patients. HIV-infected patients had an average of 3.6 diagnoses in addition to their HIV diagnosis. Nearly a fourth of the additional diagnoses were for other infectious diseases, such as pneumocystosis or candidiasis. Anemia, pneumonia, and drug use and dependence also were frequent diagnoses.*

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**I**N THE PERIOD 1984-90, more than 500,000 patients were discharged from short-stay hospitals with a diagnosis of human immunodeficiency virus (HIV) infection, including those diagnosed with acquired immunodeficiency syndrome (AIDS). Almost three-quarters of those discharges (381,000) occurred in the 3 years of 1988-90. That surge in hospital utilization is a reflection of the increasing numbers of HIV-infected persons in the population (1) and represents a significant economic and patient care burden on hospital resources (2).

We describe the increasing use of hospitals by patients with HIV-related diagnoses and the shift in the HIV-inpatient population from almost all white male patients in the mid-1980s to a more heteroge-

neous population that included growing numbers of female and black patients in more recent years. Hospital use by HIV patients was analyzed by sex, race, expected source of payment, diagnoses of the patient, and geographic location of the hospital.

Our data source was the National Hospital Discharge Survey (NHDS), which was the data source for previous studies of national patterns of use of hospitals by patients with AIDS. Those studies included demographic analyses (3-6) and a recent article that focused on diagnoses that were within the case definition of AIDS of the Centers for Disease Control and Prevention (CDC) (7). Our study updates data presented in earlier reports, and we describe the rapid growth and change that has

Table 1. Trends in hospital use by patients with HIV-related diagnoses discharged from short-stay hospitals, United States, 1984-90

Year	Number (in thousands)				Rate per 100,000 population			
	Discharges	SE <sup>1</sup>	Days of care	SE <sup>1</sup>	Discharges	SE <sup>1</sup>	Days of care	SE <sup>1</sup>
1984	10	1	123	15	4.3	0.5	52.7	6.2
1985	23	2	387	29	9.6	0.8	163.6	12.2
1986	44	3	714	44	18.3	1.2	299.6	18.4
1987	67	4	936	80	27.7	1.7	389.1	33.2
1988	95	10	1,277	167	39.3	4.3	525.7	68.9
1989	140	15	1,731	166	57.0	6.0	706.3	67.8
1990	146	16	2,188	380	59.1	6.3	883.1	153.3

<sup>1</sup> SE = standard error; SE in thousands for number of discharges and days of care. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.  
NOTE: HIV = human immunodeficiency virus.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

Table 2. Number, percent distribution, and discharge rate of patients with HIV-related diagnoses discharged from short-stay hospitals, by race and sex, United States, 1988-90

Race	Total	SE <sup>1</sup>	Male		Female		SE <sup>1</sup>
			SE <sup>1</sup>	SE <sup>1</sup>	SE <sup>1</sup>	SE <sup>1</sup>	
<i>Number of discharges (in thousands)</i>							
All	381	35	312	31	69	8	
White	208	22	185	21	22	3	
Black	121	17	88	14	33	5	
All other	13	3	10	2	<sup>2</sup> 3	1	
Not stated	39	7	29	5	11	3	
<i>Percent distribution</i>							
All	100.0	...	100.0	...	100.0	...	
White	54.4	3.3	59.4	3.3	31.9	3.8	
Black	31.7	3.0	28.1	3.2	48.0	4.3	
All other	3.5	0.7	3.2	0.7	<sup>2</sup> 4.9	1.3	
Not stated	10.3	1.6	9.3	1.3	15.1	3.8	
<i>Rate per 100,000 population</i>							
All	51.9	4.7	87.5	8.6	18.3	2.2	
White	33.5	3.5	61.6	6.9	7.0	1.0	
Black	135.3	18.5	209.1	31.8	70.0	11.1	
All other	48.7	9.5	74.0	16.0	<sup>2</sup> 24.5	6.5	
Not stated	...	...	...	...	...	...	

<sup>1</sup> SE = standard error; SE in thousands for number of discharges. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.

<sup>2</sup> Estimate should be used with caution, based on fewer than 60 records in the sample.

NOTE: HIV = human immunodeficiency virus.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

occurred in recent years in patterns of hospital use by HIV patients. We also present information on patients' concurrent diagnoses by diagnostic categories and contrast diagnoses by sex and by racial groups.

In other studies, analyses have been based on individual hospital experiences, local area data, or nonrepresentative samples of U.S. hospitals (8, 9). Those studies provide information on specific topics, such as pediatric hospital utilization (10) or inpatient mortality from AIDS (11), but the findings cannot be generalized to the total U.S. patient population. In addition, in many of the reports, analyses were limited to patients with AIDS, ex-

cluding HIV-infected patients without symptoms of AIDS. However, most hospitalized patients with HIV-related diagnoses have been found to have severe immunosuppression and serious HIV-related diseases (12, 13). Our study, therefore, included all HIV-infected patients, rather than only those with AIDS.

## Methods

**National Hospital Discharge Survey.** NHDS is a nationally representative probability survey of discharges from non-Federal general and specialty hospitals. The survey has been conducted continu-

ously since 1965 by the National Center for Health Statistics (NCHS) of CDC. The survey is based on a multistage sample stratified by geographic region and by size of hospital. Prior to 1988, a two-stage design was used to sample hospitals and to sample discharges within hospitals. In 1988, the survey was redesigned to incorporate a three-stage design to select geographic locations within regions, to select hospitals, and to examine discharges within hospitals.

In both the two-stage and the three-stage designs, the largest hospitals were certain to be included, along with a systematic sample of other hospitals. Details of both designs have been published, as well as a review of the comparability of findings from both designs (14).

Hospitals eligible for inclusion in NHDS are those with an average length of stay of fewer than 30 days for all patients. In the three-stage survey design, hospitals were included whose specialty was general care or children's general care, regardless of whether the average length of stay of all patients was 30 days or more. Not included in NHDS are Federal hospitals; institutional hospital units, such as prison and college infirmaries; and hospitals with fewer than six beds.

**Data analysis.** Annual data were obtained on a total of from 180,000 to 250,000 patients from a sample of about 500 hospitals, out of a universe of about 6,000 hospitals. All inpatient hospitalizations were sampled regardless of diagnosis. Because HIV-infected patients are still relatively rare, only a small number of HIV-related discharges fall into the sample in a given year. The analysis was based on 4,582 records of patients with an HIV-related diagnosis, weighted to represent the 524,000 discharges during the 7 years of 1984–90.

Because of small sample sizes, values for some categories are not shown for earlier years in the three figures depicting trend data. For detailed analyses, several years of data were combined to produce reliable estimates. Those analyses concentrated on data for 3 years, 1988–90, for which 3,710 records of patients with diagnoses related to HIV infection were collected. Data were abstracted from the medical records of sample patients. The data were processed, edited, and weighted to provide national and regional estimates of hospital utilization.

A maximum of seven diagnoses and four procedures per discharge were coded according to the International Classification of Diseases, 9th Revi-

sion, Clinical Modification (ICD-9-CM) (15). To be included in the analysis, one of the patient's diagnoses had to be among the following ICD-9-CM codes: 279.19, 042, 043, 044, or 795.8.

Prior to 1986, ICD-9-CM code 279.19 was the only code used to classify patients with AIDS. Beginning in October 1986, AIDS was classified as 042, AIDS-related complex (ARC) as 043, and other HIV infection as 044. Code 795.8, positive HIV serology, also was added in 1986. As a result of the CDC expansion of the case definition for AIDS in August 1987 (16), the ICD-9-CM classification of HIV was updated in January 1988 (17). At that time, a few conditions were added to the definitions of codes 042 and 043. There were no differences in the HIV classification used to code the 1988–90 data.

Because of the complex sample design of NHDS, estimates are not shown if they were based on fewer than 30 sample cases, or had a relative standard error of 30 percent or more. Estimates based on fewer than 60 cases should not be assumed to be reliable, as is indicated in the tables. The standard errors for the 1984–87 data were obtained from approximate relative standard errors, calculated using a customized computer routine based on a rigorously unbiased algebraic estimator of variance (18). Specific standard errors for 1988–90 data were calculated with SESUDAAN software, which computes standard errors by using a first-order Taylor series approximation of the deviation of estimates from their expected values. A description of this software and its approach has been published (19).

The terms *patient*, *discharge*, and *hospitalization* refer to a patient who has been formally admitted and discharged from the inpatient setting of a hospital. *Patient* or *discharge* is not synonymous with *person*, because a person may have more than one hospitalization. All outpatient visits are outside the scope of NHDS. Newborns, defined as patients admitted to hospitals by birth, were excluded.

## Findings

Hospital use for patients with HIV-related diagnoses has increased dramatically in recent years. An estimated 10,000 patients discharged from short-stay hospitals had HIV-related diagnoses in 1984, compared to 146,000 in 1990 (table 1). The discharge rate per 100,000 population for patients with HIV-related diagnoses increased from 4.3 in 1984 to 59.1 in 1990. HIV patients used 123,000 days of care in hospitals in 1984 and 2,188,000 in

Table 3. Number and percent distribution of patients with HIV-related diagnoses discharged from short-stay hospitals by region, sex, and race, United States, 1988-90

Region	Total <sup>1</sup>	SE <sup>2</sup>	Sex				Race			
			Male	SE <sup>2</sup>	Female	SE <sup>2</sup>	White	SE <sup>2</sup>	Black	SE <sup>2</sup>
<i>Number of discharges (in thousands)</i>										
All .....	381	35	312	31	69	8	208	22	121	17
Northeast .....	156	26	112	20	44	7	64	12	66	15
Midwest .....	55	14	50	14	(3)	...	(3)	...	(3)	...
South .....	102	13	88	12	14	2	64	10	31	6
West .....	68	14	63	14	(3)	...	46	11	7	2
<i>Percent distribution</i>										
All .....	100.0	...	100.0	...	100.0	...	100.0	...	100.0	...
Northeast .....	40.9	4.6	35.8	4.9	63.9	5.2	30.8	4.9	54.7	6.4
Midwest .....	14.5	3.4	15.9	3.9	(3)	...	(3)	...	(3)	...
South .....	26.8	3.3	28.2	3.8	20.5	3.4	30.9	4.3	25.2	4.6
West .....	17.8	3.3	20.1	3.9	(3)	...	22.2	4.5	5.8	1.8

<sup>1</sup> Includes patients of races other than white or black and patients for whom race was not stated.

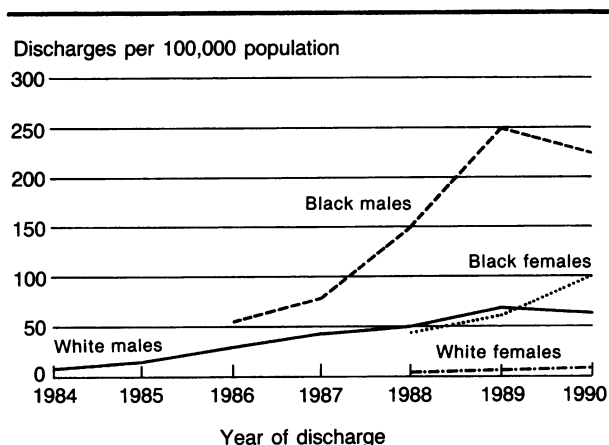
<sup>2</sup> SE = standard error; SE in thousands for number of discharges. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.

<sup>3</sup> Estimate not reliable, relative standard error greater than 30 percent.

NOTE: HIV = human immunodeficiency virus.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

Figure 1. Discharge rates for patients with HIV-related diagnoses, by sex and race, United States, 1984-90



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

1990. The rate of days of care per 100,000 population rose from 52.7 to 883.1 during the same period.

**Race and sex.** HIV-discharge rates generally increased across race and sex groups, but the patterns have varied (figure 1). White males were the first group to have significant numbers of HIV-related discharges. They were discharged at a rate per 100,000 population of 8.0 (SE = 0.6) in 1984; their discharge rate increased to 64.7 (SE = 8.1) in 1990. By 1986 it was possible to estimate the HIV-related discharge rate for black males, which

was 54.5 (SE = 10.6) per 100,000 population. That rate increased dramatically from 1986 to 1989 and was at 226.2 (SE = 38.2) per 100,000 population in 1990.

Only since 1988 have sufficient data been available to estimate HIV-related discharges for black and white females. The discharge rate per 100,000 population for black females with HIV-related diagnoses was 44.3 (SE = 7.4) in 1988 and 102.2 (SE = 23.0) in 1990. White females with HIV-related diagnoses had a discharge rate per 100,000 population of 4.8 (SE = 1.3) in 1988 and 9.3 (SE = 1.9) in 1990. All of the rates by race are likely to be somewhat underestimated because race was not reported for all discharges in NHDS. For the 1984-90 period, 9.1 percent of HIV-related discharges were in the "race not stated" category.

For 1988-90, 54.4 percent of HIV-related discharges were classified as white patients and 31.7 percent as black patients (table 2). A larger proportion of male than female HIV-infected patients were white. Almost half of the females with HIV-related diagnoses were black, compared to only 28.1 percent of males. Race was not stated for 10.3 percent of all HIV-related patients discharged during the 1988-90 period, 9.3 percent of males and 15.1 percent of females.

Although the number of HIV-related discharges was higher for white patients, black patients had a much higher rate of HIV discharges per 100,000 population during the 1988-90 period. Black males had the highest HIV-related discharge rate, and the rate was as high for black females as for white

males. The HIV-related discharge rate for white females was significantly lower than the rates for the other three groups.

**Region.** The increase in discharge rates for patients with HIV-related diagnoses has been especially dramatic in the Northeast region (figure 2). In 1985, the HIV-related discharge rate was 17.5 (SE = 3.3) per 100,000 population for the Northeast, which was the same as the rate for the West. In 1990, however, the rate for the Northeast had reached 129.9 (SE = 25.0) per 100,000 population, which was nearly 3 times the rate in any other region. In the West, the HIV-related discharge rate per 100,000 population rose from 17.5 (SE = 3.3) in 1985 to 45.3 (SE = 9.8) in 1990. The rate in the South increased from 7.9 (SE = 1.8) in 1986 to 42.6 (SE = 5.9) in 1990. The Midwest region rate was 17.0 (SE = 3.5) in 1987 and 33.4 (SE = 6.8) in 1990. In 1990, there were no statistically significant differences in the HIV-discharge rates for those three regions.

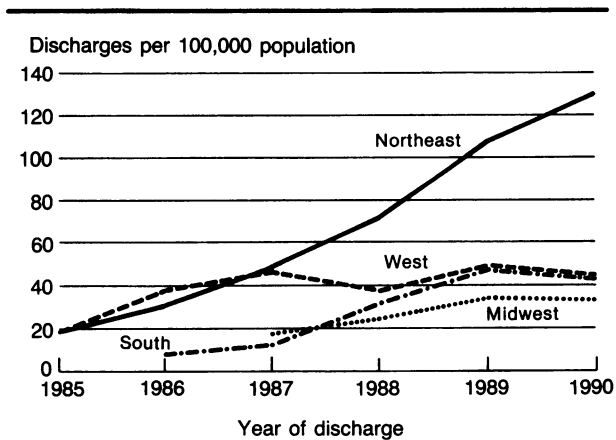
During the 1988–90 period (table 3), 40.9 percent of HIV discharges were in the Northeast region, reflecting its high HIV-related discharge rate. The South, which has the largest population of the four regions, had 26.8 percent of HIV-related discharges, compared to 17.8 percent in the West and 14.5 percent in the Midwest.

Among black patients and female patients, the majority were hospitalized in the Northeast region in 1988–90. Only 35.8 percent of males, but 63.9 percent of females, were in the Northeast; 30.8 percent of white HIV patients, compared to 54.7 percent of black HIV patients, were in the Northeast. The West region accounted for 22.2 percent of HIV-related discharges among whites, but only 5.8 percent among blacks.

**Source of payment.** Figure 3 shows trends in the proportions of discharges for which private insurance, Medicaid, or self-pay were the expected principal source of payment. The expected principal source of payment was usually entered on the patient's medical record at the time of admission and sometimes differed from the actual principal source as determined after discharge. The private insurance category consisted of all health insurance provided by nongovernmental sources, including Blue Cross, other insurance programs, private industry, and philanthropic organizations.

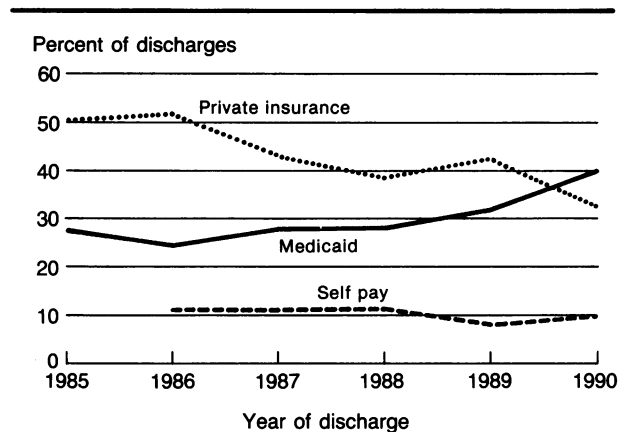
Medicaid is the joint Federal-State program that provides medical benefits to persons defined by the State as at a low-income level. Hospitalizations in

Figure 2. Discharge rates for patients with HIV-related diagnoses, by region, United States, 1985–90



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

Figure 3. Percent of discharges with HIV-related diagnoses, by expected principal source of payment, United States, 1985–90



SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

the self-pay category are expected to have the major share of total costs paid by the patient or the patient's spouse, family, or next of kin.

In 1985, private insurance was the main expected principal source of payment for patients with HIV diagnoses. Private insurance covered 50.3 percent (SE = 3.1) of HIV discharges, compared to 27.4 percent (SE = 2.5) that were Medicaid patients. By 1990 the proportion of HIV-related discharges with private insurance had declined to 32.8 percent (SE = 2.7), which was not significantly different from the 40.1 percent (SE = 4.3) covered by Medicaid. The proportion of HIV-related discharges in the self-pay category was significantly lower and did not change significantly from 1986 (11.0 percent, SE = 1.2) to 1990 (10.0 percent, SE = 2.2).

Table 4. Number and percent distribution of patients with HIV-related diagnoses discharged from short-stay hospitals, by expected principal source of payment, sex, and race; United States, 1988-90

Source	Total <sup>1</sup>	SE <sup>2</sup>	Sex				Race			
			Male	SE <sup>2</sup>	Female	SE <sup>2</sup>	White	SE <sup>2</sup>	Black	SE <sup>2</sup>
<i>Number of discharges (in thousands)</i>										
All sources .....	381	35	312	31	69	8	208	22	121	17
Private insurance.....	144	16	132	16	12	2	101	14	27	4
Medicaid .....	130	20	96	17	34	5	57	10	54	12
Other government.....	39	4	32	4	7	2	17	3	16	3
Self pay.....	37	6	28	5	9	2	16	3	15	3
Other .....	18	3	13	2	( <sup>3</sup> )	...	8	2	6	1
Not reported .....	13	3	<sup>4</sup> 11	3	( <sup>3</sup> )	...	48	2	( <sup>3</sup> )	...
<i>Percent distribution</i>										
All sources .....	100.0	...	100.0	...	100.0	...	100.0	...	100.0	...
Private insurance.....	37.8	3.3	42.3	3.5	17.4	3.3	48.6	4.1	21.9	3.5
Medicaid .....	34.1	3.0	30.7	3.3	49.1	3.8	27.6	3.3	44.4	5.0
Other government.....	10.3	1.1	10.2	1.2	10.6	2.4	8.4	1.3	13.6	2.7
Self pay.....	9.7	1.2	8.9	1.2	13.4	2.5	7.7	1.2	12.0	2.0
Other .....	4.7	0.8	4.2	0.8	( <sup>3</sup> )	...	3.9	0.9	5.3	1.1
Not reported .....	3.4	0.6	<sup>4</sup> 3.7	0.8	( <sup>3</sup> )	...	<sup>4</sup> 3.8	0.9	( <sup>3</sup> )	...

<sup>1</sup> Includes patients of races other than white or black and patients for whom race was not stated.  
<sup>2</sup> SE = standard error; SE in thousands for number of discharges. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.  
<sup>3</sup> Estimate not reliable, relative standard error greater than 30 percent.

<sup>4</sup> Estimate should be used with caution, based on fewer than 60 records in the sample.  
 NOTE: HIV = human immunodeficiency virus.  
 SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

Table 5. Percent distribution of patients with HIV-related diagnoses, discharged from short-stay hospitals, by specific HIV diagnosis with ICD-9-CM code (15), sex, and race; United States, 1988-90

Diagnosis and ICD-9-CM Code	Total <sup>1</sup>	SE <sup>2</sup>	Sex				Race			
			Male	SE <sup>2</sup>	Female	SE <sup>2</sup>	White	SE <sup>2</sup>	Black	SE <sup>2</sup>
<i>Number of discharges (in thousands)</i>										
All HIV-related discharges.....	381	35	312	31	69	8	208	22	121	17
HIV infection with specified conditions (AIDS) (042) .....	259	27	224	25	36	5	155	18	69	12
HIV infection causing other specified conditions (043) .....	23	3	18	2	<sup>3</sup> 5	1	14	2	6	1
Other HIV infection (044).....	36	6	27	4	9	2	14	3	16	3
Positive serological or viral culture findings for HIV (795.8) .....	63	6	44	5	19	3	25	3	30	4
<i>Percent distribution</i>										
All HIV-related discharges.....	100.0	...	100.0	...	100.0	...	100.0	...	100.0	...
HIV infection with specified conditions (AIDS) (042) .....	67.9	1.8	71.6	1.9	51.3	3.7	74.6	2.0	57.0	3.1
HIV infection causing other specified conditions (043) .....	6.0	0.7	5.6	0.7	<sup>3</sup> 7.9	1.7	6.7	1.0	5.1	0.9
Other HIV infection (044).....	9.4	1.2	8.5	1.1	13.2	2.7	6.6	1.1	12.9	1.9
Positive serological or viral culture findings for HIV (795.8) .....	16.5	1.4	14.0	1.4	27.5	3.7	12.0	1.4	25.0	2.8

<sup>1</sup> Includes patients of races other than white or black and patients for whom race was not stated.  
<sup>2</sup> SE = standard error; SE in thousands for number of discharges. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.  
<sup>3</sup> Estimate should be used with caution, based on fewer than 60 records in

sample.  
 NOTE: HIV = human immunodeficiency virus.  
 SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Discharge Survey.

During the 1988–90 period, 37.8 percent of HIV-related discharges had private insurance as the expected principal source of payment, and a similar 34.1 percent were Medicaid patients (table 4). Other government sources, such as Medicare, Workers' Compensation, and the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), covered an additional 10.3 percent of HIV-related discharges, and 9.7 percent were in the self-pay category.

Private insurance accounted for a larger proportion of HIV-related discharges for males than for females and for white HIV patients than for black HIV patients. Almost half of females with HIV-related diagnoses had Medicaid as their source of payment, but only 30.7 percent of males. Black HIV patients also had a significantly larger proportion of Medicaid discharges than white HIV patients.

**HIV-related diagnoses.** Variation by sex and race was seen in the specific HIV diagnoses reported for hospitalized patients (table 5). A diagnosis of HIV infection with specified conditions or AIDS (ICD-9-CM, code 042), was reported for 67.9 percent of all HIV patients in the 1988–90 period. The proportion of male HIV patients with a diagnosis coded 042 was significantly larger than the proportion of female HIV patients. Likewise, white HIV patients were more likely to have a diagnosis coded 042 than were black HIV patients.

HIV infection as the cause of other specified conditions (ICD-9-CM, code 043) accounted for 6.0 percent of all HIV-related discharges in the 1988–90 period and for generally similar proportions of male, female, white, and black HIV patients. Other HIV infection (ICD-9-CM, code 044) was the diagnosis for 9.4 percent of all HIV patients, but for a significantly larger proportion of black HIV patients than of white HIV patients.

Positive serological or viral culture findings for HIV (ICD-9-CM, code 795.8) was the only HIV diagnosis for 16.5 percent of all HIV patients in the 1988–90 survey data. However, many of those patients were found to have the same conditions as patients assigned codes 042 or 043. A significantly larger proportion of female HIV patients than of male HIV patients had a diagnosis coded 795.8. Black HIV patients were significantly more likely than white HIV patients to be assigned code 795.8.

**Concurrent diagnoses.** Patients hospitalized with HIV-related diagnoses typically have numerous other diagnoses. During the years 1988–90, HIV

*'Hospital use for patients with HIV-related diagnoses has increased dramatically in recent years. An estimated 10,000 patients discharged from short-stay hospitals had HIV-related diagnoses in 1984, compared to 146,000 in 1990.'*

patients had an estimated 1.4 million diagnoses in addition to HIV infection, which was an average of 3.6 concurrent diagnoses per discharged patient. As shown in table 6, half of the conditions reported were in four ICD-9-CM diagnostic groupings (15), namely, infectious and parasitic diseases, diseases of blood and blood-forming organs, diseases of the respiratory system, and mental disorders.

The diagnostic grouping of infectious and parasitic diseases accounted for 23.3 percent of all concurrent diagnoses for patients with HIV infections. The main diagnoses in this grouping were pneumocystosis; candidiasis, which was primarily candidiasis of the mouth; and septicemia. Other infectious and parasitic diseases often diagnosed in patients with HIV included cytomegalic inclusion disease, diseases due to mycobacteria, other bacterial infections, cryptococcosis, and tuberculosis.

Diseases of the blood and blood-forming organs were 10.6 percent of the concurrent diagnoses. Two-thirds of the diagnoses in this grouping were anemias, which were usually aplastic anemia or unspecified anemia. Diseases of white blood cells, such as agranulocytosis, were also common diagnoses.

Diseases of the respiratory system made up 10.1 percent of concurrent diagnoses, and pneumonia was the main condition in this grouping. Mental disorders were 8.8 percent of concurrent diagnoses, more than half of which were drug use or dependence. In addition, psychosis was a frequent diagnosis of HIV patients.

The distributions of concurrent diagnoses were generally similar for males and females and for white and black patients. The four major diagnostic groupings included more than half of the concurrent diagnoses for each of the sex and race categories. More than 20 percent of the diagnoses for each patient category were infectious and parasitic diseases. No significant differences were found between males and females or between white and

Table 6. Percent distribution of concurrent diagnoses, by diagnostic groupings, with ICD-9-CM (15) code, for patients with HIV-related diagnoses discharged from short-stay hospitals, United States, 1988-90

Diagnosis and ICD code	Total <sup>1</sup>	SE <sup>2</sup>	Sex				Race			
			Male	SE <sup>2</sup>	Female	SE <sup>2</sup>	White	SE <sup>2</sup>	Black	SE <sup>2</sup>
All conditions .....	100.0	...	100.0	...	100.0	...	100.0	...	100.0	...
Infectious and parasitic diseases (001-139) .....	23.3	1.1	23.7	1.2	21.2	1.9	24.7	1.1	20.2	1.9
Septicemia (038) .....	2.3	0.2	2.4	0.2	<sup>3</sup> 1.7	0.3	2.0	0.3	2.3	0.3
Candidiasis (112) .....	4.3	0.3	4.0	0.3	5.5	0.7	4.2	0.4	4.2	0.6
Pneumocystosis (136.3) .....	5.2	0.4	5.5	0.4	4.0	0.8	5.9	0.5	4.1	0.6
Neoplasms (140-239) .....	3.9	0.4	4.4	0.4	( <sup>4</sup> )	...	5.2	0.6	1.9	0.5
Malignant neoplasm of skin, excluding melanoma (173) .....	2.0	0.2	2.4	0.3	( <sup>4</sup> )	...	2.8	0.3	( <sup>4</sup> )	...
Endocrine, nutritional and metabolic diseases, and immunity disorders (240-279) .....	6.9	0.5	7.3	0.5	5.2	0.7	6.8	0.6	6.6	0.7
Disorders of fluid, electrolyte, and acid-base balance (276) .....	4.4	0.4	4.6	0.4	3.6	0.6	4.1	0.5	4.5	0.5
Diseases of the blood and blood-forming organs (280-289) .....	10.6	0.4	10.8	0.5	10.0	1.0	11.6	0.6	9.9	0.7
Anemias (280-285) .....	7.3	0.4	7.4	0.4	7.0	0.9	7.6	0.6	7.5	0.7
Diseases of white blood cells (288) .....	1.6	0.1	1.5	0.1	<sup>3</sup> 1.7	0.5	1.8	0.2	1.3	0.3
Mental disorders (290-319) .....	8.8	0.7	8.0	0.7	12.2	1.3	6.9	0.7	11.2	1.2
Psychosis (290-299) .....	1.6	0.2	1.8	0.2	<sup>3</sup> 0.7	0.2	1.7	0.3	1.5	0.3
Drug use and dependence (304-305) .....	4.8	0.6	3.8	0.5	8.9	1.2	2.7	0.4	7.5	0.9
Diseases of the nervous system and sense organs (320-389) .....	5.2	0.5	5.5	0.6	4.2	0.6	5.8	0.6	3.9	0.7
Diseases of the central nervous system (320-349) .....	3.0	0.3	3.2	0.4	<sup>3</sup> 2.1	0.6	2.9	0.4	2.6	0.6
Diseases of the circulatory system (390-459) .....	4.8	0.5	4.6	0.5	6.0	1.1	3.8	0.5	6.9	1.0
Diseases of the respiratory system (460-519) .....	10.1	0.5	10.0	0.6	10.8	1.2	10.0	0.7	10.1	1.0
Pneumonia (480-486) .....	4.2	0.4	4.0	0.4	5.0	1.0	3.6	0.4	4.8	0.6
Diseases of the digestive system (520-579) .....	6.5	0.4	6.7	0.5	5.7	0.8	7.1	0.6	5.3	0.6
Diseases of the genitourinary system (580-629) .....	4.7	1.0	4.7	1.3	4.6	0.7	3.0	0.4	( <sup>4</sup> )	...
Diseases of the skin and subcutaneous tissue (680-709) .....	2.6	0.2	2.6	0.2	<sup>3</sup> 2.7	0.7	2.7	0.3	2.8	0.4
Symptoms, signs, and ill-defined conditions (780-799) .....	6.2	0.4	6.4	0.5	5.6	0.6	7.2	0.6	4.8	0.6
Injury and poisoning (800-999) .....	2.4	0.3	2.5	0.3	<sup>3</sup> 1.8	0.5	2.4	0.4	2.3	0.4
All other conditions .....	3.9	0.7	2.9	0.7	8.5	1.8	2.9	0.6	6.3	1.7

<sup>1</sup> Total includes patients of races other than white or black and patients for whom race was not stated.

<sup>2</sup> SE = standard error. To produce 95 percent confidence intervals, multiply by plus or minus 1.96.

<sup>3</sup> Estimate should be used with caution; estimate based on fewer than 60

records in the sample.

<sup>4</sup> Estimate not reliable as the relative standard error was greater than 30 percent.

NOTE: HIV = human immunodeficiency virus.

SOURCE: Centers for Disease Control and Prevention, National Center for Health Statistics, National Discharge Survey.

black patients in the proportions of concurrent diagnoses that were diseases of blood and blood-forming organs or diseases of the respiratory system.

Mental disorders, however, accounted for a larger percent of the concurrent diagnoses for females than for males and for black patients than for white patients. Primarily, this was because of drug use and dependence, which made up 8.9 percent of concurrent diagnoses for females, compared to 3.8 percent for males, and 7.5 percent of

concurrent diagnoses for black patients, compared to 2.7 percent for white patients.

Another difference in diagnostic patterns was that, for males, neoplasms accounted for 4.4 percent of concurrent diagnoses, but too few neoplasms were reported for females to make a national estimate. For white patients, neoplasms were 5.2 percent of concurrent diagnoses, compared to only 1.9 percent for black patients. Half of the neoplasms were malignant neoplasms of the skin, excluding melanoma, which included Kaposi's sarcoma.



Diseases of the circulatory system made up a larger proportion of concurrent diagnoses for black HIV patients than for white HIV patients. A common circulatory system diagnosis for HIV patients was cardiac dysrhythmia. Female diagnoses were more likely to be in the "all other conditions" grouping than were male diagnoses. For females, almost half the diagnoses in this grouping were complications of pregnancy, childbirth, and the puerperium. For males "all other conditions" were predominately in the supplementary classification, categories such as personal history of certain diseases or of their aftercare.

**1991 data.** Data from the 1991 NHDS became available as this report was being completed. The data show that trends in HIV-related hospital use are continuing in the directions seen for earlier years. HIV patients had an estimated 165,000 hospital discharges in 1991, which was a rate of 65.7 discharges per 100,000 population. They used 2,108,000 days of care, or 841.2 per 100,000 population. The 1991 discharge rate per 100,000 population was 284.4 for black males and 124.9 for black females, compared to 60.7 for white males and 8.5 for white females. The discharge rate in the Northeast was 120.7 per 100,000 population, compared to rates of 62.3 in the West, 50.6 in the South, and 43.7 in the Midwest. Medicaid covered 41.4 percent of HIV discharges and private insurance covered 31.5 percent in 1991.

## Discussion

Data from NHDS document the rapid rise in hospital use by patients with HIV-related diagnoses in 1984-90 and increases in HIV-related discharges across sex and racial groups. These patterns are seen in the number of AIDS cases reported to CDC in the 1981-90 period (1). The high discharge rate for black HIV patients is consistent with the rates of reported AIDS cases and death rates for HIV (20), both of which were higher for blacks than for whites in 1990. Studies have found that black patients with HIV diagnoses are more likely than white HIV patients to be hospitalized, but white HIV patients have a higher rate of outpatient visits (9, 21).

The high discharge rate for patients with HIV diagnoses in the Northeast, compared to the other three regions of the country, can be explained in part by a greater incidence of HIV in the Northeast. The Northeast had a higher rate of reported AIDS cases in 1990 (1) and a higher death rate for

*'The discharge rate per 100,000 population for patients with HIV-related diagnoses increased from 4.3 in 1984 to 59.1 in 1990.'*

HIV in 1989 (22) than the other three regions. However, these rates were only 40 to 50 percent higher in the Northeast, compared to the almost 200 percent higher rate found for hospital discharges. Thus, although the Northeast may have more HIV patients than the other regions, those patients are likely to be hospitalized at a higher rate. The concentration of hospitalizations for female and black HIV patients in the Northeast may be related to the high HIV-related discharge rate for the region. In addition, practice patterns appear to vary across regions, such as the use of outpatient care, long-term care, and home care as alternatives to hospitalization in the West (2, 11).

The decline in the proportion of HIV hospitalizations with private insurance as the expected principal source of payment is likely to be related to the increase in hospitalizations for female and black HIV patients, who are more likely than male and white HIV patients to be covered by Medicaid. The lack of a significant difference in proportions of recent HIV hospitalizations covered by private insurance and Medicaid differs from findings of other surveys. In the Hospital Cost and Utilization Project (HCUP), private insurance was found to be the most frequent payment source for HIV-related discharges, but the data were for 1986-87 and do not reflect trends in more recent years (23). Medicaid was the primary payer for HIV patients in the 1988 U.S. Hospital AIDS/HIV Survey, but this survey focused on hospitals in large urban areas, where privately insured patients may be underrepresented (13).

Differences in the distribution of AIDS versus other HIV diagnoses by sex and race may reflect more recent HIV infection among female and black patients, but could also result from the use of diagnostic criteria based on the manifestations of AIDS in white males. To the extent that the latter is true, the proportions of female and black HIV patients diagnosed with AIDS would be expected to increase as expanded criteria for AIDS are implemented in 1993 (24).

Concurrent diagnoses of HIV patients were generally similar across sex and racial groups. How-

ever, diagnostic differences were found, such as more malignant neoplasms of the skin for male and white patients and more frequent reporting of drug use and dependence for female and black patients. The proportion of concurrent diagnoses that were drug use and dependence should not be interpreted as the proportion of HIV patients with this diagnosis. Although only 4.8 percent of concurrent diagnoses were for drug use or dependence, there were 17.4 diagnoses of drug use or dependence per 100 HIV patients. The rate was 13.8 for males, 33.3 for females, 9.4 for white patients, and 28.9 for black patients. Those rates are still lower than the proportion of HIV patients with drug use as a risk factor reported elsewhere (25, 13). Ball and Turner suggest that drug use is generally underreported on discharge abstracts, because it may not be recognized or considered clinically important during a particular hospitalization (23).

Surveys based on abstracts of hospital records may underestimate the number of discharges of patients with HIV infection. Not all patients infected with HIV are diagnosed, and the medical records of those diagnosed with HIV do not always show that diagnosis (26). Because our study was limited to patients with an HIV diagnosis, we did not include the infrequent non-HIV cases with such diagnoses as *Pneumocystis carinii* pneumonia (PCP), or Kaposi's sarcoma, which are highly indicative of HIV infection.

Data for 1984-86 probably underestimate total hospitalizations for HIV because only a single code for AIDS was available in the coding system until late 1986. In 1987 and 1988, about a fourth of patients with HIV diagnoses did not have a diagnosis of AIDS. However, even if estimates for the earlier years were increased by a fourth, the dramatic rise in HIV hospital use from 1984 through 1990 would remain. The expansion in the AIDS case definition in 1987 would be expected to affect the distribution of HIV discharges, increasing those identified as AIDS cases (27), but this change would not affect the estimates of total HIV discharges, which are the focus of this report. The 1988-90 data that were examined in detail were not affected by any changes in the coding system.

Because of the small number of HIV cases in the NHDS sample, especially cases of females with HIV, it was not possible to examine separately the characteristics of white males, white females, black males, and black females for the period studied. As the number of HIV hospitalizations increase, more detailed analyses will be possible.

Incomplete reporting of patients' race in NHDS

resulted in underestimates of the rates of hospital use of all racial groups and may have introduced additional bias into the estimates. Most of the "race not stated" data were from hospitals that did not report race data to NHDS for any of their patients. Further research is needed to examine whether these hospitals were likely to have distributions of discharges by race similar to the reporting hospitals.

Data on the Hispanic origin of patients were reported to NHDS, but these data were much less complete than race data and could not be used. In the 1988-90 period, only 37 percent of HIV patients were identified as Hispanic or not Hispanic. Since the rate of HIV infection is increasing among Hispanics (28), efforts should be made to encourage hospitals to report that information.

Hospital use patterns should not be interpreted as a direct reflection of the prevalence of HIV in the population. HIV patients would be expected to have multiple hospitalizations. The availability of alternative forms of treatment, such as outpatient care, hospice and home health care, and formal and informal care giving groups, affects hospital use patterns. In addition, insurance coverage, employment, and other factors can affect the frequency of hospitalization.

Despite those limitations, NHDS data are an important tool for continued monitoring of the HIV epidemic. The survey has the advantage of continuous data collection, which allows analysis of trends and rapid updating of estimates of HIV-related hospital use. The use of a nationally representative sample of discharges from short-stay, non-Federal hospitals permits calculation of population-based rates. NHDS data complement data on hospital use by HIV patients from other surveys. The Hospital Cost and Utilization Project (23) includes a larger number of hospital discharge abstracts and data from other sources, but the data are not as timely and usually are not used to produce population-based rates. Surveys conducted specifically to examine hospital use by HIV patients, such as the U.S. Hospital AIDS/HIV Survey (13) and the Sentinel Hospital HIV Surveillance System (8), have been able to collect HIV-related data not available in the general surveys of hospital use, but they do not have nationally representative samples.

Nationally representative data on the growth and change in HIV hospital use patterns are important in understanding the burden the disease creates for the nation's hospitals and to plan health policy to meet the needs of HIV patients.

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