

affecting "entrance" to health services (i.e., barriers and delays in seeking care and overall patterns of underutilization) and of the factors affecting AMA discharge rates, which may be viewed as inappropriate "exit" from such services.<sup>10-14</sup>

Since regional data systems are now widely available, it is possible to monitor these processes more systematically. These rates can be linked more directly to the relationships between medical and social problems in regional populations and to the pressures imposed on medical management by different forms of reimbursement as they change the character of inpatient care. AMA discharges represent many of the problems (e.g., those related to drugs, alcohol, psychiatric conditions, and indigent care) that public health agencies address. The percent of AMA discharges may in time take its place among other indicators of incidence rates and use of health services in a population and help document progress (or the lack of it) in solving larger social problems. □

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## An Evaluation of the Use of the Statewide Planning and Research Cooperative System of New York State as a Resource Planning Tool for HIV Infection

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### Introduction

One means of estimating acute care hospital use in New York State by patients infected with human immunodeficiency virus (HIV) has been based on the Statewide Planning and Research Cooperative System (SPARCS).<sup>1</sup> SPARCS, a mainframe data base that has been in existence since 1980, contains a discharge abstract for more than 95 percent of the acute care hospital stays in the state, exclusive of those occurring in federal and psychiatric acute care facilities. The discharge abstracts describe the hospital patient's medical condition in five diagnostic fields,

including a principal diagnosis and four secondary diagnoses, using ICD-9-CM diagnostic codes.

In October 1986, new HIV-specific ICD-9-CM codes<sup>2</sup> became effective.<sup>3</sup> The new codes, 042-044, indicate the presence of certain illnesses and/or conditions occurring simultaneously with HIV infection,

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### ABSTRACT

Hospital discharge records of patients with *Pneumocystis carinii* pneumonia (PCP) in New York State were studied to determine whether cases of human immunodeficiency virus (HIV) infection were identified. We estimate that as many as 13 percent of hospitalizations of patients with PCP in 1987 and 10 percent of those in 1988 were not appropriately identified as HIV related. Identification of PCP as HIV related was a function of a hospital's volume of PCP admissions. (*Am J Public Health* 1991;81:213-215)

TABLE 1—HIV-Identified PCP Discharges

Year	PCP Discharges (n)	HIV-Estimated PCP <sup>a</sup>		HIV-Identified PCP (n)	HIV-Identified PCP ÷ HIV-Estimated PCP (%)
		(n)	(%) <sup>b</sup>		
1987	5,725	5,631	(98)	4,891	(87)
1988	5,093	5,015 <sup>c</sup>	(98)	4,509	(90)

Note: Data obtained from the New York State Statewide Planning and Research Cooperative System (SPARCS). Data for 1988 are 80–85 percent complete.  
<sup>a</sup>PCP discharges minus non-HIV PCP background.  
<sup>b</sup>HIV-estimated PCP divided by PCP discharges multiplied by 100.  
<sup>c</sup>Background considered 82.5 percent reported (78 PCP discharges).

and another, 795.8, indicates an HIV-seropositive test result. The purpose of this study was to estimate the completeness with which admissions of HIV-infected patients were identified in the SPARCS.

## Methods

We studied the completeness of HIV identification in admissions for *Pneumocystis carinii* pneumonia (PCP) in SPARCS during 1987 and 1988. PCP was extremely rare prior to the HIV epidemic<sup>4-6</sup>; it is now the most frequently found illness in persons with acquired immunodeficiency syndrome (AIDS).<sup>7</sup> Each SPARCS discharge record with a diagnosis of PCP infection (ICD-9-CM code 136.3 in the principal or secondary diagnosis fields) was considered to represent a PCP admission. Each PCP discharge with an ICD-9-CM code of 042-044 or 795.8 in the principal or secondary diagnosis fields was considered to be a PCP admission identified with HIV infection.

To establish the expected number of HIV-related PCP discharges in the given year, we subtracted the estimated number of non-HIV not-related PCP discharges from the reported number. We estimated this "background" frequency of non-HIV-related PCP discharges by counting the number of PCP discharges in 1980; we assumed such discharges to be non-HIV related. We assumed the number non-HIV-related PCP discharges had not substantially changed since 1980.

We studied the validity of the assumption that the annual number of non-HIV-related PCP discharges remained essentially unchanged in two ways. First, we compared the 1987 and 1980 PCP admissions from New York State counties that reported fewer than two AIDS cases through 1987 to the New York State AIDS Registry. If our assumption was correct, there should have been little or no difference in the number of PCP discharges by these counties in the 2 years.

Second, we reviewed the extent of

HIV identification in PCP discharges in the "most sensitive" hospitals, those with the most experience with PCP in 1988. If our assumption was correct, the number of non-HIV-identified PCP discharges in such hospitals should be consistent with our 1980 background estimate.

We also investigated whether the percentage of PCP discharge abstracts with an ICD-9-CM code indicating HIV infection was associated with a hospital's experience with PCP. Hospitals were grouped into 11 different experience levels for each year studied. Linear regression using SAS<sup>8</sup> was performed to determine if a relation existed between PCP experience, year, and HIV coding.

## Results

### Completeness of HIV-Infection Identification

**Non-HIV-related PCP Rates**—In 1980, 94 discharges with a PCP diagnosis were reported to SPARCS. At that rate, one would expect non-HIV PCP background level of 1.6 percent in 1987 and 1988.

Eight of the 62 counties in New York State reported fewer than two AIDS cases to the New York State Registry through 1987. In 1980 each of these eight counties reported no PCP discharges. In 1987, four of the [se] eight counties reported no PCP discharges, three reported one PCP discharge, and one reported two PCP discharges.

Our review of the two hospitals with the largest number of PCP discharges (277 and 241) in 1988 revealed that HIV was associated with 97.4 percent and 99.6 percent of the PCP discharges.

**PCP Discharges and HIV Codes**—The results are shown in Table 1. After correction is made using the non-HIV PCP background, 98 percent of PCP discharge records in 1987 and 1988 should have been identified with an HIV diagnosis. Only 87 percent of the 1987 PCP discharge records and 90 percent of the 1988 records included an HIV diagnosis. Thus, up to 13 percent more of the 1987 and 10 percent more of the 1988 PCP discharge records should have contained an HIV-infection code.

### Hospital Experience

Two linear regression models were considered. The first included year and hospital PCP volume as independent variables and percentage HIV identified as the dependent variable. A borderline significant effect was noted for year ( $\beta = 5.00$ ,  $SE = 2.63$ ,  $p = .07$ ). Utilizing the

TABLE 2—HIV Associated with PCP Discharges in 1987 and 1988

PCP Discharges Per Hospital	1987		1988	
	Ratio of PCP Discharges with HIV Identified to PCP Discharges (%)		Ratio of PCP Discharges with HIV Identified to PCP Discharges (%)	
1-10	248/389	(64)	283/368	(77)
11-20	236/298	(79)	174/202	(86)
21-30	236/267	(88)	233/269	(87)
31-40	129/169	(76)	183/210	(87)
41-50	147/181	(81)	113/131	(86)
51-60	39/52	(75)	156/162	(96)
61-70	224/267	(84)	233/254	(92)
71-80	131/148	(89)	116/142	(82)
81-90	67/83	(81)	62/81	(77)
91-100	250/289	(87)	87/99	(88)
>100	3184/3582	(89)	2869/3175	(90)

Note: Data obtained from the New York State Statewide Planning and Research Cooperative System (SPARCS). Data for 1988 are 80–85 percent complete.

data available from both years, a reduced model was then considered that contained only hospital PCP volume as the independent variable (Table 2). Results from that model indicated a positive association between hospital PCP volume and percentage HIV identified ( $\beta = 0.93$ ,  $SE = 0.45$ ,  $p = .049$ ).

### Discussion

After correcting for the non-HIV-related PCP discharges, we have found undercoding of HIV infection in discharge abstracts of PCP-identified patients in New York State's acute care facilities. The amount of undercoding was a function of the facility's volume of PCP patients.

Our estimate of HIV-related PCP discharges depended on our assumption that the number of non-HIV-related PCP discharges was essentially constant statewide between 1980 and 1988. The results from our review of PCP occurrence in counties with a low incidence of AIDS and in hospitals with a high occurrence of PCP are consistent with such an assumption. However, there may be secular trends in non-HIV-related causes of PCP that affect the background level. Review of diagnoses in the SPARCS records of non-HIV-identified PCP patients is not sufficient to determine the presence or absence of HIV infection.

The reasons for the hospital variations in reporting PCP patients as HIV infected are unknown. In the interest of confidentiality, a hospital may choose to report that a patient was not HIV-positive even though the condition was diagnosed or suspected. A lack of sufficient number of diagnostic fields in SPARCS may also be a factor, since many PCP patients are sufficiently ill with other conditions that could fill the principal and four secondary diagnosis fields of the SPARCS record. However, since the inclusion of an HIV diagnostic code would increase reimbursement substantially, HIV coding should take precedence by hospitals when its presence is known.

Another explanation is that even at this late date in the HIV epidemic, providers in New York State do not recognize that PCP patients demonstrate the most publicized HIV-related opportunistic infection. If so, other, more subtle sequelae of HIV infection may be being identified at an even lower rate, and treatment of HIV-infected patients may be delayed. Further study of the non-HIV-infected PCP patients would clearly be fruitful. In the absence of such a study, it is prudent to recognize that statewide HIV hospitalization utilization may be underestimated when SPARCS or a comparable system is used as the source. □

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## Survival Trends of People with AIDS in Washington State

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### Introduction

In Seattle-King County, the major metropolitan area in Washington State, acquired immunodeficiency syndrome (AIDS) was the third leading cause of death in males aged 25-44 years in 1986. In 1987, it was second, according to the King County Department of Vital Statistics. While AIDS continues to increase in importance as a cause of mortality,<sup>1</sup> therapeutic advances should eventually be reflected in decreased mortality and longer survival times. Such trends have been reported from major epicenters of the epi-

demic, such as San Francisco,<sup>2</sup> and may be occurring nationwide.<sup>3</sup> Our study confirms that survival times of persons living

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### ABSTRACT

Survival rates of 609 cases of acquired immunodeficiency syndrome (AIDS) in Washington State diagnosed between 1982 and 1987 according to pre-1987 AIDS surveillance definition were analyzed. People with a primary diagnosis of Kaposi's sarcoma survived longer than those with *Pneumocystis carinii* pneumonia. Both groups survived longer than those with other diagnoses. Median survival increased from 11.3, to 12.5, to 20.8 months for cases diagnosed in or before 1985, during 1986, and during 1987, respectively. (*Am J Public Health* 1991; 81:215-218)