Soz.- Präventivmed. 42 (1997) 314–319
0303-8408/97/050314-06 $ 1.50 + 0.20/0

Philippe Vanhems[1,2], Alfredo Morabia[3], Marc Pechère[1], Victor Gabriel[1], Bernard Hirschel[1]

[1] *Infectious Diseases, Geneva University Hospital*
[2] *Research Center, Hôtel Dieu de Montréal, Montreal*
[3] *Clinical Epidemiology, Geneva University Hospital*

Duration of hospitalization during the first two years after AIDS diagnosis: A descriptive study

Summary

Has there been a change in the duration of periods of hospitalization during the first two years after diagnosis of AIDS between patients diagnosed before 1988, compared with patients diagnosed since 1988? A cohort of 212 AIDS patients was studied. They were diagnosed before December 31, 1990 and were hospitalized between January 1, 1981 and March 31, 1993 in the University Hospital of Geneva, Switzerland. Overall, the duration of hospitalization did not seem to differ according to the year of AIDS diagnosis, though the more recently diagnosed patients were hospitalized with a more advanced level of immunosuppression. However, the pattern of hospitalization was slightly different. The periods of hospitalization for subjects diagnosed before 1988 were relatively longer soon after the AIDS diagnosis and at a late stage in the course of the disease, whereas for the more recent patients the lengths of hospital stays were more uniform during the whole course of the disease.

It is still unclear whether improvements in prophylaxis and medical care have reduced the time patients spend in hospital after AIDS diagnosis. Several reports indicate that the average duration of hospitalization of AIDS patients has decreased since the beginning of the AIDS epidemic[1–4], but insufficient attention has been given to the possibility of cross-sectional bias. This was suggested to us when analyzing the results for the Geneva component of the Swiss HIV cohort study. In a first cross-sectional analysis, we found and reported a linear decline in cumulative length of hospitalization of AIDS patients between 1981 and 1990[5]. However, a subsequent analysis stratified into cohorts according to year of AIDS diagnosis did not confirm the decline. In addition, it suggested that the timing of hospitalization varied according from cohort to cohort. More recently diagnosed AIDS patients were hospitalized for shorter periods early after diagnosis, but for longer periods later on.

In the present paper we describe the duration of hospital stays during the two years after diagnosis. We studied the hospital days used by AIDS patients rather than exploring the hospitalisation histories of individual patients because we were interested in estimating the resources provided by the institution. We stratified patients on the basis of AIDS diagnosis before or after 1988, because this was the year of the introduction of zidovudine and *Pneumocystis carinii* (PCP) prophylaxis. We also stratified on duration of follow-up, to adjust for the survival bias involved in assessing hospital stays. All patients were followed for at least 6 months after the AIDS diagnosis to allow the identification of patterns of repeated hospitalizations.

Methods

Population

All patients were eligible for the present study who 1) met the 1987 CDC criteria for AIDS[6], 2) were hospitalized before December 31, 1990, for more than one day at the University Hospital of Geneva (the Canton of Geneva has one of the highest incidence rates of

AIDS in Europe[7–8]). The sample of 212 patients represented 83% of all AIDS cases diagnosed during that period in the Canton of Geneva according to the data of the Geneva Department of Public Health[8]. Sociodemographic variables (sex, age, risk factors), and date of AIDS diagnosis and every admission to discharge from hospital, were abstracted from medical charts and from the Swiss HIV cohort study (SHCS) database using standardized forms. The SHCS has been described in detail elsewhere[9]. Briefly, the cohort comprises all HIV positive patients followed in University Hospitals in Switzerland. In the SCHS, the major risk factor for AIDS and the date of initial diagnosis of AIDS are determined for all subjects by their physicians. The level of CD4+ T lymphocytes was determined as close as possible to the time of diagnosis by standardized methods[10].

Statistical analysis

The statistical analysis was restricted to subjects followed for 6 months to 2 years from the day of AIDS diagnosis, to the last information date available or death. We report the categorical data in a percentage and frequency table, and continuous data as means (± standard deviation). We calculated the average of duration of hospital stays per semester after the AIDS diagnosis, stratified on diagnosis before and after 1988. The average duration of hospital stays was the mean of cumulated days spent in hospital during a given period of time, divided by the number of hospital admissions. The comparisons of categorical data were done using the chi-squared test, and the comparisons of continuous date were assessed by the Mann-Whitney U-test or the t-test on logarithmic transformations.

Results

In the whole sample (n = 212), the mean age was 34.9 years (± 9.2 years), 81% were male, 43% were homosexual or bisexual (HS/BS), and 35% were intravenous drug users (IVDU). Table 1 shows that there were no significant differences in sex, age, and risk factors whether AIDS was diagnosed before (n = 71) or since 1988 (n = 141). Neither were there significant differences in frequency of opportunistic infections. Thirty five percent of patients who had AIDS before 1988 received zidovudine, and 71% of those diagnosed since 1988 (p = 0.001). Patients diagnosed since 1988 had lower CD4 counts at the time of AIDS diagnosis (median = 60/mm^3) than patients diagnosed before 1988 (median 120/mm^3, $p < 0.0001$) (not shown in a table).

Table 2 shows the number of hospitalizations and their durations by semester after AIDS diagnosis, stratified on the time of diagnosis. In each case the analysis was done within a period of time for which the patients were known to be alive. The results are globally similar, but for the patients with a follow-up lasting > 18 months, the pattern of hospitalization durations differed strongly by semester according to the period of AIDS diagnosis (Figure 1, Figure 2). For the patients diagnosed before 1988, shorter hospital stays occurred at the median period of follow-up. Lengths of hospital stays seem to be less variable for the recent patients.

	Year of AIDS diagnosis		
	1981–1990	1981–1987	1988–1990
	n = 212	n = 71	n = 141
Mean age (mean ± SD)	34.9 ± 9.7	34.7 ± 9.9	34.9 ± 9.7
Gender (n, %)			
Male	172 (81)	57 (80)	115 (82)
Female	40 (19)	14 (20)	26 (18)
Risk factors (n, %)			
Homo/bisexual	92 (43)	31 (44)	61 (43)
Intravenous drug users	75 (35)	23 (32)	52 (37)
Heterosexual	23 (11)	7 (10)	16 (11)
Others	22 (11)	10 (14)	12 (9)
AIDS defining diagnosis (n, %)			
CMV*	20 (9)	13 (18)	7 (5)
PCP**	82 (39)	19 (27)	63 (45)
Toxoplasmosis encephalitis	30 (14)	8 (4)	22 (16)
Kaposi sarcoma	42 (20)	15 (21)	27 (19)
Mycobacteriosis	16 (8)	8 (4)	8 (6)
HIV-dementia	21 (10)	9 (4)	12 (9)

* CMV: retinitis or colitis due to cytomegalovirus.
** PCP: *Pneumocystis carinii* pneumonia.

Table 1. *Characteristics of AIDS patients by year of diagnosis, Geneva, Switzerland, 1981–1990.*

Duration of follow-up after AIDS diagnosis	Year of AIDS diagnosis	Average number of hospital days per semester after AIDS diagnosis according to the duration of follow-up			
		1st semester	2nd semester	3rd semester	4th semester
>6 months	<1988 (n = 53)	44.6	–	–	–
	≥1988 (n = 114)	35.0	–	–	–
>12 months	<1988 (n = 43)	31.6	23.6	–	–
	≥1988 (n = 90)	30.0	42.9	–	–
>18 months	<1988 (n = 35)	31.9	17.5	26.3	–
	≥1988 (n = 69)	36.5	29.6	28.9	–
>24 months	<1988 (n = 29)	32.9	18.3	14.1	33.4
	≥1988 (n = 47)	27.4	28.6	27.7	21.6

Note: non-significant differences for comparisons of average number of hospital days according to the year of AIDS.

Table 2. *Mean number of hospital days according to the year of AIDS diagnosis and to the duration of follow-up.*

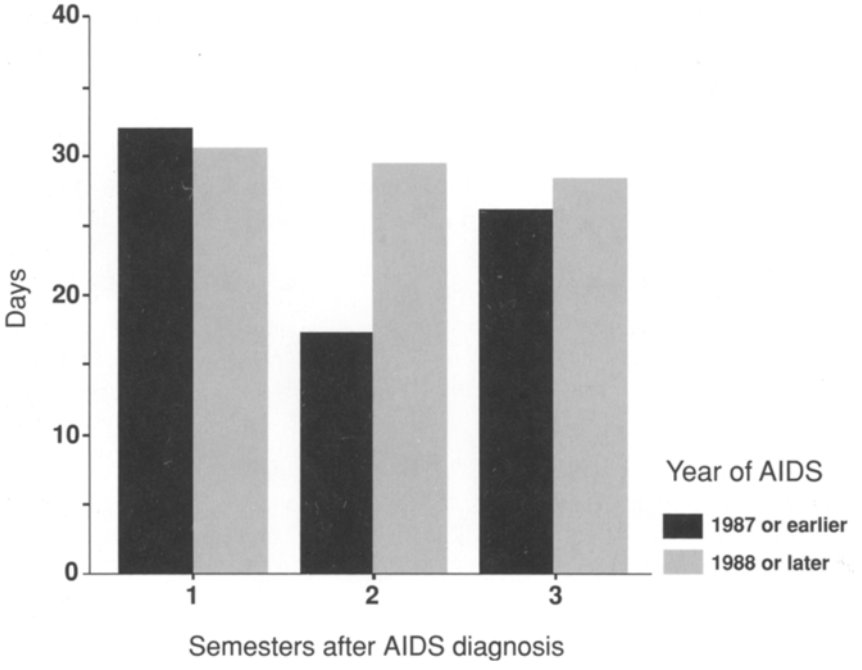

Figure 1. *Average hospital days per semester for AIDS patients stratified on the year of diagnosis for patients followed >18 months.*

Discussion

The present analysis of the Geneva component of the Swiss HIV cohort study suggests that patients diagnosed as having AIDS since 1988 spent the same amount of time in hospital during the first two years after diagnosis as those diagnosed before 1988. Nevertheless, the distribution of the duration of periods of hospitalisation varied according to the date of diagnosis.

The present study results seem to contradict previous cross-sectional analyses of the medial care of AIDS patients which have indicated a time trend towards less hospitalization[1–3]. Seage et al[1] found that US patients admitted during the first year of a study remained hospitalized on average 3.1 days longer than patients admitted during the second year of the study. According to Markson et al.[3], hospitalization duration of New York AIDS patients has steadily declined at a rate of one day per year since 1984. However, these analyses may have been confounded by a cohort effect, hospitalization in more recently diagnosed patients being delayed but the overall duration not reduced. An English report has found, as we do, that the average time spent in hospital had increased for more recently diagnosed AIDS patients: it was 26% for the AIDS patients diagnosed between 1983 and 1988 and 30% for those diagnosed between 1988 and 1990 (calculation from Table 3 of ref. 4).

We can speculate about the possible reasons why there is no decrease of time spent in hospital by the more recently-diagnosed patients. The total time of hospitalization stayed the same but patients were hospitalized later in the

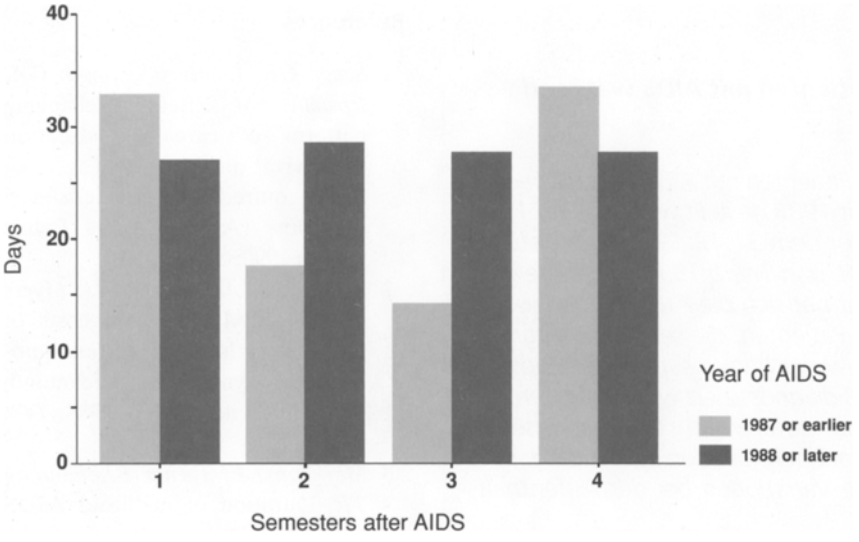

Figure 2. *Average hospital days per semester for AIDS patients stratified on the year of diagnosis for patients followed > 24 months.*

course of HIV infection, as is shown by their lower CD4 counts at the time of AIDS diagnosis. Thus, preventive measures, such as pentamidine inhalations[11–13] and zidovudine administration[14,15] now postpone the diagnosis of AIDS until immunosuppression is more advanced. After diagnosis, the mean number of hospital days is table for recent patients but a different pattern emerged for the patients diagnosed earlier. The pattern suggests that patients diagnosed before 1988 spent longer in hospital soon after diagnosis, because diagnostic and therapeutic procedures were less codified than they are today. As immunosuppression progresses, diseases such as disseminated mycobacterial infections, cachexia and diarrhea, AIDS-related dementia, and lymphoma, are less easily managed outside the hospital, so that more hospitalization is required during the second year after diagnosis. This effect was more pronounced for the patients in the earlier group, for whom prophylaxis regimens, especially against *Pneumocystis carinii* pneumonia, encephalitis toxoplasmosis and mycobacterial infections, were less used.

A limitation of the present study was the lack of information on hospital service consumption by HIV positive patients prior to the diagnosis of AIDS. The changes in the pattern of hospitalization during the first two years of AIDS diagnosis that we observed may be related to complementary changes during the pre-AIDS period. A study[4] found that the number of hospital days spent by HIV positive patients without AIDS doubled between 1986 and 1990. Future studies should also analyse the pre-AIDS period to clarify fully the impact on medical services on time spent in hospital by patients infected by HIV before AIDS in the era of HIV protease inhibitors. Another limitation was that the analysis was carried out only for patients with a follow-up period > 6 months. This excluded the patients with severe disease who died soon after the AIDS diagnosis.

The pattern of hospitalizations for these patients with a poor prognosis would have needed a separate analysis.

A strength of the present study is that complete information on hospitalization during the first two years after AIDS diagnosis was available for 83% of all AIDS patients diagnosed in the Canton of Geneva between 1981 and 1990. Detailed information on every hospitalization episode allowed us to compute crude descriptive statistics of hospital stay according to the duration of follow-up. Finally, the analysis was performed for AIDS cohorts according to year of diagnosis. Even though the patients analysed in the present study were diagnosed before December 31, 1990, and the follow-up ended in March 1993, it is reasonable to believe that these results remain valid for recently diagnosed AIDS patients since there has not been a change in patients care since 1993 as profound as that of 1988.

In summary, improvement in AIDS prophylaxis and therapy may have delayed the beginning major periods of hospitalization after diagnosis, but they have not reduced the overall time spent hospitalized during the first two years after diagnosis. These findings may be at odds with current beliefs on the evolution of time spent hospitalized by AIDS patients, but they deserve to be considered seriously, since they could have important implications for the evolution of hospital needs and costs related to the AIDS epidemic.

Zusammenfassung

Aufenthaltsdauer im Spital bei Patienten mit AIDS während zwei Jahren nach Diagnose

Ist die Aufenthaltsdauer im Spital bei Patienten mit AIDS unterschiedlich, wenn die Diagnose vor 1988 oder seit 1988 gestellt wurde? Bei 212 Patienten dieser Kohorte wurde AIDS vor dem 31.12.1990 diagnostiziert, und sie waren zwischen Januar 1981 und März 1993 im Genfer Universitätsspital hospitalisiert. Insgesamt hat sich die Aufenthaltsdauer im Spital seit 1988 nicht geändert, aber Patienten, die seit 1988 diagnostiziert worden waren, werden mit schwerer Immunsuppression hospitalisiert. Bei den Patienten, die vor 1988 diagnostiziert worden waren, war die Aufenthaltsdauer im Spital länger: sofort nach der Diagnose von AIDS und auch später im Lauf der Krankheit. Bei den seit 1988 diagnostizierten Patienten findet man diese Variationen bei der Aufenthaltsdauer nicht.

Résumé

Durée d'hospitalisation au cours des deux années suivant le diagnostic de SIDA

Y a-t-il eu un changement dans la durée d'hospitalisation des patients chez qui un SIDA a été diagnostiqué avant 1988 ou depuis 1988? Les 212 patients de cette cohorte ont eu un SIDA diagnostiqué avant le 31.12.1990 et ont tous été hospitalisés entre janvier 1981 et mars 1993 à l'Hôpital cantonal universitaire de Genève. Au total, les durée d'hospitalisations ne sont pas differentes selon l'année du diagnostic de SIDA, mais les patients les plus récents ont été hospitalisés à un stade d'immunosuppression plus avancé. Pour les plus anciens patients, les durées de séjour hospitaliers ont été plus longues immédiatement après le diagnostic de SIDA et plus tard au cours de l'évolution de la maladie alors que les durées d'hospitalisations des patients diagnostiqués après 1988 restaient constantes au cours du temps.

References

1 *Seage GR, Landers S, Lamb GA, Epstein AM.* Effect of changing patterns of care and duration of survival on the cost of treating the acquired immunodeficiency syndrome (AIDS). Am J Public Health 1990; *80*:835–839.

2 *Kaplowitz LG, Turshen IJ, Myers PS,* et al. Medical care costs of patients with acquired immunodeficiency syndrome in Richmond, Va. Arch Intern Med 1988; *148*: 1793–1797.

3 *Markson LE, Turner BJ, Fanning TR.* Duration of medicaid AIDS hospitalizations – Variation by season, stage and year. Am J Public Health 1992; *82*:578–580.

4 *Johnson AM, Shergold C, Hawkins A, Miller R, Adler MW.* Patterns of hospital care for patients with HIV infections and AIDS. J Epidemiol Commun Health 1993; *47*: 232–237.

5 *Vanhems P, Morabia A, Gabriel V, Chamot E, Hirschel B.* Evolution of epidemiologic and hospital care characteristics of AIDS patients in Geneva between 1981 and 1990. Abstract in: Program and abstracts of the European Regional meeting of the International Epidemiological Association. Basel, August 1991. International Epidemiological Association; 1991:186.

6 Centers for Disease Control. Revision of the CDC surveillance case definition for AIDS. Morb Mortal Wkly Rep 1987; *36*:3S–15S.

7 Anonymous. Statistics from the World Health Organization and the Centers for Disease Control. AIDS 1991; *5*:119–120.

8 Anonymous. AIDS information. Bulletin de l'Office Fédéral de la Santé Publique 1990; *46*:750.

9. *Engel RR, Samuel MC, Rieder HL, Billo N, Somaini B.* Completeness of AIDS reporting in Switzerland: a study based on deaths between December 1987 and June 1990. AIDS 1992; *6*:1385–1389.

10 *Ledergerber B, von Overbeck J, Egger M,* et al. The Swiss HIV Co-

hort Study: Rationale, organization and selected baseline characteristics. Soz Präventivmed 1994; *39*:387–394.

11 *Hirschel B, Lazzarin A, Chopard P,* et al. A controlled study of inhaled pentamidine for primary prevention of *Pneumocystis carinii* pneumonia. N Engl J Med 1991; *324*:1079–1083.

12 *Heald A, Flepp M, Chave JP,* et al. Treatment for cerebral toxoplasmosis protects against *Pneumocystis carinii* pneumonia in patients with AIDS. Ann Intern Med 1991; *115*:760–763.

13 *Chien SM, Rawji M, Mintz S, Rachlis A, Chan CK.* Changes in hospital admissions pattern in patients with human immunodeficiency virus infection in the era of *Pneumocystis carinii* prophylaxis. Chest 1992; *102*:1035–1039.

14 *Fishl MA, Richman DD, Grieco MH,* et al. The efficacy of azidothymidine (AZT) in the treatment of patients with AIDS and AIDS-related complex. N Engl J Med 1987; *317*:185–191.

15 *Cooper DA, Gatell JM, Kroon S,* et al. Zidovudine in persons with asymptomatic HIV infection and CD4+ cell counts greater than 400 per cubic millimeter. N Engl J Med 1993; *329*:297–303.

Acknowledgments

The authors thank Eric Chamot, MD, PhD, and Chantal Berti for their assistance in the data collection.

Address for correspondence

Alfredo Morabia, MD, PhD
Clinical Epidemiology Division
Rue Micheli-du-Crest 24
CH-1211 Geneva 14