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Causes of Death among Women with Human Immunodeficiency Virus Infection in the Era of Combination Antiretroviral Therapy

Mardge H. Cohen, MD, **Audrey L. French, MD**, **Lorie Benning, MS**, **Andrea Kovacs, MD**, **Kathryn Anastos, MD**, **Mary Young, MD**, **Howard Minkoff, MD**, and **Nancy A. Hessol, MSPH**
Department of Medicine (MHC, ALF), Cook County Hospital, Chicago, Illinois; Department of Medicine (ALF), Rush Medical College, Chicago, Illinois; Department of Epidemiology (LB), The Johns Hopkins School of Public Health, Baltimore, Maryland; Maternal-Child HIV Management and Research Center (AK), University of Southern California Keck School of Medicine, Los Angeles, California; Lincoln Medical Center (KA), Bronx, New York; Georgetown University Medical Center (MY), Washington, D.C.; Maimonides Medical Center and SUNY Health Science Center (HM), Brooklyn, New York; and Department of Medicine (NAH), University of California, San Francisco, California

Abstract

PURPOSE—To examine changes in the causes of death and mortality in women with human immunodeficiency virus (HIV) infection in the era of combination antiretroviral therapy.

METHODS—Among women with, or at risk of, HIV infection, who were enrolled in a national study from 1994 to 1995, we used an algorithm that classified cause of death as due to acquired immunodeficiency syndrome (AIDS) or non-AIDS causes based on data from death certificates and the CD4 count. Poisson regression models were used to estimate death rates and to determine the risk factors for AIDS and non-AIDS deaths.

RESULTS—Of 2059 HIV-infected women and 569 who were at risk of HIV infection, 468 (18%) had died by April 2000 (451 HIV-infected and 17 not infected). Causes of death were available for 428 participants (414 HIV-infected and 14 not infected). Among HIV-infected women, deaths were classified as AIDS (n = 294), non-AIDS (n = 91), or indeterminate (n = 29). The non-AIDS causes included liver failure (n = 19), drug overdose (n = 16), non-AIDS malignancies (n = 12), cardiac disease (n = 10), and murder, suicide, or accident (n = 10). All-cause mortality declined an average of 26% per year ($P = 0.03$) and AIDS-related mortality declined by 39% per year ($P = 0.01$), whereas non-AIDS-related mortality remained stable (10% average annual decrease, $P = 0.73$). Factors that were independently associated with non-AIDS-related mortality included depression, history of injection drug use with hepatitis C infection, cigarette smoking, and age.

CONCLUSION—A substantial minority (20%) of deaths among women with HIV was due to causes other than AIDS. Our data suggest that to decrease mortality further among HIV-infected women, attention must be paid to treatable conditions, such as hepatitis C, depression, and drug and tobacco use.

With the advent of combination antiretroviral therapy, mortality for persons with acquired immunodeficiency disease syndrome (AIDS) in the United States has declined markedly (1–3). For women with AIDS, these declines have been delayed and smaller in magnitude than those seen in men (1,4), perhaps due to racial and sex differences in access to antiretroviral

Requests for reprints should be addressed to Mardge Cohen, MD, CORE Center, 2020 West Harrison, Chicago, Illinois 60612, or mcohen@corecenter.org.

therapy and other human immunodeficiency virus (HIV)–related care, or to antiretroviral adverse effects (5– 8). It may also be related to a difference in the frequency of deaths unrelated to AIDS.

Although most studies have not found sex-related differences in HIV disease progression (9,10), some have noted a worse prognosis for women, especially those who inject drugs (11,12). Causes of death were not examined in these studies. Assessing causes of death may clarify the effects of other medical problems on mortality of women with HIV infection.

The purpose of this investigation was to evaluate cause-specific mortality of participants in the Women's Interagency HIV Study, the largest U.S. longitudinal study of women with HIV infection. We examined non-HIV-related causes of death, compared the changes in mortality between those who died of AIDS and those who died of non-AIDS causes, and compared risk factors for AIDS and non-AIDS mortality in the era of combination antiretroviral therapy.

METHODS

Sample

The Women's Interagency HIV Study, a National Institutes of Health–funded cohort study, consists of six sites: Bronx/Manhattan; Brooklyn; Chicago; Washington, D.C.; San Francisco; and Los Angeles/Hawaii. Participants with or at risk of HIV infection were enrolled between October 1994 and November 1995. Eligible women were 13 years of age or older, gave informed consent, were tested for HIV infection, completed an interview in English or Spanish, and underwent a clinical examination and laboratory testing. The study's methodology, training, quality assurance activities, and the cohort's baseline characteristics, which are similar to those for HIV-infected women in the United States, have been reported (13).

A standardized interview-based survey was used to collect demographic characteristics; medical, gynecologic, and psychosocial history; use of cigarettes, alcohol, and drugs (including intravenous drugs, and noninjected heroin and cocaine); sexual history; and medications at each 6-month visit. The Center for Epidemiological Studies depression scale measured depressive symptomatology, with a score of ≥16 indicating depressive symptoms. Women were considered to have experienced abuse if they answered affirmatively to questions about physical, sexual, or emotional coercion. (Abuse data were not collected at the two California sites.)

Combination antiretroviral therapy was defined as the use of two or more nucleoside analogue reverse transcriptase inhibitors with at least one protease inhibitor or non-nucleoside reverse transcriptase inhibitor; one nucleoside with at least one protease inhibitor and non-nucleoside; ritonavir and saquinavir with one nucleoside and no non-nucleoside; abacavir and two or more non-nucleosides. At each visit, HIV antibody status, HIV-1 ribonucleic acid (RNA), and CD4 T-lymphocyte count were determined using standard flow cytometric techniques at local laboratories participating in the National Institutes of Health (NIH) Quality Assurance Program. Quantitation of HIV-1 RNA was performed using the isothermal nucleic acid sequence– based amplification method (NASBA, Organon Teknika Corp., Raleigh, North Carolina) in laboratories certified by the NIH Virology Quality Assurance program. The lower limit of detection was 4000 copies/mL. Baseline hepatitis B antigen and hepatitis C antibody assays were performed locally. Serum lipid levels were not obtained.

Ascertainment of Cause of Death

The study protocol included ongoing ascertainment of clinical outcomes including death, AIDS, tuberculosis, and malignancies. Cause of death was determined from death certificates (n = 302) and electronic death certificate information from the National Death Index, with immediate and underlying causes of death, using the *International Classification of Diseases, Ninth Revision* (n = 54), as well as local death registries (n = 18), hospital records (n = 25), physician reports (n = 13), and reports from family or friends (n = 15).

Death was categorized as likely to be attributable to AIDS if the stated cause was an AIDS-defining opportunistic infection or malignancy; the stated cause was non-specific infection or organ failure (e.g., pneumonia with no organism identified, sepsis, multi-organ or respiratory failure) and the CD4 count obtained at the last study visit was <200 cells/mm^3; or the stated cause of death was AIDS without further specification and the last CD4 count was <200 cells/mm^3.

Death was categorized as a non-AIDS death if a non-AIDS cause was identified as the primary cause of death (e.g., violence, accident, drug overdose, liver failure, non-AIDS–associated malignancy); or if kidney failure, or cardiovascular, gastrointestinal, or central nervous system disease was the primary cause of death and the last CD4 count was ≥200 cells/mm^3. We considered the cause of death to be indeterminate if the available cause of death was entirely nonspecific, most frequently "cardiopulmonary arrest;" the stated cause was nonspecific infection or organ failure with the last CD4 count ≥200 cells/mm^3; the stated cause was AIDS alone and the last CD4 count was ≥200 cells/mm^3; or kidney failure was the primary cause of death with a CD4 count <200 cells/mm^3.

Deaths were classified as due to unknown causes if there were no available death certificates, matches in the National Death Index, or clinical reports. Two physician-investigators reviewed the classification of each death.

Statistical Analysis

The time from October 1994 through April 2000 was divided into 11 six-month intervals. Enrollment spanned October 1994 to November 1995. Each participant contributed time at risk from her date of enrollment through her date of death or the date she was last seen alive. HIV seroconverters contributed time at risk to the seronegative cohort up to the estimated date of seroconversion, and to the seropositive cohort after that date.

Death rates for each interval were calculated as the number of deaths divided by the time contributed by participants in that interval. Poisson regression models were used to estimate and to test the significance of the average annual change in the rates of all-cause mortality, AIDS-related and non-AIDS mortality among HIV-infected women, and all-cause mortality among those who were not HIV infected (14). *P* values <0.05 were used to determine statistical significance.

Poisson regression was also used to calculate rate ratios (RR) and 95% confidence intervals (CI) to determine risk factors for AIDS and non-AIDS death among HIV-infected women, and for any death among those who were not HIV infected. Multivariate models for causes of death among HIV-infected women included all potential risk factors, except domestic violence (data were available for only four sites and the associations were not significant [*P* >0.05] in univariate analyses), and the likely explanation for HIV infection (HIV risk factor), which was collinear with baseline injection drug use.

RESULTS

At enrollment, the median age of the 2628 participants was 36 years; 56% were black, and 23% were Latina (Table 1). The median annual income was $4500, and 66% of participants reported a history of abuse or domestic violence. The likely causes of HIV infection were heterosexual sex in 42%, injection drug use in 34%, and transfusion in 4%; 20% had no identified cause. At baseline, the median CD4 cell count was 330 cells/mm^3, and the median viral load was 22,000 copies/mm^3.

The cohort included 2059 HIV-infected women and 569 who were not infected, of whom 9 seroconverted during follow-up. By April 2000, 468 participants had died (451 who were HIV infected [59.9 per 1000 woman-years] and 17 who were not HIV infected [8.5 per 1000 woman-years]). There were no deaths among the sero-converters. Causes of death were missing for 40 participants (37 of whom were HIV infected) (Table 2). For participants with HIV infection, AIDS accounted for 294 deaths (71% of those with available information), non-AIDS causes for 91 deaths (22%), and a classification could not be determined for 29 deaths (7%). Of these 29 indeterminate deaths, 14 (48%) had CD4 cell counts <200 cells/mm^3 at their last measurement and 15 had CD4 counts ≥200 cells/mm^3.

For deaths classified as AIDS, 138 (47%) were due to an AIDS-defining condition or malignancy and 90 (31%) were due to unspecified AIDS with CD4 cell count <200 cells/mm^3. For non-AIDS deaths, the major causes were hepatic disease (21%); drug overdose (18%); non-AIDS malignancies (13%); cardiac causes (11%); accident, suicide or homicide (11%); and other gastrointestinal causes (10%). Deaths due to liver disease were about five times more common among HIV-infected women than among those who were not infected ($P = 0.11$).

Non-AIDS malignancies among the HIV-infected women included lung cancer (n = 3); oropharyngeal cancer (n = 2); hematologic cancer (n = 2); and liver, colon, stomach, ovary, and brain cancer (n = 1 each). Cardiac deaths in the non-AIDS group included coronary artery disease (n = 4, including 2 with renal failure), myocardial infarction (n = 1), hypertension (n = 2), and heart failure (n = 3). Four women who were not HIV infected died of cancer (3 with lung cancer, 1 with a hematologic malignancy).

All-cause and AIDS-related mortality rates (Figure) for HIV-infected women decreased markedly from October 1995 through April 1997, the period of introduction of combination antiretroviral therapy, and continued to decrease subsequently. Rates of all-cause mortality declined by an average of 26% per year ($P = 0.03$), and rates of AIDS-related mortality declined by an average of 39% per year ($P = 0.01$) among HIV-infected women. In contrast, rates of non-AIDS mortality among HIV-infected women (10% annual decrease, $P = 0.73$) and all-cause mortality among women who were not HIV infected (18% annual increase, $P = 0.62$) remained stable.

Women who died of AIDS-related conditions had higher median HIV-1 RNA counts than did those who lived or died of other causes (Table 1). Women who died of non-AIDS causes were older, had higher rates of hepatitis B antigenemia and hepatitis C infection, were more likely to have used injection drugs and smoked, and were more likely to have injection drug use as their likely cause of HIV infection than did those who survived. In general, women without HIV infection who died had similar characteristics as those with HIV infection who died of non-AIDS-related conditions (Table 1).

In unadjusted analyses, higher HIV-1 viral load, depressive symptoms, and use of combination antiretroviral therapy were associated with AIDS-related deaths. As expected,

use of antiretroviral therapy was not independently associated with death due to AIDS after adjusting for HIV-1 RNA level (Table 3).

In the multivariate model, higher HIV-1 viral load, depressive symptoms, and past injection drug use were associated with death from non-AIDS causes among HIV-infected women. Although hepatitis B antigenemia, hepatitis C infection, and recent injection drug use were risk factors for non-AIDS deaths in univariate analyses, these effects were not observed after adjusting for a history of injection drug use.

In unadjusted analyses, hepatitis C infection and history of injection drug use were significant risk factors for non-AIDS-related deaths due to liver disease, drug overdose, and malignancy among HIV-infected women (Table 4). Depressive symptoms were a significant risk factor for deaths from drug overdose and non-AIDS malignancies, whereas recent drug injection use, use of cocaine or heroin, smoking, and frequent alcohol use were associated with death from drug overdose.

Among women who were not HIV infected, depressive symptoms, history of abuse, hepatitis C infection, history of injection drug use, recent injection drug use, frequent alcohol use, and use of heroine or cocaine were associated with mortality in univariate analyses (Table 3). There were too few deaths for multivariate models.

DISCUSSION

In our study, mortality decreased significantly in women with HIV infection in 1996. Participants first reported use of combination antiretroviral therapy in early 1996; by 1998, over 50% reported use of combination therapy (15). A similar decline in mortality has been noted in other cohorts (16,17). However, throughout the study, a substantial minority of deaths (20%) was caused by non-AIDS-related conditions, including liver failure, cancer, violence, and drug- and alcohol-related problems. As combination antiretroviral therapy has reduced the number of deaths due to AIDS-related causes, the relative importance of these non-AIDS conditions has increased.

Two retrospective reports have described trends in HIV-related mortality. Sansone found a decline in deaths attributable to opportunistic infections and a significant increase in deaths from hepatitis C after combination antiretroviral therapy was introduced (18). Valdez et al. noted a decline in deaths due to AIDS-defining illnesses and a rise in the frequency of death in patients with controlled HIV replication in a review of 260 deaths from 1995 through 1999 (19). The Swiss HIV Cohort Study also found that injection drug use and hepatitis C were associated with mortality in patients who were being treated with combination antiretroviral therapy (20). We found a high prevalence of hepatitis C infection and injection drug use in this cohort of women infected with HIV; both of these conditions were associated with increased mortality. More research is needed to elucidate the relation between hepatitis C infection and HIV-associated immunosuppression in contributing to death from hepatic diseases.

The women in our study who died of non-AIDS conditions (liver disease, drug overdose, violence, and malignancies) were an extremely vulnerable group of women. Three quarters experienced depressive symptoms, over 80% had a history of injectable drug use, three quarters had hepatitis C infection, and most had smoked.

The concept of competing causes of death in persons with HIV/AIDS has received little attention. Goedert et al. retrospectively studied mortality in drug users in Italy and found that trauma, overdose, bacterial infections, hepatitis, and cirrhosis were increased in those who were HIV infected (21). One British study, which took place before combination

antiretroviral therapy, found that 5% of deaths among HIV-infected persons were due to non-AIDS causes, especially among those who were older or used injection drugs (22). Another study emphasized the importance of smoking as a risk factor for lung cancer in HIV-infected persons (23). Our results point to the importance of smoking, alcohol, and drug use in contributing to excess mortality in these patients.

The excess risk related to depressive symptoms supports the association of depression and an increased risk of dying from AIDS (24). However, we found that depressive symptoms were more strongly associated with non-AIDS causes of death and with deaths in uninfected women. Undetected and untreated depression needs to be addressed in clinical settings that provide care for women with, or at risk of, HIV infection (25).

Homicide, accidents, and suicide caused one of every eight non-AIDS deaths in our cohort. The contribution of violent deaths in women with HIV was noted in a Brazilian study (26). The high prevalence (67%) of past domestic violence among HIV-infected women underscores the importance of establishing abuse identification and referral programs to alleviate stresses and to give women the option of removing themselves from unsafe surroundings (27,28).

The major limitation of this study, which is common to many mortality studies, is that death certificate diagnoses may be inaccurate in identifying the cause of death (29 –33). There may be particular problems in death certificates of persons with HIV/AIDS (34). Death certificates may suffer in terms of sensitivity (misguided concerns about patient confidentiality leading to underreporting of AIDS-related deaths) and specificity (ascribing any death in a person with HIV to HIV/AIDS) (35). However, aggregate death certificate data are useful in epidemiological studies of effects of HIV infection (36–39). Inaccuracy in death reporting is unlikely to have changed systematically during the study, and should not have biased our analysis. Also, our algorithm tended to favor linkage of HIV/AIDS to cause of death; thus, our finding of substantial numbers of non-AIDS causes is likely to be robust.

As combination antiretroviral therapy alters the course of HIV disease and delays morbidity and mortality, providers need to be aware of the effects of common comorbid conditions on the survival of women with HIV infection. With the changing demographic characteristics of the HIV epidemic in the United States, the medical and psychosocial problems faced by women with HIV infection will require more attention. Addressing these problems may have beneficial effects on the health of these women.

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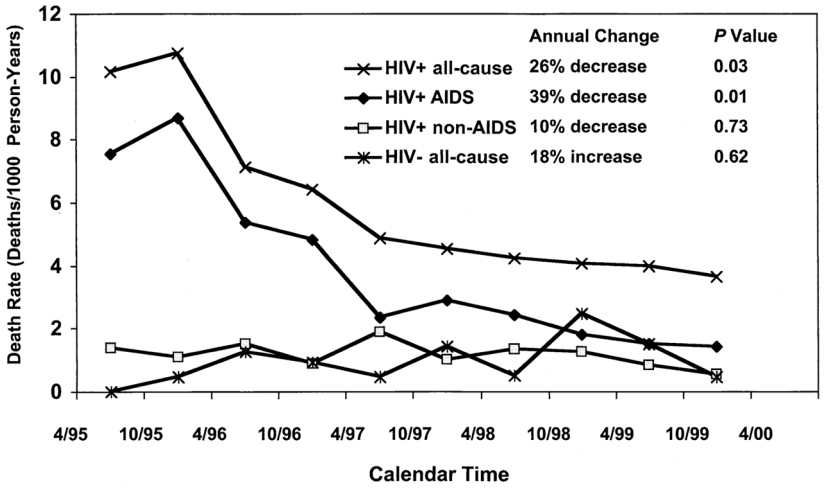

Figure.

Change in Mortality in the Women's Interagency HIV Study. HIV + indicates HIV infected; HIV– indicates not HIV infected. AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus.

Table 1

Comparison of Baseline Characteristics of Women in the Women's Interagency HIV Study Cohort, by HIV Status and Survival during Follow-up

	HIV Infected					Not HIV Infected		
	Alive (n = 1608)	AIDS Deaths (n = 294)		Non-AIDS Deaths (n = 91)		Alive (n = 552)	Deaths (n = 17)	
Risk Factor	**N (%) or Median**		***P* Value***	**N (%) or Median**	***P* Value***	**N (%) or Median**		***P* Value***
HIV RNA (copies/mL)	14,000	220,000	<0.0001	54,500	<0.0001	—	—	—
Depression	883 (55)	170 (58)	0.36	57 (63)	0.15	292 (53)	14 (82)	0.02
Abuse history†	—	—	—	—	—	—	6/9 (67)	0.72
Hepatitis B	317 (20)	55 (19)	0.75	32 (35)	0.0007	67 (12)	4 (24)	0.14
Hepatitis C	632 (39)	121 (41)	0.56	62 (68)	<0.0001	145 (26)	12 (71)	<0.0001
Injection drug use history	633 (39)	108 (37)	0.40	68 (75)	<0.0001	176 (32)	13 (76)	0.0003
Recent drug use	167 (10)	25 (9)	0.40	18 (20)	0.009	65 (12)	6 (35)	0.01
Smoking			0.22		<0.0001			0.12
Current	876 (54)	150 (51)	—	70 (77)	—	347 (63)	15 (88)	—
Previous	264 (16)	60 (20)	—	13 (14)	—	61 (11)	0	—
Never	449 (28)	78 (27)	—	8 (9)	—	137 (25)	2 (12)	—
Alcohol use‡	125 (8)	15 (5)	0.14	10 (11)	0.24	53 (10)	5 (29)	0.02
Cocaine or heroin use§	405 (25)	81 (28)	0.38	29 (32)	0.17	177 (32)	12 (71)	0.003
Age (years)	36	37	0.02	41	<0.0001	35	39	0.03
Race			0.16		0.30			1.00
White	343 (21)	60 (20)	—	20 (22)	—	105 (19)	3 (18)	—
Latino	395 (25)	59 (20)	—	16 (18)	—	153 (28)	5 (29)	—
Black	867 (54)	175 (60)	—	55 (60)	—	293 (53)	9 (53)	—
HIV risk‖			0.45		<0.0001			0.01
Injection drugs	529 (33)	85 (29)	—	52 (57)	—	147 (27)	11 (65)	—
Heterosexual sex	663 (41)	132 (45)	—	26 (29)	—	142 (26)	3 (18)	—
Transfusion	61 (4)	14 (5)	—	2 (2)	—	15 (3)	0	—
None identified	339 (21)	60 (20)	—	10 (11)	—	243 (44)	3 (18)	—

* *P* values for comparison between women who died (AIDS, non-AIDS, or not HIV infected) with those who were alive.

† Sexual, physical, or emotional, excluding California sites.

‡Drinks 5 to 7 days per week.

§Noninjection use.

||Likely cause of HIV infection.

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus; RNA = ribonucleic acid.

Table 2

Causes of Death in the Women's Interagency HIV Study Cohort

	HIV Infected	Not HIV infected
Cause of Death	**Number of Deaths (Mortality per 1000 Woman-Years)**	**Number of Deaths (Mortality per 1000 Woman-Years)**
Definite AIDS		
Opportunistic conditions	119 (15.8)	
AIDS-related malignancy	19 (2.5)	
Probable AIDS		
Unspecified AIDS	90 (12)	
Sepsis	28 (3.7)	
Unspecified pneumonia	24 (3.2)	
Other lung disease	9 (1.2)	
Metabolic acidosis	3 (0.4)	
Encephalopathy	1 (0.1)	
Gastrointestinal disease	1 (0.1)	
Total AIDS	294 (39)	
Non-AIDS		
Liver disease	19 (2.5)	1 (0.5)
Malignancy	12 (1.6)	4 (2)
Drug overdose	16 (2.1)	2 (1)
Homicide/suicide/accident	10 (1.3)	4 (2)
Cardiac	10 (1.3)	
Gastrointestinal	9 (1.2)	
Kidney	6 (0.8)	1 (0.5)
Neurologic	5 (0.7)	
Infection	2 (0.3)	
Autoimmune	1 (0.1)	1 (0.5)
Multiple causes	1 (0.1)	1 (0.5)
Total non-AIDS	91 (12.1)	

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus.

Table 3

Associations between Selected Risk Factors and Causes of Mortality*

	HIV Infected				Not HIV Infected
	AIDS-Related Deaths		Non-AIDS-Related Deaths		Deaths
	Univariate	Multivariate	Univariate	Multivariate	Univariate
Risk Factor (unit)	**Relative Risk (95% Confidence Interval)**				
HIV RNA (per 1 log difference)	4.8 (4.1–5.5)	4.7 (4.0–5.5)	2.0 (1.6–2.6)	2.1 (1.6–2.8)	—
Combination antiretroviral therapy	0.6 (0.4–0.7)	0.97 (0.69–1.4)	1.1 (0.7–1.7)	1.6 (0.96–2.7)	—
Depression	1.8 (1.4–2.2)	1.3 (0.98–1.7)	2.8 (1.7–4.6)	2.7 (1.6–4.7)	4.7 (1.5–14)
History of abuse	0.8 (0.6–1.1)	—	0.6 (0.4–1.1)	—	0.8 (0.2–3.0)
Recent abuse	1.2 (0.8–2.0)	—	0.9 (0.3–2.6)	—	11 (2.7–47)
Hepatitis B	0.9 (0.7–1.2)	0.9 (0.7–1.3)	2.1 (1.4–3.3)	1.5 (0.9–2.4)	2.5 (0.8–7.8)
Hepatitis C	0.99 (0.78–1.3)	1.2 (0.8–1.8)	3.2 (2.0–5.1)	0.8 (0.4–1.6)	7.9 (2.5–24)
Injection drug use history	0.84 (0.66–1.1)	0.9 (0.6–1.3)	4.3 (2.7–6.9)	3.4 (1.6–7.5)	6.8 (2.2–21)
Recent use of injection drugs	0.7 (0.4–1.2)	1.5 (0.8–2.7)	2.4 (1.4–4.3)	1.5 (0.7–3.1)	4.5 (1.6–13)
Alcohol use	1.1 (0.6–1.7)	1.1 (0.7–1.9)	1.2 (0.5–2.8)	0.7 (0.3–1.7)	3.9 (1.3–12)
Smoking†					
Current	0.9 (0.7–1.2)	0.9 (0.6–1.2)	3.4 (1.6–7.1)	3.5 (1.2–10)	5.7 (0.8–43)
Former	1.1 (0.8–1.6)	1.2 (0.9–1.8)	3.0 (1.3–6.7)	3.2 (1.1–10)	No deaths
Cocaine or heroin	1.3 (0.96–1.7)	1.3 (0.9–1.8)	1.4 (0.9–2.2)	0.8 (0.4–1.4)	2.5 (0.96–6.6)

*Multivariate models adjusted for age, race, and other factors in the table. See Table 1 for definitions.

†Compared with women who had never smoked.

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus; RNA = ribonucleic acid.

Table 4

Univariate Associations between Selected Risk Factors and Specific Non-AIDS Causes of Death among HIV-Infected Women*

	Liver Disease (n = 19)	Drug Overdose (n = 16)	Malignancy (n = 12)	Homicide/Suicide/ Accident (n = 10)
Risk Factor	**Relative Risk (95% Confidence Interval)**			
Hepatitis C	3.8 (1.4–11)	18 (2.3–134)	3.6 (1.0–14)	0.9 (0.3–3.2)
History of injection drug use and hepatitis C	13 (2.9–54)	22 (2.9–167)	6.6 (1.4–31)	1.0 (0.3–3.5)
Recent use of injection drugs	1.5 (0.4–6.6)	5.9 (2.0–17)	1.3 (0.2–10)	1.4 (0.2–11)
Current smoker	1.2 (0.4–3.9)	5.8 (1.3–26)	2.2 (0.3–19)	2.7 (0.3–22)
Depression	2.4 (0.8–6.8)	4.0 (1.1–14)	10 (1.3–78)	4.0 (0.9–19)
Alcohol	0.9 (0.1–6.9)	3.8 (1.1–14)	No deaths	4.2 (0.9–20)
Cocaine or heroin use	0.3 (0.04–2.0)	2.9 (1.1–8.0)	2.8 (0.8–9.4)	3.2 (0.9–11)

* There were too few deaths for multivariate analyses. See Table 1 for definitions.

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus.