

Causes of death in HIV-infected patients in the region of Lodz, Poland from 1995 through 2005

Research Article

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Abstract: In 2005, 440 patients infected with HIV were registered in the AIDS center in Lodz, Poland. The aim of our study was to analyze the causes of death in 70 fatal cases. We analyzed the data from 70 fatal cases from 1995 through 2005. Of the fatal cases we investigated, 10 were in women and 60 in men. The most common route of HIV transmission was intravenous drug use (50%). At the time of death, the mean age of patients was 36,48 years, and the mean CD4 count was 115,14 cells per microliter. The mean time from HIV diagnosis to death was 3,75 years. The leading cause of death in the group from 1995 through 2004 was AIDS. In 2002, liver diseases resulting from hepatitis C virus (HCV) infection were the cause of death in two patients. In 2005, two patients died as a result of myocardial infarction. The prevalence of fatal cases decreased from 9,09 % in 1995 to 1,59 % in 2005. Hepatitis B surface antigen (HBsAg) was found in 4 of 62 patients (6,45%), anti-HCV in 28 patients (45,16%), and both hepatitis B virus (HBV) and HCV infection in 5 patients (8,07%). Coinfections occurred most frequently in intravenous drug users (IDUs). In conclusions: (1) AIDS is still the leading cause of death in HIV-positive patients in the Lodz region; (2) the emerging cause of death in HIV-positive patients is liver disease as the sequel of HBV and HCV coinfections; (3) heart disease is becoming an important cause of death in HIV-positive patients.

Keywords: *AIDS • HIV infection • Mortality*

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1. Introduction

Improved methods for the prophylaxis of opportunistic infections and primarily the introduction of highly active antiretroviral therapy (HAART) has resulted in a decreased number of deaths among HIV-positive patients [1-8]. Although current reports indicate that the mortality rate from opportunistic infections among HIV-infected patients is higher than among those who are HIV-negative, in many analyses the main cause of death among HIV-infected patients is still an AIDS-related event [1,8-9].

We focused our analysis of this problem in the Lodz region, because our clinic and outpatient setting serves approximately 2,6 million Polish inhabitants and includes diagnosis, treatment, and medical care for patients with HIV/AIDS.

The aim of this study was to analyze the cause of death in HIV-infected patients from 1995 through 2005.

2. Material and Methods

We retrospectively analyzed the medical records of 70 patients infected with HIV who died from 1995 through 2005. We noted the cause of death, the patient's age at the time of HIV diagnosis and at the time of death, sex, CD4 count at the time of death, the route of HIV transmission, and results of tests for anti-HCV and HBsAg. Tests for anti-HCV and HBsAg were carried out by immunoassay with EIA II COBAS CORE kits.

2.1. Statistical analysis

For the measurable parameter (age), arithmetic means, standard deviations, and minimum and maximum values were calculated.

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Table 1. The routes of HIV transmission in 70 fatal cases.

Route of transmission	No. of cases	(females/males)
Intravenous drug users	35	7 / 28
Heterosexual intercourse	13	1 / 12
Homo/bisexual intercourse	15	0 / 15
Other	2	1 / 1
Unknown	5	1 / 4
Total	70	10 / 60

Table 2. The mean age of patients at the time of HIV diagnosis.

Route of transmission	Age (years $\pm$ SD) (range)
Intravenous drug users	27,23 $\pm$ 8,14 (16 -44)
Heterosexual intercourse	39,92 $\pm$ 13,02 (19 -68)
Homo/bisexual intercourse	35,81 $\pm$ 12,70 (20 -65)
Other	48,50 $\pm$ 31,82 (26 -71)
Unknown	39,67 $\pm$ 15,63 (23 -54)
Total	32,85 $\pm$ 12,60 (16 -71)

3. Results

From 1st January 1995 through 31st December 2005, 70 deaths were noted in HIV-infected patients in our center. Of these, 10 were women (14,29%) and 60 men (85,71%). The main route of transmission in this group was intravenous drug use (35 persons, 50%). HIV infection was acquired by heterosexual contact in 13 (18,57%) persons, by homosexual or bisexual contact in 15 (21,43%), and by other routes in 2 (2,86%) (deliberate infection, blood transfusion). An unknown route of transmission was noted in five patients (7,14%) (Table 1). At the time of death, the mean patient age was 36,48 $\pm$ 12,11 (range 17-71), and the mean CD4 count was 115,14 $\pm$ 152,07 cells per microliter (range 4-810). Tables 2 and 3 present the mean age of the patients

Table 3. The mean age of HIV-infected patients at the time of death.

Route of transmission	Age (lata $\pm$ SD) (zakres)
Intravenous drug users	31,40 $\pm$ 7,88 (17 -50)
Heterosexual intercourse	43,15 $\pm$ 12,43 (25 -68)
Homo/bisexual intercourse	39,37 $\pm$ 13,38 (22 -69)
Other	54,00 $\pm$ 24,04 (37-71)
Unknown	39,25 $\pm$ 12,79 (23 -54)
Total	36,48 $\pm$ 12,11 (17-71)

Table 4. Survival period since HIV diagnosis in patients infected through various routes of transmission.

Route of transmission	No of cases	Survival period (years)
Intravenous drug users	35	4,26 $\pm$ 3,89
Heterosexual intercourses	13	3,23 $\pm$ 2,45
Homo/bisexual intercourses	15	3,56 $\pm$ 3,41
Other	2	5,50 $\pm$ 7,78
Unknown	5	0
Total	70	3,75 $\pm$ 3,60

at the time of diagnosis of HIV infection and at the time of death according to the route of transmission. The mean survival period was 3,75 $\pm$ 3,60 years; in the group of patients with an unknown route of transmission, this period was described as "0 years" because HIV infection was diagnosed just before death (Table 4). A considerable decrease in the percentage of deaths was observed in consecutive years. In 1995, 5 deaths occurred among 55 registered HIV-positive patients (9,09%); in 2005, 7 cases out of 440 were fatal (1,59%).

From 1995 through 2004, AIDS was still the main cause of death in HIV-positive persons. Importantly, in 3 of the 6 patients who died in 2004, the HIV infection was diagnosed just before the death, when life-threatening opportunistic infections occurred. In 2002, the cause of death for the first time was hepatic cirrhosis and

Table 5. The causes of death of HIV-positive patients in 1995 - 2005.

Year	No of registered patients	No of fatal cases	AIDS	Cirrhosis hepatis/hepatoma	Heart diseases	Others	Unknown
1995	55	5 (9,09%)	3	0	0	1	1
1996	94	3 (3,19%)	2	0	0	1	0
1997	132	4 (3,03%)	4	0	0	0	0
1998	168	4(2,38)	3	0	0	1	0
1999	212	6(2,83)	4	0	0	1	1
2000	254	6(2,36%)	5	0	0	0	1
2001	289	8 (2,77%)	4	0	0	2	2
2002	331	10 (3,02%)	5	2	0	1	2
2003	372	10 (2,69%)	5	1	0	2	2
2004	399	7 (1,75%)	6	1	0	0	0
2005	440	7 (1,59%)	2	1	2	2	0
Total		70	43	5	2	11	9

Table 6. HBV and HCV serology in 62 fatal cases of HIV-positive patients infected through various routes of transmission.

Route of transmission	No of cases	HBsAg only	anti HCV only	HBsAg and anti HCV
Intravenous drug users	33	4	24	4
Heterosexual intercourse	13	0	1	0
Homo/bisexual intercourse	14	0	1	1
Unknown	2	0	2	0
Total	62	4	28	5

hepatocellular carcinoma as a consequence of co-infection with HCV. In 2005, the first deaths for cardiac reasons were noted (myocardial infarction), and AIDS appeared not to be the most frequent cause of death. The causes of death from 1995 through 2005 are presented in Table 5.

Tests for anti-HCV and HBsAg were carried out in 62 patients in the study group. HBsAg was detected in 4 patients (6,45 %), anti-HCV in 28 (45,16%), and both markers in 5 (8,07%) (Table 2). Antibody to HCV was present in 24 (72,72%) intravenous drug users. The prevalence of HBsAg and anti-HCV according to the route of transmission is presented in Table 6.

4. Discussion

The patients in this study had had full access to HAART since 1997, and the majority were coinfecting with HCV or HBV. The HIV infection resulted from the most frequent route of transmission, which was intravenous drug use. Such persons usually do not seek medical help until the late stages of HIV infection, resulting in delayed diagnosis and treatment. Moreover, the effectiveness of antiretroviral treatment in this group of patients is worse because their adherence is not optimal.

In our group, like in many other studies, the percentage of deaths among HIV-infected patients decreased in the consecutive years of the HIV epidemic [1,2,6]. The decrease resulted not only from properly administered prophylaxis for opportunistic infections and from the tremendous efficacy of HAART, but also from increased awareness by patients of their disease and earlier diagnosis of HIV infection. The percentage of deaths decreased from 9% in 1995 to less than 2% from 2004 through 2005. Similar results have been described by Crum *et al.* [1], who found that the annual rate of deaths reached 10.3 per 100 patients in 1995 and decreased gradually to the present rate of less than 2 deaths per 100 patients. It is difficult to say whether this trend will continue. All possible complications associated with antiretroviral treatment as well as emerging of HIV mutants resistant to treatment must be considered [10]. The decrease in the number of deaths is accompanied

by changing causes of fatal cases. In the study group, the main cause of death up to 2004 was AIDS (50% or more). Other reports also indicate, that despite the decrease in prevalence, AIDS remains an important cause of death in HIV-infected patients [1,9]. With the decrease in the percentage of AIDS-related deaths in HIV-infected persons, an increase in deaths unrelated to that infection has been observed [11,12]. Liver and heart diseases are mainly seen, but suicides, injuries, drug overdosing and neoplasms also occur [8,13,14,15]. The great efficacy of HAART has allowed HIV-infected patients to live longer, and that has resulted in the occurrence of so-called diseases of civilization, e.g., diabetes or heart disease. Moreover, antiretroviral treatment itself may cause some metabolic disorders such as hyperlipidaemia or hyperglycemia, which can also increase the frequency of heart disease. Patients infected with HIV, especially intravenous drug users, are often coinfecting with HBV or HCV. The sequelae of these infections, such as hepatic cirrhosis or hepatocellular carcinoma, appear many years (20-30) after infection. In HIV-infected patients, these consequences may occur much earlier. HAART itself is a potentially hepatotoxic treatment, and the risk is much greater in HIV/HBV and HIV/HCV coinfecting patients [16]. For these reasons, patients in the HAART era are expected to die more frequently of liver disease. These trends were also observed in our study. Since 2002, deaths resulting from liver diseases (cirrhosis or hepatocellular carcinoma) have been observed, and in 2005 two deaths were caused by myocardial infarction.

Since most of the patients in our center are HIV/HCV coinfecting, we believe that in the next years end-stage liver disease will become the main cause of death among HIV-positive patients, an expectation that has been confirmed by other authors [13,17-20]. Additionally, poor access by Polish patients to the treatment of HCV infection (pegylated interferon with ribavirin) may strengthen this trend.

In conclusions, AIDS is still the leading cause of death in HIV-positive patients in the Lodz region in Poland; the emerging cause of death in HIV-positive patients is end-stage liver disease as the sequela of HIV/HBV and HIV/HCV coinfections and finally heart disease has become an important cause of death in HIV-positive patients.

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