

Changes in the AIDS epidemiologic situation in Puerto Rico following health care reform and the introduction of HAART

Doris V. Báez-Feliciano,¹ James C. Thomas,² María A. Gómez,¹
Sandra Miranda,³ Diana M. Fernández,¹ Miriam Velázquez,¹
Eddy Ríos-Olivares,¹ and Robert F. Hunter-Mellado¹

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ABSTRACT

Objectives. To compare the occurrence of AIDS as well as the sociodemographic and clinical profiles of AIDS patients in Puerto Rico before and after the introduction of highly active antiretroviral therapy (HAART) and the privatization of the island's public health care system.

Methods. We compared the incident AIDS cases for two three-year periods, 1992–1994 and 1998–2000, in four populations: (1) entire United States, (2) Puerto Rico, (3) Bayamón Health Region (located in north-central Puerto Rico, it includes 11 of the island's 78 municipalities), and (4) an HIV cohort enrolled at the Universidad Central del Caribe (UCC) School of Medicine. The UCC is located in Bayamón, Puerto Rico, within an academic medical complex that houses the teaching hospital (Ramón Ruíz Arnaú University Hospital), the ambulatory health care facilities (Immunology Clinics) for patients with HIV, and administrative buildings. This represents the major government-sponsored health care infrastructure within the Bayamón Health Region.

Results. Incident AIDS declined substantially between the two periods in each of the four populations studied. The 48.1% decline in Puerto Rico exceeded the 40.9% decline in the United States. The decline in Puerto Rico likely resulted from increased availability and implementation of HAART and the delivery of health care to HIV/AIDS patients in an integrated fashion within each regional ambulatory clinic. In spite of this improvement, the absolute number of patients with AIDS on the island remains high. Substantial resources for treatment and prevention are required. The proportion of new AIDS cases was lower among women, persons 40 years of age or older, the less educated, and those living alone. Injection drug use remains the predominant mode of transmission in Puerto Rico.

Conclusions. Further gains in Puerto Rico's fight against AIDS will depend on the island's ability to reduce the transmission that occurs through injection drug use; the use of HAART on a larger number of vulnerable patients, particularly intravenous drug users; educational interventions to improve medication compliance in certain risk groups; and specific measures aimed at decreasing the rate of injection drug use.

Key words

Acquired immunodeficiency syndrome; substance abuse, intravenous; Hispanic Americans; Puerto Rico.

¹ Universidad Central del Caribe, Retrovirus Research Center, Bayamón, Puerto Rico, United States of America. Send correspondence to: Doris V. Báez-Feliciano, Retrovirus Research Center, Universidad Central del Caribe, PO Box 60-327, Bayamón, Puerto Rico 00960-6032, United States of

America; e-mail: dbaez@ucaribe.edu, doritapr@hotmail.com; telephone: (787) 787-8710 and (787) 787-8722; fax: (787) 787-8733.

² University of North Carolina, School of Public Health, Department of Epidemiology, Chapel Hill, North Carolina, United States of America.

³ Commonwealth of Puerto Rico, Health Department, Puerto Rico AIDS Surveillance Program, San Juan, Puerto Rico, United States of America.

Among the states and territories of the United States of America in 2001, Puerto Rico had the fourth highest incidence of AIDS (32.3 cases per 100 000 population). Puerto Rico ranked behind only the city of Washington, D.C. (152.2 cases per 100 000), the state of New York (39.3 cases per 100 000), and the state of Maryland (34.6 cases per 100 000) (1). The metropolitan statistical area of San Juan was ranked eighth among metropolitan areas of the United States, with an annual rate of 35.3 cases per 100 000 (1).

Located in the Caribbean, the island of Puerto Rico is a commonwealth of the United States. Puerto Rico has a population of 3.8 million and has a nonvoting representative in the United States Congress (2). Just over half (52%) of the population lives in the San Juan metropolitan statistical area (2, 3). The median family income in Puerto Rico in 2000 was US\$ 16 543, compared to US\$ 50 046 in the 50 states of the United States (4–6). The vast majority of the island’s inhabitants are Hispanic (2, 4–6).

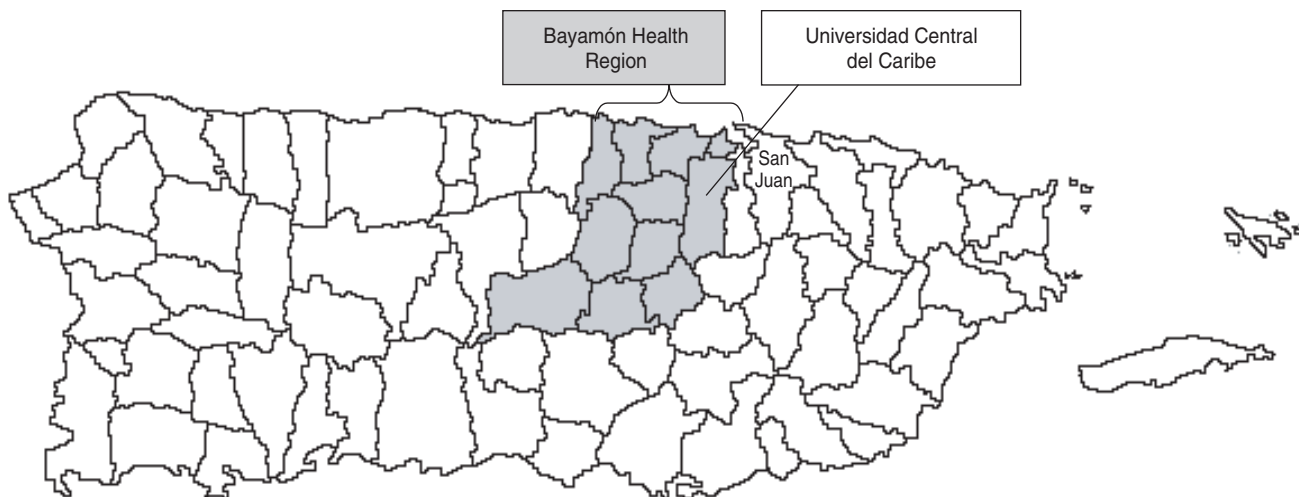
In the continental United States, inhabitants of Hispanic descent account for 12.5% of the population (Mexicans, 7.3%; Puerto Ricans, 1.2%; Cubans, 0.4%; others, 3.6%) (7–10). Many of these Hispanic residents were born to

parents who migrated to the United States. Though we are unaware of accurate information on the rate of migration from Puerto Rico to the continental United States, it appears that the number of individuals born in Puerto Rico who reside on the mainland is substantial. The cohort from the Universidad Central del Caribe (UCC) described in our study includes a majority of patients who were born and live in Puerto Rico (91%), as well as a substantial number of individuals of Puerto Rican descent who were born in the continental United States and are now living on the island (7.2 %) (7, 8).

As of 2001, persons born in Puerto Rico accounted for 22% of all new AIDS cases within the group of Hispanic adult and adolescent AIDS cases in the United States and its territories (1,10). The majority (61%) of these patients live in Puerto Rico (1); the remaining 39% live predominantly in the large metropolitan centers of the continental United States. (1, 8, 11) New AIDS cases were 13% higher among Puerto Rican-born individuals than among Mexican-born individuals living in the continental United States (1, 7–10). Of the new Hispanic AIDS cases in 2001 in which injection drug use was the main risk factor, 43% had been born in Puerto Rico (1).

Considering the large number of new AIDS patients who were born in Puerto Rico and the important number who migrate to one of the 50 states of the United States, information on the course of the HIV/AIDS epidemic in Puerto Rico is critical in guiding prevention and treatment efforts and in the planning of future health care interventions both in Puerto Rico and in the continental United States. The island of Puerto Rico also provides a unique perspective into the delivery of public health care services for the HIV/AIDS patient. Prior to the passage of the Puerto Rican Health Care Reform Act of 1994, the health care of all medically indigent patients was provided by the Government in one of the island’s multiple health care facilities (12, 13). Following the passage of this bill, the delivery of health care services was transformed to a managed care format in which the Government contracted a third party insurer for the administration and delivery of health care to the medically indigent community. Due to the heavy economic burden and the lack of efficient specialized care required for HIV/AIDS patients, the Government was forced to maintain and improve regional health care facilities providing the specialized services that HIV/AIDS patients

FIGURE 1. The 78 municipalities of Puerto Rico, with the 11 municipalities of the Bayamón Health Region highlighted



Source: Commonwealth of Puerto Rico. Health Department of Puerto Rico. [Web Page] Available from: <http://www.salud.gov.pr/Facilidades/Mapa%20PR%20Reg.htm> Accessed 15 May 2003.

require. These facilities are heavily subsidized by additional Government funds. Highly active antiretroviral therapy (HAART) also became widely available during the period in which health care was becoming privatized in Puerto Rico (12–14).

In this study we describe changes in epidemiologic trends in AIDS in Puerto Rico three years before (1992–1994) and three years after (1998–2000) the implementation of health care reform and the increased availability of HAART (12–14). We examined changes in reported AIDS cases in: (1) all of Puerto Rico, (2) the Bayamón Health Region, and (3) an AIDS cohort under the care of the Retrovirus Research Center at UCC (15–17). We compared these trends with those during the same two three-year periods in the United States and its territories, including Puerto Rico.

METHODS

Data on incident AIDS cases in the United States and its territories were obtained from annual HIV/AIDS surveillance reports published by the Centers for Disease Control and Prevention (CDC) (18–26). Data reflecting cases occurring before the 1993 revised definition of AIDS were adjusted by the CDC to reflect the new definition (26).

Data on the number and characteristics of incident cases of HIV/AIDS in Puerto Rico and in the Bayamón Health Region were obtained from the Office of AIDS Surveillance of the Program on Health Protection and Promotion Auxiliary Secretary of the Puerto Rico Department of Health (15–17). This office, which contributes to the CDC surveillance system, follows the 1993 CDC definition of AIDS (26). We did not have access to individual reports, only to numbers of cases aggregated by demographic characteristics, the mode of exposure, AIDS-related diseases, and the year of the report (15–17).

Puerto Rico is divided into 8 health care regions (16). The Bayamón Health Region is located in the north-central area of Puerto Rico and is comprised

of 11 municipalities, with a total population of 623 387 (6, 16). This represents 16% of the population of the island (16). Every health care region has a Government-supported ambulatory health care facility that provides specialized care to HIV/AIDS patients. The Bayamón Health Region has, in addition, a teaching hospital providing tertiary care (Ramón Ruíz Arnaú University Hospital), a medical school run by the Universidad Central del Caribe (UCC), as well as graduate medical training programs. Puerto Rico has a mandatory AIDS reporting structure; all new cases must be reported to the surveillance office of the island's health department. The UCC Retrovirus Research Center has been tracking the epidemic in the Bayamón Health Region since 1992. This research facility, which is sponsored by the Research Centers for Minority Institutions (RCMI), studies the natural history of HIV infection in patients who seek health services in one of the facilities in our medical complex (27, 28). The UCC cohort consists of patients with a confirmed diagnosis of HIV infection who are being followed in the Ramón Ruíz Arnaú University Hospital or in the specialized ambulatory HIV clinics of our medical center (Immunology Clinics). We collected data on our cohort of patients using medical records and an interview done with a structured questionnaire. The data collected included psychological, laboratory, and clinical information, in addition to standard surveillance information. The patients included in this study are members of the UCC cohort who had AIDS upon entry into our data bank. The date of AIDS diagnosis used in our study is that in which an AIDS-defining condition was diagnosed for the first time or in which a CD4 cell count of less than 200 cells/microliter (μL) was first detected. After health care reform was begun on the island, many medically indigent patients who had previously used public health care facilities began seeking health care in non-Government institutions and organizations. Nevertheless, Government-funded facilities continue to provide and deliver health care to a substantial number of patients

with catastrophic illnesses, including HIV infection.

This study does not include AIDS cases diagnosed between 1995 and 1997 because during that period the implementation of the Puerto Rican health care system reform was in a transitional phase (12, 13). In addition, HAART was not made available to our patient population until after 1996 (12, 13, 28–31). We compared demographic characteristics and modes of transmission of newly diagnosed AIDS cases for the periods of 1992–1994 and of 1998–2000 in the United States, Puerto Rico, the Bayamón Health Region, and the UCC cohort. Each of the successive populations in that listing is a subset of the preceding ones in the listing; that is, they are not independent of each other. More information is available on the smaller populations than on the larger ones. Thus, for Puerto Rico, the Bayamón Health Region, and the UCC cohort we were able to compare for the two periods the occurrence of AIDS-defining conditions. For the UCC cohort we were also able to compare information on education, employment, and health care in the two periods.

To avoid confusion, we report proportions (values between 0 and 1) for a given period, while differences between the two periods are reported in terms of percentages. When comparing the two periods, the first one (1992–1994) is always the referent or denominator for the percent change.

RESULTS

We present comparisons of the trends in incident AIDS cases in order of descending population size: the United States and Puerto Rico; Puerto Rico and the Bayamón Health Region; and the Bayamón Health Region and the UCC cohort. We then compare the two study periods in the UCC cohort.

The United States and Puerto Rico

The total number of new AIDS cases in the United States (including its ter-

TABLE 1. Distribution of the proportion of AIDS cases by gender, age, and exposure category, in the United States, Puerto Rico, Bayamón Health Region, and the AIDS cohort at the Universidad Central del Caribe, 1992–1994 and 1998–2000

	United States ^a		Puerto Rico ^b		Bayamón Health Region ^b		Universidad Central del Caribe ^c	
	1992–1994	1998–2000	1992–1994	1998–2000	1992–1994	1998–2000	1992–1994	1998–2000
Males	(n = 192 026)	(n = 103 177)	(n = 5 758)	(n = 2 797)	(n = 993)	(n = 481) ^d	(n = 482)	(n = 230)
Age (yr)								
13–19	0.004	0.004	0.003	0.007	0.003	0.006	... ^e	... ^e
20–29	0.165	0.116	0.166	0.101	0.170	0.104	0.195	0.070
30–39	0.457	0.424	0.447	0.395	0.471	0.414	0.481	0.430
≥ 40	0.374	0.456	0.383	0.497	0.355	0.476	0.324	0.500
Exposure category								
MSM ^f	0.572	0.451	0.214	0.222	0.188	0.210	0.205	0.183
IDU ^g	0.240	0.208	0.555	0.504	0.581	0.494	0.602	0.491
MSM-IDU	0.085	0.056	0.084	0.076	0.092	0.077	0.095	0.022
Heterosexual contact	0.040	0.083	0.138	0.193	0.123	0.210	0.075	0.274
RNI ^h	0.046	0.195	0.004	0.005	0.008	0.008	0.008	0.026
Other ⁱ	0.016	0.008	0.005	0.000	0.008	0.000	0.015	0.004
Females	(n = 36 665)	(n = 32 059)	(n = 1 632)	(n = 1 034)	(n = 266)	(n = 183)	(n = 112)	(n = 95)
Age (yr)								
13–19	0.012	0.016	0.007	0.020	0.004	0.005	... ^e	... ^e
20–29	0.231	0.179	0.241	0.134	0.214	0.158	0.216	0.116
30–39	0.461	0.413	0.466	0.408	0.530	0.421	0.477	0.411
≥ 40	0.296	0.392	0.286	0.438	0.252	0.415	0.306	0.474
Exposure category								
MSM	NA ^j	NA	NA	NA	NA	NA	NA	NA
IDU	0.482	0.282	0.363	0.333	0.365	0.350	0.313	0.337
MSM-IDU	NA	NA	NA	NA	NA	NA	NA	NA
Heterosexual contact	0.402	0.411	0.612	0.658	0.620	0.634	0.607	0.621
RNI	0.085	0.293	0.010	0.008	0.004	0.016	0.045	0.032
Other ^k	0.031	0.013	0.015	0.001	0.011	0.000	0.036	0.011

^a Source: United States of America, Department of Health and Human Services, Centers for Disease Control and Prevention. AIDS public information data set. AIDS surveillance in the United States [Web page]. Available from: <http://www.cdc.gov/hiv/software/apids/apidsssof.htm>. Accessed February 12, 2003.

^b Source: Commonwealth of Puerto Rico, Puerto Rico Central Program for AIDS and Sexually Transmitted Diseases, Puerto Rico AIDS Surveillance Program. Puerto Rico AIDS surveillance report. San Juan: Commonwealth of Puerto Rico Health Department.

^c Source: Data from Universidad Central del Caribe Retrovirus Research Center, HIV Central Registry through December 2000, for only AIDS cases in the cohort at the Universidad Central del Caribe in Bayamón, Puerto Rico.

^d One patient was diagnosed with AIDS as an adult but had evidence of being HIV-infected as a child.

^e Individuals must be at least 18 years of age to enter the UCC cohort. Therefore, the numbers in this age group from the UCC are not comparable to those for the United States, Puerto Rico, and the Bayamón Health Region.

^f MSM = Men who have sex with men.

^g IDU = injection drug user.

^h RNI = risk not reported or identified.

ⁱ The "other" exposure category includes patients who reported hemophilia/coagulation disorder and receipt of blood products.

^j NA = not applicable.

ritories) declined 40.9% from the first period (1992–1994) to the second period (1998–2000) (Table 1). The decline in Puerto Rico (48.2%) was slightly greater (Table 1). AIDS rates in Puerto Rico during the first and second periods were 265.7 and 128.1 cases per 100 000 population, respectively, with a rate ratio of 0.48 (95% confidence interval = 0.46, 0.50) (32).

During the first period, the proportion of female cases was greater in Puerto Rico (0.221) than in the United States (0.160) (Table 1). During the sec-

ond period, the proportion of females increased in both populations. A comparison of the time periods shows that the proportion of females increased 48.1% in the United States, as compared to 22.2% in Puerto Rico. Still, the proportion of females in Puerto Rico remained higher during the second period (0.270 vs. 0.237 in the United States).

The proportion of new AIDS cases among persons 40 years of age or older in the first period was similar in Puerto Rico and the United States

(Table 1). Between the first and second periods, the proportions increased in both populations but more so among Puerto Rican males (29.7%) and females (53.2%) than for United States males (21.9%) and females (32.4%).

More than half (0.572) of the United States men in the first period were exposed to HIV solely by having sex with other men (Table 1). For the same period in Puerto Rico, more than half of the men (0.555) were exposed solely through injection drug use. Similar proportions of the men (0.08) in the

United States and Puerto Rico reported sex with men and injection drug use as potential modes of exposure. In the second period, the proportion of transmission by heterosexual sex was 107.5% higher for the men in the United States and 39.8% higher for the men in Puerto Rico.

Female transmission in the first period involved more drug use in the United States (0.482) than in Puerto Rico (0.363) (Table 1). Injection drug use was involved in a lower proportion of the cases among women in both settings in the second period, with a larger decrease in the United States (41.5%) than in Puerto Rico (8.3%).

Puerto Rico and the Bayamón Health Region

In the first period the 1 259 new cases in the Bayamón Health Region comprised slightly more than one-sixth (0.170) of the total cases in Puerto Rico, and the proportion in the second period (0.173) was similar (Table 1). In the first period the proportion of female cases was slightly greater in Puerto Rico (0.221) than in the Baya-

món Health Region (0.211). The increase in the female proportion in the second period was the same in both regions (27.0%).

In the first period, the proportions of cases among persons 40 years of age or older in the Bayamón Health Region (0.35 among males and 0.25 among females) were similar to the proportions found in all of Puerto Rico (0.38 among males and 0.28 among females) (Table 1). The increase between the first and second period in the proportions of older cases was slightly greater in the Bayamón Health Region (34.1% for males and 64.7% for females) than in Puerto Rico (29.7% for males and 53.1% for females).

The distribution of modes of transmission was similar for men in the Bayamón Health Region and Puerto Rico in the first period (Table 1). Between the two periods the proportion of male heterosexual transmission increased nearly twice as much in the Bayamón Health Region (70.7%) as it did in Puerto Rico (39.8%).

The distribution of modes of transmission in the first period was also similar for women in the Bayamón Health Region and in Puerto Rico as a

whole (Table 1). From the first to the second period, transmission by injection drug use decreased twice as much among Puerto Rican women overall (8.3%) as among the women of the Bayamón Health Region (4.1%).

The top five AIDS-defining conditions in the first period were similar in the Bayamón Health Region and in Puerto Rico as a whole (Table 2). However, lower proportions of patients with *Pneumocystis carinii* pneumonia and wasting syndrome were found in the Bayamón Health Region than in Puerto Rico (0.221 vs. 0.238, and 0.126 vs. 0.256, respectively). In rank order the AIDS-defining conditions were: CD4 count less than 200 cells/ μ L; esophageal candidiasis; wasting syndrome; *Pneumocystis carinii* pneumonia; and toxoplasmosis of the brain. In the second period, the proportions of new AIDS cases in the Bayamón Health Region and in Puerto Rico that presented with esophageal candidiasis, *Pneumocystis carinii* pneumonia, or toxoplasmosis of the brain were lower than they had been in the first period. The proportion with wasting syndrome was lower in Puerto Rico but nearly twice as high in the Bayamón Health Region. The proportion pre-

TABLE 2. Distribution of the proportion of AIDS cases by gender, and the top five AIDS-defining conditions in Puerto Rico, the Bayamón Health Region, and the AIDS cohort at the Universidad Central del Caribe in Bayamón, for 1992–1994 and 1998–2000^a

AIDS-defining conditions ^b	Puerto Rico ^c		Bayamón Health Region ^c		Universidad Central del Caribe ^d	
	1992–1994	1998–2000	1992–1994	1998–2000	1992–1994	1998–2000
Males		(n = 2 803)	(n = 1 001)	(n = 483) ^e	(n = 482)	(n = 230)
Esophageal candidiasis	0.305	0.172	0.319	0.201	0.122	0.096
<i>Pneumocystis carinii</i> pneumonia	0.238	0.204	0.221	0.130	0.189	0.074
Toxoplasmosis of the brain	0.058	0.049	0.084	0.070	0.087	0.052
Wasting syndrome	0.256	0.227	0.126	0.251	0.089	0.196
CD4 cells < 200 per μ L or < 14%	0.579	0.701	0.615	0.710	0.662	0.774
Females		(n = 1 687)	(n = 275)	(n = 183)	(n = 136)	(n = 119)
Esophageal candidiasis	0.311	0.194	0.327	0.148	0.153	0.095
<i>Pneumocystis carinii</i> pneumonia	0.229	0.239	0.178	0.137	0.198	0.095
Toxoplasmosis of the brain	0.055	0.061	0.080	0.066	0.162	0.095
Wasting syndrome	0.271	0.224	0.131	0.240	0.072	0.274
CD4 cells < 200 per μ L or < 14%	0.554	0.673	0.585	0.743	0.634	0.695

^a These data are not available for the United States as a whole.

^b Not mutually exclusive.

^c Source: Commonwealth of Puerto Rico, Puerto Rico Central Program for AIDS and Sexually Transmitted Diseases, Puerto Rico AIDS Surveillance Program. Puerto Rico AIDS surveillance report. San Juan: Commonwealth of Puerto Rico Health Department.

^d Source: Data from Universidad Central del Caribe Retrovirus Research Center, HIV Central Registry through December 2000, for only AIDS cases in the cohort at the Universidad Central del Caribe in Bayamón, Puerto Rico.

^e One patient was diagnosed with AIDS as an adult but had evidence of being HIV-infected as a child.

senting with a CD4 count less than 200 cells/ μ L increased by 21% between the first and second periods in Puerto Rico. An increase of 15% in males and 27% in females was seen in the Bayamón Health Region between the first and second periods.

The Bayamón Health Region and the UCC AIDS cohort

AIDS cases in the UCC cohort comprised nearly half of all new cases in the Bayamón Health Region in both the first and second periods (0.472 and 0.489, respectively) (Table 1). The total number of new AIDS cases showed a similar decrease in the UCC cohort and in the Bayamón Health Region (29.3% and 30.9%, respectively) from one period to the next.

In the first period, the proportions of females was similar in the two groups (0.187 in the UCC cohort and 0.211 in the Bayamón Health Region) (Table 1). In the second period, the proportion of females increased more in the UCC cohort (55.3%) than in the Bayamón Health Region (30.8 %).

The first-period proportions of new cases among persons 40 years of age or older were only slightly dissimilar in the UCC cohort and in the Bayamón Health Region (males: 0.324 and 0.355, respectively; females: 0.306 and 0.252, respectively) (Table 1). In the second period, the proportion of individuals who were 40 years or older increased in both of these groups, and more so among men in the UCC cohort (50%) than in the Bayamón Health Region (47.6%). The proportion among women increased to 41.5% in the Bayamón Health Region and to 47.4% in the UCC cohort.

The distributions of male exposure categories in the first period were similar in the UCC cohort and in the Bayamón Health Region (Table 1). From the first to the second period the proportion of males exposed through heterosexual contact increased much more in the UCC cohort (265%) than it did in the Bayamón Health Region (70.7%). The proportion of females exposed through injection drugs increased slightly between the two pe-

TABLE 3. Distribution of the proportion of AIDS cases by gender, education level, occupational status, if living alone, and place of entry in the AIDS cohort at the Universidad Central del Caribe in Bayamón, Puerto Rico, 1992–1994 and 1998–2000

Characteristics	Males ^a		Females ^a	
	1992–1994	1998–2000	1992–1994	1998–2000
Education level	(n = 414)	(n = 215)	(n = 98)	(n = 88)
< 12th grade	0.514	0.735	0.622	0.773
Occupational status	(n = 414)	(n = 224)	(n = 96)	(n = 91)
Unemployed	0.792	0.830	0.917	0.890
Patient living alone	(n = 75)	(n = 229)	(n = 31)	(n = 93)
	0.240	0.389	0.194	0.398
Place of entry	(n = 482)	(n = 230)	(n = 111)	(n = 75)
Immunology Clinics	0.600	0.517	0.523	0.432
Hospital	0.400	0.483	0.477	0.568

^a Source: Data from Universidad Central del Caribe Retrovirus Research Center, HIV Central Registry through December 2000, for only AIDS cases in the cohort at the Universidad Central del Caribe in Bayamón, Puerto Rico.

riods in the UCC cohort (7.3%), and it decreased slightly in the Bayamón Health Region (–4.1%).

When we compare the top five AIDS-defining conditions during the second period, their rankings were similar among males and females in the UCC cohort and in the Bayamón Health Region. In the first period, *Pneumocystis carinii* pneumonia was more frequent among males and females in the UCC cohort, and esophageal candidiasis was seen more often among females in the Bayamón Health Region. (Table 2). In both the UCC cohort and in the Bayamón Health Region, esophageal candidiasis, *Pneumocystis carinii* pneumonia, and toxoplasmosis of the brain all decreased between the two periods, while both the number and proportion of cases of wasting syndrome increased. Patients presenting with a CD4 count less than 200 cells/ μ L increased 17% among males and 9.6% among females in the UCC cohort, and 14% among males and 27% among females in the Bayamón Health Region.

Additional trends within the UCC AIDS cohort

The majority of those entering the UCC cohort with AIDS in the first period had less than a 12th grade education and were unemployed; this was seen more often in females than in

males (Table 3). In the second period, the proportion of entrants with less than a 12th grade education was higher, around three-quarters. The proportions of those who were unemployed did not markedly change. In the first period, the majority of men and women entered into the cohort through the UCC ambulatory HIV clinics. In the second period, this was true only for men.

DISCUSSION

Summary of trends

The number of new AIDS cases in the 1998–2000 period decreased in all four groups examined. With respect to the first period, the reduction seen in the second period was 40.9% in the United States, 48.2% in Puerto Rico, 47.2% in the Bayamón Health Region and 45.7% in the UCC cohort. These figures show that the reduction was less pronounced in the United States. When we examine specific subgroups within each group (United States, Puerto Rico, Bayamón Health Region, UCC cohort), male patients who were 40 years of age or older were proportionally more frequent in all groups, with an increase of 22%, 30%, 34%, and 54%, respectively, from one period to the next. Females who were 40 years or older also increased in all four

groups, by 32%, 53%, 65%, and 55%. The decline in new AIDS cases between the two periods in all four groups was also less pronounced in females than in men. AIDS cases declined by 46.3%, 51.4%, 51.6%, and 52.3%, respectively, in males and by 12.6%, 36.6%, 31.2%, and 15.2%, respectively, in females.

In both periods studied, about half of the transmission among men in the United States occurred solely through having sex with other men, and in Puerto Rico about half of the transmission in men was due solely to injection drug use. These general patterns remained unchanged in spite of the decrease between the two periods in the number and incidence rate of AIDS cases. More specifically, the proportion of injection drug use (IDU) among males decreased in all four groups, but more so in the UCC cohort (18.4%). In males, there was an increase in heterosexual contact as the main risk category in all four groups. The proportional increase was 107% in the United States, 39.9% in Puerto Rico, 70.7% in the Bayamón Health Region, and 265% in the UCC cohort. In females, IDU as the main exposure category decreased by 41% in the United States. A small (7.6%) increase in the UCC cohort was seen. Heterosexual contact as a risk category in females increased minimally in all four groups.

In the UCC cohort, the proportion of new AIDS cases who were living alone at the time of study entry increased noticeably in both males (62%) and females (105%). In addition, the proportion of patients without a high school education also increased in males (43%) and in females (24%).

Between the first and second periods the incidence of AIDS in Puerto Rico decreased more than it did in the United States. The noticeable decrease seen in Puerto Rico is likely to have resulted from both improved organization of the HIV/AIDS health care infrastructure on the island and the advent of HAART, both of which occurred during the interim period. The higher proportion of new AIDS cases in Puerto Rico being identified with a CD4 count less than 200 cells/ μ L may

result from a number of factors: IDU remains an important risk category in Puerto Rico, where several things interfere with optimal delivery of health care. These include difficulties with medication compliance, poor access to health care, and increased rates of co-infection and co-morbidity that interfere with HAART's effectiveness. In addition, an important number of new patients are 40 years of age and older. It has been reported that in this older group of patients the serological test for HIV may be delayed due to physician- and patient-related factors (33, 34). Furthermore, this group of older patients has additional co-morbidities that may not allow a uniform implementation of HAART (33, 34). We believe these factors are contributing to the greater proportion of AIDS patients arriving with a CD4 cell count of less than 200 cells/ μ L. The decrease in opportunistic infections, such as *Pneumocystis carinii* pneumonia, esophageal candidiasis, and toxoplasmosis of the brain, is further evidence of the benefits of HAART (29–31).

The presence of an increasing proportion of patients with wasting syndrome seen in the UCC cohort is notable when compared with Puerto Rico as a whole. This trend was found in both men and women and was also seen to a lesser degree in the Bayamón Health Region. Potential explanations include underreporting for this condition in the UCC cohort in the first period, and a shift in the spectrum of patients seeking care at the UCC because of health care changes on the island.

AIDS among Puerto Ricans versus other Hispanics in the United States

In 2002, Hispanics accounted for 13% of all new HIV/AIDS diagnoses reported in 30 areas of the United States with long-term confidential name-based HIV reporting (11). Among the ethnic and racial groups in the United States, Hispanics had the second highest incidence of AIDS cases in the United States (26.0/100 000) (11). Of all AIDS cases reported to the CDC in 2001, 19% were Hispanic (1). Of these

Hispanics, 43% were born in the continental United States, 22% were born in Puerto Rico, 13.5% were born in Mexico, and the remainder were born in other Latin countries in the Caribbean or in Central or South America (1).

In the second period reported in this paper we see two notable differences between the distribution of AIDS cases in Puerto Rico and in the United States. First, a greater proportion of females were seen in Puerto Rico (26% vs. 23%, respectively), and injection drug users (IDUs) comprised a larger risk group in Puerto Rico than in the United States (45.7% vs. 22.5%, respectively). Intravenous drug use was a risk category in 17% of individuals of Hispanic descent living in the continental United States. In the same group, having sex with other men was a risk category in 25% of males. We are uncertain as to the reasons behind the noticeable differences observed in intravenous drug use as a risk factor in the Puerto Rican cohort and in the other groups of Hispanic descent. If we examine a subset of individuals born in Mexico or in Central or South America who live in the continental United States, the rates of intravenous drug use as a risk category are substantially lower than among individuals born in Puerto Rico (6% and 5% vs. 45.7%) (1). Additional research into the reasons for this disparity is required. Others have found that Puerto Ricans born on the island of Puerto Rico who were living in the continental United States were more likely to have been exposed through injection drug use than were Mexicans, Cubans, and persons born in Central and South America who were living in the continental United States (1, 7–11, 35–37).

There are also differences between Puerto Ricans living in Puerto Rico and those living in the continental United States. The ARIBBA Project has studied injection drug use among Puerto Ricans in the East Harlem section of New York City and in Bayamón, Puerto Rico (38). That project reported that IDUs in Puerto Rico practice more risky behaviors than do Puerto Rican IDUs in New York City. In Puerto Rico, IDUs are more likely

to use shooting galleries (areas where drug users go to inject drugs) and to share injection paraphernalia, and they are less likely to obtain needles from sterile needle exchange programs (38–41). One reason for the differences in behavior is that Puerto Rico has a more limited availability of sterile needle exchange programs and drug treatment programs than does New York City.

In Puerto Rico there is less availability of condoms than in New York City (37, 38). Reasons for this include the absence of a Government-sponsored program for condom distribution and the fact that 45% of Puerto Rican women living in Puerto Rico use tubal ligation as a means of birth control (42). In one qualitative study, many Puerto Rican women who were IDUs living in Puerto Rico stated that they did not need condoms since they had had their tubes tied (38). This is likely to be one of the factors contributing to the higher proportion of women in all three cohorts studied in Puerto Rico, as compared to the United States, who state that heterosexual contact is their main risk factor for HIV infection. Poverty is also more common in Puerto Rico than it is in the continental United States. In some cases, women in Puerto Rico, particularly IDUs, turn to prostitution to earn a living or to obtain drugs. (34).

Implications for public health policies and research

Effective HIV/AIDS prevention programs and policies in Puerto Rico will need to address the financial limitations of the HIV/AIDS health care infrastructure, cultural issues, and gaps in patients' and health care providers' knowledge of HIV prevention and treatment. A higher rate of regular employment will help some persons to avoid the transmission that is associated with injection drug use or with prostitution. Education can help men and women to understand that the cultural preference for birth control via tubal ligation does not obviate the need for condoms. Such a message in Puerto Rico would need to be accompanied by an enhanced availability of condoms (37, 38, 42). Furthermore, a wider availability of drug treatment and needle exchange programs will be critical for lowering the number of injection drug users and decreasing their risky drug use practices, such as sharing paraphernalia, that facilitate HIV transmission (40–42).

While the privatization of the Puerto Rican health care system extended services to a greater number of people, there is a subgroup of AIDS patients that is not reaping the benefits of this health care reform. This is particularly true for individuals whose main risk

factor is being an IDU. Trends in the AIDS epidemic in Puerto Rico suggest that more effort is needed to reach women, older people, the less educated, and those living apart from a family.

These observations on Puerto Rico are of a general nature, and they point to the need for more research into several areas, such as the health care-seeking patterns of patients and appropriate health care promotion efforts for patients with HIV infection. In addition, the effectiveness of current efforts to prevent and treat drug use in Puerto Rico warrants further study. Puerto Rico must invest sufficient funds and human resources if the rate of HIV infection on the island is to be reduced.

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RESUMEN

Cambios en la situación epidemiológica del sida en Puerto Rico tras la reforma sanitaria y la introducción de la TARGA

Objetivos. Comparar la frecuencia de casos de sida, así como las características sociodemográficas y clínicas de los pacientes de sida en Puerto Rico, antes y después de la introducción de la terapia antirretrovírica de gran actividad (TARGA) y la privatización del sistema de salud de la isla.

Métodos. Comparamos los nuevos casos de sida durante dos períodos de tres años, 1992–1994 y 1998–2000, en cuatro poblaciones: 1) todos los Estados Unidos, 2) Puerto Rico, 3) la Región de Salud de Bayamón (que se sitúa en la parte norte del centro de Puerto Rico y contiene 11 de las 78 municipalidades de la isla) y una cohorte de pacientes infectados por el VIH y atendidos en la Escuela de Medicina de la Universidad Central del Caribe (UCC). La UCC está en Bayamón, Puerto Rico, dentro de un complejo médico universitario donde se encuentran el hospital escuela (Hospital Universitario Ramón Ruíz Arnaú), las clínicas ambulatorias (Clínicas de Inmunología) para pacientes infectados por el VIH y los edificios administrativos. Todo ello en conjunto representa la principal infraestructura de atención sanitaria de carácter público en la Región de Salud de Bayamón.

Resultados. La frecuencia de nuevos casos de sida se redujo notablemente entre los dos períodos en cada una de las cuatro poblaciones estudiadas. La reducción de 48,1% observada en Puerto Rico superó a la de 40,9% observada en los Estados Unidos en general. La reducción en Puerto Rico obedeció probablemente a la mayor disponibilidad y aplicación de la TARGA y a la provisión de atención sanitaria de manera integrada a pacientes de sida o con infección por el VIH en cada clínica ambulatoria regional. A pesar de estas mejoras, sin embargo, el número absoluto de pacientes de sida en la isla sigue siendo elevado. Hacen falta cuantiosos recursos para proporcionar tratamiento y aplicar medidas de prevención. La proporción de casos de sida nuevos fue menor entre las mujeres, las personas de 40 años de edad o mayores, las personas con menos escolaridad y las que vivían solas. El uso de drogas inyectadas sigue siendo la principal vía de transmisión en Puerto Rico.

Conclusiones. En Puerto Rico, cualquier adelanto futuro en la lucha contra el sida dependerá de la capacidad de la isla para reducir la transmisión ocasionada por el uso de drogas inyectadas; de la administración de la TARGA a un gran número de pacientes vulnerables, especialmente a usuarios de drogas intravenosas; de intervenciones educativas para mejorar la observancia del tratamiento en ciertos grupos en riesgo; y de medidas orientadas a reducir la frecuencia del uso de drogas inyectadas.

Palabras clave

Síndrome de inmunodeficiencia adquirida; abuso de sustancias intravenosas; hispanoamericanos; Puerto Rico.

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La Fundación Panamericana de la Salud y la Educación (PAHEF) solicita candidaturas para el Premio Fred L. Soper a la excelencia en la bibliografía de salud. Este galardón, creado en 1990, se otorga anualmente a un artículo de investigación sobre temas de salud pública de interés actual para América Latina o el Caribe. El premio de 2005 se otorgará a un artículo publicado en 2004 en una revista científica incluida en el *Index Medicus* o en las publicaciones oficiales de la Organización Panamericana de la Salud (OPS) y cuyos autores estén afiliados a instituciones docentes, de investigación o de servicios ubicadas en América Latina o el Caribe, incluidos los centros colaboradores de la OPS. Los estudios pueden ser experimentales o de observación y consistir en análisis de datos nuevos o en revisiones de datos primarios, pero interesan sobre todo los de naturaleza multidisciplinaria, los que tienen implicaciones para las políticas sanitarias, y los que versan sobre enfermedades infecciosas, que constituían la especialidad del Dr. Soper. Cualquiera puede proponer un trabajo como candidato al premio, incluso sus propios autores.

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Correo electrónico: info@pahef.org • Internet: www.pahef.org