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AIDS and HIV infection in Costa Rica — a country in transition

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INTRODUCTION

Costa Rica, located in the Central American Isthmus about 10° north of the Equator, is bordered by Nicaragua and the Caribbean Sea in the north and east, Panama in the east, and the Pacific Ocean in the south and west. Twenty per cent of its 51 000 km^2 is arable; there is an estimated 2.7 million inhabitants. The population, of predominantly Spanish and Amerindian descent, is relatively homogeneous and enjoys religious, racial and political freedom. The death penalty was abolished more than 100 years ago, and the army in 1949. More than 90% of the people are literate and free elections are held every 4 years. Costa Rica is regarded as the most stable and prestigious democracy in Latin America.

In 1986, infant mortality was 17 per 1000 live births and life expectancy at birth averaged 73 years (77 for women). Poliomyelitis and diphtheria have been eradicated since 1974. Social security is universal and free medical services are provided to the whole rural population. A network of modern hospitals and clinics serves the whole territory, but there is tolerance of private medicine. Current health indicators place Costa Rica closer to the industrial nations than to the less developed countries (1). Costa Rica has an increasing tourist trade and thousands of people visit each year. Due to its proximity to North America and to its high level of education and consumerism, thousands of Costa Ricans visit North America and Europe each year.

Apparently, haemophiliacs were the first to be infected in Costa Rica by the human immunodeficiency virus (HIV). Coagulation factors VIII and IX prepared in Spain, France, Austria and the United States of America have been imported since the 1970s. The first case of acquired immunodeficiency syndrome (AIDS) in a haemophiliac occurred in 1980 (2). Presumably, some coagulation factors used in Costa Rica were derived from contaminated blood collected in Africa, Europe, Caribbean countries and the United States.

However, the main reservoir of HIV in Costa Rica is homosexual and bisexual men who have had sexual contact with infected people while travelling abroad, or who have had sexual contact with infected visitors, probably as early as the late 1970s. The first autochthonous case of AIDS in a homosexual man was diagnosed in 1985; the first men infected within the country were diagnosed at INISA, University of Costa Rica, in August–October 1985. As we learn more about the epidemic, it seems likely that the virus had been circulating among Costa Rican homosexuals before 1980.

Abbreviations used in this paper: AIDS, acquired immunodeficiency syndrome; ELISA, enzyme-linked immunosorbent assay: HIV, human immunodeficiency virus; IF, immunofluorescence; PPA, particle agglutination test; WB, western blot.

THE AIDS EPIDEMIC

Haemophiliacs

The first case appeared in 1980, but was not recognized until 1983 when his autopsy was revised; proof of HIV infection was provided in 1985 by demonstration of antibodies by enzyme-linked immunosorbent assay (ELISA) and western blot (WB) in frozen serum (2).

Fifteen haemophiliacs, in approximately 120 treated patients, developed AIDS (Table 1); 14 had haemophilia A and one had haemophilia B. The outbreak accounts for an accumulated incidence of 10 cases per 100 treated haemophiliacs, or 5.5 cases per million inhabitants, one of the highest in the world. For comparison, the United States had about one case per 100 haemophiliacs in 1986, about 14 times less than Costa Rica.

Homosexual and bisexual men

AIDS appeared in Costa Rican homosexuals exposed either during residence overseas, while travelling abroad or after contact with visitors to the country. By 30 November 1987, 26 homosexual or bisexual men had been diagnosed with AIDS (Table 1); 13 had resided overseas for more than 8 years, but half of them had visited home on several occasions. At least 13 cases represent autochthonous infections because they had not travelled abroad. One case was diagnosed in 1985, six in 1986 and 19 in the first 11 months of 1987. About half of the accumulated cases were reported dead at any given time.

Several foreign homosexual men suffering from AIDS visited Costa Rica during 1983–87 but left shortly thereafter; they were not included in this report.

Table 1. AIDS and HIV infection in Costa Rica, to 30 November 1987.

Risk group	Cases (*n*)
AIDS	
Homosexual/bisexual men	26
Haemophiliacs	15
Blood recipients	1
Spouse of haemophiliac	1
Total	43
HIV infection	
Homosexual/bisexual men	290
Haemophiliacs	64
Women	9
Heterosexual men	5
Blood recipients	5
Infants	1
Total	374

AIDS in other risk groups

The spouse of a haemophiliac contracted AIDS from him (3). One man received blood transfusions in the United States and developed AIDS.There are no known cases of AIDS cases in intravenous drug abusers, although two homosexuals with AIDS reported that they are drug abusers. Intravenous drug abuse is uncommon in Costa Rica. No paediatric AIDS cases have been reported, excepting the haemophiliac children. No AIDS has been diagnosed in female 'sex workers' (prostitutes).

Overall incidence of AIDS

With 43 cases of AIDS, Costa Rica has an accumulated incidence of 15·9 cases per million inhabitants, similar to that of Brazil. Table 2 has incidence rates in selected Latin American countries with similar development of health services, predominantly homosexual transmission, and a negligible rate of drug abuse. Rates for Australia and New Zealand are shown for comparison. The higher incidence of Costa Rica in comparison with continental Latin America can be explained by the epidemic in haemophiliacs, the proximity and ample communication with North America, and the good reporting system and extension of health services.

HIV INFECTION WITHOUT AIDS

Except for blood donors and applicants for residence in the country, there is no mandatory HIV antibody testing in Costa Rica. All diagnosis are by the ELISA and WB tests. The figures described below are of people without AIDS; however, some may present

Table 2. Accumulated incidence (AI) of AIDS, per million inhabitants of selected countries during 1987.

Country	Population ($\times 10^3$)	Cases (*n*)	AI
Bahamas	232	126	543
Trinidad-Tobago	1185	199	168
Dominican Republic	6600	200	30
Costa Rica	2700	43	16
Brazil	138 000	2013	15
Jamaica	2550	30	12
Panama	2150	22	10
Venezuela	18 100	101	6
Uruguay	3050	13	4
Australia	15 700	562	36
New Zealand	3350	50	15

Sources: (4,5).

generalized lymphadenopathy or other symptoms compatible with HIV infection.

Haemophiliacs

At least 64 (53·8%) of 119 patients tested had HIV antibodies (Table 1) (3). Presumably contaminated factors VIII and IX were widely administered to haemophiliacs in clinics and homes throughout the country. This situation was favoured by the advanced infrastructure of health services, which permitted prompt detection and treatment of such patients.

Homosexual and bisexual men

The serologic status of this population was assessed through a long-term study of otherwise healthy homosexual men who, beginning in August 1985, have visited the Institute for Health Research (INISA) on a voluntary basis (6). The study included 'gays', 'sex workers' and 'prison inmates'; socio-economic, clinical, behavioural and serologic information was obtained (6,7). 'Cryptic' homosexual and bisexual men (those who hide their sexual orientation and do not visit gay discotheques or other gay places) were not well represented; they were included more in the other follow-up (8).

Men were evaluated for HIV antibodies (ELISA and WB) upon entering the study and at 6 month intervals. No emphasis was placed in detecting sexual contacts of infected men, but sexual partners were free to join. Therefore, the study provided a good base to determine the prevalence and incidence of infection. HIV was found circulating widely among gays, but not in sex workers and prisoners (Table 3). The rate of men HIV-positives increased from 4·8% in the second half of 1985 to 13% 2 years later (9).

Recently, a few male 'sex workers' (transvestites) appeared infected, evidencing sexual contact between gays and sex workers, despite their claim that such contact did not occur.

The other study (case and contact-finding) began in October 1985 at the Clinic for Sexually Transmitted Diseases of the Ministry of Health (11). The study includes all types of homosexuals. An attempt to locate

Table 3. Incidence of HIV antibodies among gays of Costa Rica, 1985–87 (ELISA, WB).

Year	Semester	Gays (*n*)*	Number positive (%)
1985	2	104	5 (4·8)
1986	1	42	2 (4·8)
	2	130	16 (12·5)
1987	1	230	26 (11·3)
	2	84	11 (13·1)

*New men included in period.
Source: (10).

the sexual contacts of persons with AIDS or HIV antibodies was made. About 20% of the men in this study had HIV antibodies by ELISA and WB. More than 1000 identified contacts of HIV-positive homosexual men await epidemiologic study and testing for HIV antibodies. An emphasis on contact-finding magnifies the real prevalence of infection.

These studies gave indirect evidence of the size of the homosexual population in Costa Rica, and of the pattern of sexual behaviour, morbidity and drug abuse, which appear to be similar, although less intense, than those described in advanced industrial nations (12). Both studies monitor the spread of infection, detect persons with AIDS and related syndromes at an early stage, and educate on prevention of infection.

Blood donors

Blood donors in Costa Rica are altruistic persons 18–60 years old; two-thirds of them are male. Testing of all donors began in October of 1985, under a contract of the Social Security System with the LSU-International Center for Medical Research and Training. Screening during the first year (October 1985–September 1986) showed 0·044% of the donors with HIV antibodies (ELISA and WB) (8). The prevalence of HIV-positive donors in the succeeding year (October 1986–September 1987) had decreased significantly to 0·018% (Table 4), presumably due to greater awareness of high-risk persons about the danger of transmitting AIDS through blood, and to the banning of blood donation by persons in high-risk groups. Positive donors were identified as being homosexual or bisexual men and, to a lesser extent, heterosexuals who had been infected by transfusion.

Women

No evidence of HIV infection was found in a national sample of women defined as 'promiscuous' because they had several sexual partners in their lifetime. The sample was drawn between September 1984 and January 1985 (14). However, nine women have been independently discovered as having antibodies to HIV (the spouse of the haemophiliac described above was excluded): two were contaminated by transfused blood and two by plasma; two were sex workers presumably infected sexually (about 1000 sex workers of middle and low classes who generally do not have contact with foreigners have been found to be HIV-negative) (Table 4); two others had sexual contact with men from countries with a high incidence of AIDS; one was an ex-intravenous drug abuser.

There could be 90 additional women infected at present. No systematic testing has been made of the hundreds of female sex workers serving businessmen and tourists, or working for limited periods in North America, Europe and South America.

Table 4. Prevalence of persons with HIV antibodies (ELISA, WB) in Costa Rica during 1987.

Population*	Tested	Positive (%)
Female 'sex workers'	2500	0
Voluntary public employees (MH)	409	0
Homosexual men in prisons (MH)	582	0
Altruistic blood donors (SS)		
October 1985–September 1986	36 000	16(0·044)
October 1986–September 1987	44 000	8(0·018)
Applicants for residence (MH)†	5633	6(0·11)
Male 'sex workers' (MH)	434	4(0·9)
Persons found in night raids (MH)	147	2(1·4)
Male homosexuals (INISA)	230	11(11·3)

*MH = Ministry of Health; SS = Social Security; INISA = Institute for Health Research. High-risk employees probably did not attend. There were about 45 000 donors per year.
†Workers, students, pensioners.
Sources: (8, 9, 13).

Infants

No infected neonates have been diagnosed in Costa Rica. One infant was contaminated by blood prescribed for intestinal bleeding; the child later developed immunologic alterations, although he is currently well (8). One child born to a mother infected through *post-partum* transfusion remains HIV-negative; this child was breast-fed for 10 months and was well at age 20 months. One child born to an HIV-positive mother contaminated during treatment for von Willebrand disease, was found HIV-positive at birth; a control at 15 months will decide if antibodies were passive or represent an actual infection.

Other groups

A relatively high frequency of HIV-antibody carriers was detected among applicants for residence in the country (Table 4). Also, HIV-positive persons were detected among men found in illegal situations during two police raids (Table 4) (13).

ESTIMATION OF THE AIDS EPIDEMIC, 1988–92

Most expected HIV infections and AIDS cases in the next quinquennium will occur among homosexual men; about 20 AIDS cases might develop among haemophiliacs; intravenous drug-abuse is uncommon in Costa Rica, and heterosexual transmission appears to be negligible at present. For the quinquennium 1988–92, estimations considered the following assumptions: that no effective treatment for HIV infection would have become available; and that no significant change in rate of infection would occur (10).

HIV-positive homosexuals

The number of HIV-antibody carriers in the country was estimated by multiplying: (i) the number of AIDS in homosexuals (26 cases) by 50–150 (= 1300–3900); (ii) the number of known HIV-positive homosexuals (290) by 10 (= 2900); and (iii) the prevalence of HIV-positive homosexuals (13·1% in the INISA cohort) by 20 000, the estimated size of the homosexual population (= 2620). The number of HIV-infected men will inevitably increase in the near future.

AIDS

Of the approximately 150 persons with congenital bleeding disorders in the country, 120 have received coagulation factors, and 60 have developed antibodies to HIV in addition to the 15 AIDS cases already described. Therefore, about 20 additional cases are expected in this population.

Projections were calculated for homosexual men only, because they will receive the greatest impact in the near future, notwithstanding that only one homosexual with AIDS occurred in 1985, that only six cases were diagnosed in 1986, and only 19 up to 30 November 1987. However, the responsibility of making estimates outweighs the

Table 5. Projection of AIDS in Costa Rica, 1987–91.

Year	Annual duplication Cases	Annual duplication Accum.†	Power curve* Cases	Power curve* Accum.†
Observed cases	1	1		
1985	6	7		
1986	19	26		
1987‡				
Estimated cases				
1988	38	64	40	66
1989	76	140	72	138
1990	152	292	118	256
1991	304	596	178	434
1992	608	1204	254	688

*$r^2 = 1{\cdot}00$; $\alpha = 0{\cdot}98$; $\beta = 2{\cdot}67$.
†Total accumulated.
‡To 30 November 1987.
Source: (10).

danger of handling only three data points and a small number of cases (10).

Of four mathematical models used to fit these data (linear regression, logarithmic, exponential and power curve), the latter gave the best fitting and produced credible figures (Table 5) (10). The linear regression and exponential models gave good fittings, but estimates were unacceptably low (linear regression) or immensely large (exponential). The logarithmic model gave a poor fitting and a low estimate.

The procedure of doubling the number of cases' (Table 5), yielded figures for 1988–89 similar to those obtained with the power curve; figures thereafter (1990–92) were about the same as those obtained by the power curve for the preceding year.

Approximately 254 new AIDS cases are expected in 1992, giving an accumulated total of 688 cases, a frightening figure. Assuming that 50% of the cases have already died at any given time, 350 AIDS cases might be alive in 1992, demanding about 450 person-months of hospital care that year only. A scenario of congested services and eventual paralysis of the major hospitals is expected unless an alternative to hospital care is found, for instance, hospices and domiciliary care.

CONTROL AND PREVENTION

The National AIDS Commission of the Ministry of Health was established in 1985. With about 20 members, the Commission became inactive within a year; it was reorganized to have six members representing the National Health System, University of Costa Rica, Ministry of Justice and the Catholic Church. Expert committees (epidemiology, laboratory diagnosis, clinical medicine, health education, law and psychosociology) were appointed by the Commission.

Legislation

The first legislation, enacted in 1985, made notification of AIDS cases and HIV-infected persons compulsory. Legislation was passed in 1986 banning donation of blood, tissues, organs and semen by persons in high-risk groups (homosexual and bisexual men, intravenous drug abusers, sex workers, sexual partners of the above). Virtually all blood donors have been tested for HIV antibodies since October 1985. Legislation was approved in 1987 to regulate imports of coagulation factors VIII and IX; however, since June 1985, only preheated factors prepared from HIV-negative blood had been authorized. A very low level of HIV-infected heterosexual persons prompted screening of applicants for residence since April 1987. Legislation will be passed to improve sanitary conditions in barber shops and similar establishments.

Education of the general population

A national health education campaign was initiated in April 1987. The pamphlet *AIDS: Don't die of ignorance* distributed in early 1987 to each home in the United Kingdom, was adapted and translated into Spanish. About 750 000 copies were distributed in the country; they were also printed in the five daily newspapers. The aim of this and other manoeuvres was to improve parents and children in discussing transmission and prevention of HIV Infection.

Posters were printed in the five dailies. A television video and, more importantly, messages for grammar and high school students, in a programme starting in March 1988, were also prepared. There is debate as to the appropriate age at which education on AIDS prevention should begin; this was arbitrarily decided to be 10 years of age.

Education of high-risk groups

No significant actions to educate high-risk groups were effected by the National AIDS Commission during 1985. Several factors accounted for this situation: relative inaccessibility of high-risk groups; incapacity to reach them once identified; mistrust by members of high-risk groups about Governmental actions; lack of organization of the homosexuals; and neglect of the seriousness of the epidemic by high-risk groups and health authorities. In November 1987, gays attempted to organize a brochure on 'safe sex', and condoms were provided by the Commission and the Costa Rican Associ-

Table 6. Behaviour of gay men (percentage answering yes), before and 2 years after starting safe sex education, Costa Rica, 1985–87

Variable	1985, Jul–Dec (n = 106)	1987, Ene–Jun (n = 87)	Change (%)
Travel overseas	45·3	40·3	−11*
United States	17·9	4·7	−73*
Europe	2·8	3·9	+39
Receptive anal intercourse	67·9	81·4	+20*
Active fellatio	76·4	82·9	+ 9
Swallows semen	47·2	62·0	+31*
Receptive anilingus	45·3	38·8	−14*

*Significant difference.
Source: (9).

ation of Demography for distribution in gay discotheques, saunas and similar meeting places. However, 2 years after emphasizing safe sex through the prospective studies, no apparent change in sexual behaviour has been noted (Table 6) (9). It seems that many AIDS deaths will need to occur before high-risk persons realize the importance of seeking protection against infection.

Nothing is being done to educate male and female sex workers on prevention of HIV infection. Most individuals in these groups, however, are aware of the danger of certain sexual practices and of the importance of using condoms for prevention.

Education of health workers

Unfortunately, there is a lack of adequate information on AIDS among health workers of Costa Rica, including medical practitioners and microbiologists (15). This has led to sporadic or sustained discrimination against patients in hospitals, and refusal to examine blood and other body fluids from AIDS and HIV-infected persons. Such situations sparked conflict and administrative and legal actions during 1986 and 1987.

A booklet with updated information on AIDS has been widely distributed by the National AIDS Commission among health professionals; several World Health Organization and Centers for Disease Control documents were translated into Spanish, including an update on AIDS (16) and the recommendations for working in health care environments (17). Many talks have been given in hospitals and clinics throughout the country, and scientific presentations were made in most national meetings of medical doctors and other health workers.

RESEARCH EFFORT

The two prospective studies are being expanded. They are the most important source of socio-economic, behavioural, medical and immunologic data. They also offer a means for education of high-risk persons and for identification of new cases and infections (6,8). The studies provide social and medical support for infected persons. In the laboratory, the passive particle agglutination test (PPA, Fujirebio) which uses highly purified HIV antigens absorbed on to gelatin particles was evaluated against the ELISA (Abbott), using WB and immunofluorescence (IF) for reference. PPA was found to be as sensitive as the ELISA and as specific as WB or IF (18). More powerful ELISA obtained by genetic engineering, and an ELISA to investigate circulating HIV antigen, were also made available. Screening of high-risk groups and other populations continues at the Ministry of Health and the University of Costa Rica, using ELISA and PPA, and confirming these results with WB.

More recently, HIV was grown in established mononuclear cell lines, and HIV antigen was identified by IF and ELISA (19).

COMMENTS

HIV infection is rapidly spreading in Costa Rica, and AIDS cases are surfacing at a rate forecasting a considerable epidemic. By

1992, about 680 cases would have occurred, with more than 250 new expected cases that year alone. If no effective and accessible treatment becomes available by 1992, the number of expected deaths would surpass those due to diarrhoeal disease and several other infectious diseases. The demand for institutional care could congest hospitals and might even paralyse some of them, unless an alternative to orthodox hospitalization is found. Rates of HIV infection among heterosexual persons expectedly will remain low, but the possibility that HIV-positive women might increase — to mimic Honduras and the Dominican Republic — should not be neglected.

The Ministry of Health did not allocate funds to combat AIDS during 1986 and 1987 on the assumption that AIDS was a small problem compared to others. It became evident with time that a relatively small number of AIDS cases was causing more societal problems and conflicts than any other disease in recent decades. The Ministry of Health, Social Security System and University of Costa Rica shifted resources to study and cope with the problem. Aside from efforts to diagnose HIV infections, the more significant actions have been the long-term studies and other related research.

The development of an adequate clinical and laboratory diagnostic capacity, legislation, a national health education programme, and education of high-risk groups, place Costa Rica at the vanguard in the control of AIDS.

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