

Prevention of HIV Transmission through Blood and Blood Products: Experiences in Mexico

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As of August 1988, 1,628 cases of AIDS had been reported in Mexico, of which 12% were ascribed to transmission through blood. Of the 201 subjects infected by blood, 159 (79%) were infected through transfusions. The relatively high number of such cases was found to be associated with a prevalence of HIV infection of 7% among paid donors as compared with a prevalence of 0.1% among volunteer donors. A National AIDS Prevention Committee has been established in Mexico, and amendments to the country's General Health Law mandate compulsory screening to detect HIV infection among all donors and prohibit the sale of blood. A national network of screening laboratories was established and an educational campaign initiated among health personnel. Evaluation of this program shows that the current frequency of HIV infection in donors is 0.04%.

This paper explores efforts undertaken in Mexico to prevent and control HIV transmission through blood. Our country faced special challenges regarding both the scope of the problem and the urgency of implementing measures to correct it. Our legislative and technological experiences may benefit other countries.

SUPPLY OF BLOOD PRODUCTS

To determine the potential magnitude of the problem of HIV transmission through blood, Mexico's blood requirements and how units of blood are supplied must be studied. The yearly demand for blood units per 100 inhabitants in a given country depends on several

factors, including the population's age structure and the country's regional medical and surgical care characteristics. In developing countries, where requirements are lower than in developed countries, it is estimated that between one and three units are needed for each 100 inhabitants. In the United States this figure climbs to six units per 100 inhabitants, and in Europe it reaches eight to ten units per 100 inhabitants (World Health Organization figures).

An estimated 700,000 units of blood are transfused in Mexico annually; this figure is lower than the one which would be arrived at by applying the indicators cited above. Before legislative reforms were enacted in Mexico, the country's blood was provided by volunteer donors, by family members, or by paid donors. This last group provided roughly one-third of the total blood supply (approximately 231,000 units).

As a rule, the use of blood products in Mexico, as in many other countries, is

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not as efficient as it could be, since whole blood is transfused more often than blood components. The small hospitals that perform most of the transfusions lack adequate equipment, leading to waste of the existing supply. Approximately 95% of blood transfusions are carried out this way.

PERCENTAGE OF AIDS CASES ASSOCIATED WITH TRANSMISSION THROUGH BLOOD

The extent of HIV transmission through blood varies according to several factors. For example, the extent of the spread may depend on how advanced control programs are, especially in terms of the capability to detect HIV in blood products, or on the prevalence of infection among the general population.

Two transmission patterns can be detected by analyzing the situation in the Americas, one characteristic of the Caribbean and the other of the rest of the Region (1). Heterosexual transmission predominates in the Caribbean, which means that the prevalence of HIV infection in the general population may be greater. Elsewhere in the Americas, transmission mainly occurs through sexual contact among homosexual or bisexual men, and HIV infection is consequently concentrated in selected groups.

The extent of transmission through blood products that has occurred in recent years is reflected in the number of AIDS cases associated with this type of transmission. In the United States, for example, 3% of all cases (2) are attributed to blood or blood-product transfusions and 1% have occurred in hemophiliacs or those with blood clotting disorders. In Brazil, 5.2% of AIDS cases have occurred in those receiving transfusions and 2.4% in hemophiliacs (3). In Mexico, 10% of all cases have resulted from transfusions

and 2% have occurred among hemophiliacs.

EPIDEMIOLOGY OF HIV TRANSMISSION THROUGH BLOOD IN MEXICO

As of 1 August 1988, 1,628 AIDS cases had been reported to the General Directorate of Epidemiology. Since the beginning of the AIDS epidemic, the number of cases has risen exponentially, increasing by 10% each month and doubling every 6.8 months. It has been projected that the cumulative number of cases will reach 60,000 by 1991. As in other regions, and as with other sexually transmitted diseases, those most affected are young adults. In Mexico, AIDS has affected men far more than women, at a ratio of 11 to 1. Approximately 76% of adult cases have occurred among homosexual or bisexual men; 11% have occurred in persons who acquired the infection heterosexually; and the remainder, almost 12% of the cases, have occurred among those receiving blood or blood products. Very few AIDS cases have been associated with intravenous drug use, since this type of addiction is rare in Mexico. Among children, transmission through blood predominates. Of 60 pediatric cases notified as of August 1988, 67% were associated with this mode of transmission: 21 cases among hemophiliacs and 19 among children who had received transfusions (4). The high percentage of cases associated with transmission through blood or blood products indicates the extent of the problem.

Studies on hemophiliacs regarding blood transmission of HIV are available (5). In Mexico, the situation among this group is similar to that reported in the United States. The frequency of infection varies from city to city, ranging from 28% in Monterrey to 66% in the Federal District and 67% in Guadalajara.

PREVALENCE OF HIV INFECTION AMONG BLOOD DONORS IN MEXICO

Until very recently, one-third of Mexico's blood supply came from persons who made their living by selling their blood. These persons came from low socioeconomic levels and were habitually unemployed and disenfranchised. Not until May 1986, when screening for HIV infection was first made compulsory for all blood, did the high prevalence of HIV infection among paid donors surface (6).

This problem is better understood when seen in a worldwide context. The prevalence of HIV infection among donors in the United Kingdom is 0.002%, and in Canada it is 0.008%. In the United States, the situation varies: In Minnesota prevalence has been found to be 0.003%, whereas in New York City, which has one of the highest rates of AIDS cases per million inhabitants in the country, studies indicate a prevalence ranging from 0.1% to 1.6%. Prevalence among donors in Hungary has been reported as 2.8%. The highest figures are from Zaire, with an HIV infection prevalence among donors of 5%. All these studies were conducted between 1986 and 1987.

In Mexico results vary according to the type of donor studied. In one study carried out between 1986 and 1987 among 9,100 paid donors, a prevalence of 7.2% was found.

When these data were analyzed retrospectively, the results became even more alarming—the observed frequency of infection among donors increased from 6% in June 1986 to 54% in November of the same year. Seroconversion was documented in 21% of these subjects during this period.

This frequency of infection was much lower in studies of another type of donor. A study, conducted in the same period, on 319,153 subjects who donated blood

in a social security institution revealed a prevalence of infection of 0.67%. The true figure is probably lower, since these results were not confirmed. The majority of these donors were relatives of patients or volunteer donors. Another study that investigated the frequency of infection in 9,772 family-member donors revealed a prevalence of 0.12%. Lastly, an investigation of 3,314 volunteer donors showed a frequency of 0.09%.

In order to investigate the reasons for the high prevalence of HIV infection in paid donors a study was performed on 50 seropositive donors and on 50 seronegative donors who were used as controls (7). Similar risk factors for HIV infection were found in seven seropositive and in seven seronegative donors. However, a correlation was found between the presence of HIV infection and a history of four or more monthly donations (50% of the seropositives versus 14% of the seronegatives, odds ratio = 5.4, 95% CI = 1.9–16.3). It is feasible, therefore, that once the infection was introduced into the blood or plasma bank, the donors were being infected at the blood bank.

The sale of blood was organized by private companies that processed the plasma and prepared various blood products, including clotting factors. These products were distributed throughout the country and exported to other countries.

It is known that not all paid donors were infected and that the problem centered among those who lived in certain metropolitan areas. The average prevalence of around 7% made it evident that paid donors constituted a high-risk group.

CONTROL MEASURES

Given the magnitude of the problem it was decided that measures to halt it should be undertaken without waiting to

Table 1. Mexico's experience in preventing HIV transmission through blood and blood products: a short history.

1985:	Beginning of screening of donors in Mexican laboratories.
February 1986:	Establishment of the National AIDS Prevention Committee (CONASIDA).
May 1986:	Compulsory screening for HIV infection among donors.
Second half of 1986:	High prevalence detected in paid donors (7%).
November 1986:	HIV infection and AIDS subject to epidemiologic surveillance.
May 1987:	Sale of blood prohibited.
Second half of 1987:	National Network of Detection Laboratories established.
1987:	Promotion of volunteer donation strengthened.
January 1988:	Prevalence of HIV infection in donors is 0.4%.

discover its cause. Once this political decision was taken, legislative amendments were carried out (Table 1). In May 1987, the executive and legislative branches of government approved a law prohibiting the sale of blood in Mexico. This measure, coupled with compulsory screening for HIV infection in all donated blood units, was designed to ensure a safe blood supply (8). Other measures included establishing the National AIDS Prevention Committee (CONASIDA), instituting compulsory reporting of all AIDS cases (8), and promoting volunteer blood donation campaigns.

CONASIDA includes representatives from public and private health sector institutions as well as experts in the field. A central corps within the health sector was established to oversee health institutions throughout the country and to provide them with support and assistance. CONASIDA's functions include epidemiologic surveillance of the epidemic; supervision and evaluation of all related activities; epidemiologic research; social and educational issues; standards and recommendations to prevent transmission; and collection and administration of funds.

Compulsory screening of blood units is supported by a laboratory infrastructure that was nonexistent in Mexico before this time. Within four months, 70 laboratories capable of screening donors were set up in the country's 32 states. To con-

duct confirmatory tests and to supervise the screening laboratories, two central reference laboratories also were established. An external proficiency evaluation of outlying laboratories is being planned through the use of serum panels of known HIV antibody status.

Production of blood components is carried out in two blood-processing plants, one public and the other private; both adhere to established international standards. Since the quantity of plasma produced is insufficient, construction of an additional blood-processing plant has been started.

It was feared that the adopted legislative measures might give rise to various problems such as opposition from those who profited from the sale of blood and its products, the emergence of a black market, and a temporary shortage in the blood supply. Fortunately, no serious problems emerged, and blood-bank owners supported the new law. Paid donors, however, offered to illegally sell blood to persons in need of it. This situation has been dealt with through an educational campaign designed to inform the public of the dangers associated with blood acquired in this way. An adequate blood supply has been ensured through volunteer donation campaigns that encourage donations from relatives of those in need of blood, and blood collection centers have been set up in conjunction with the Mexican Red Cross. To save blood,

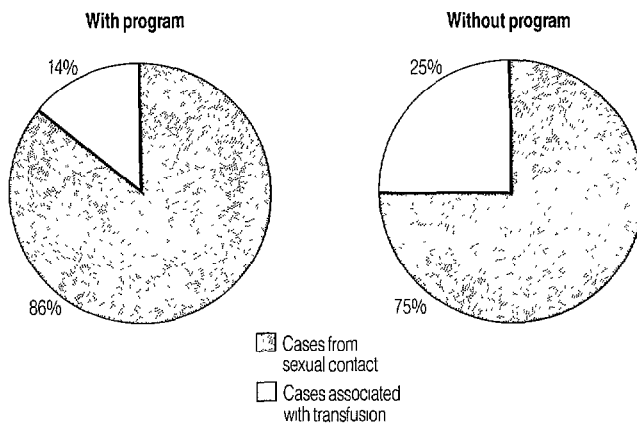


Figure 1. Percentage of cases of AIDS by mode of transmission, projections for 1991.

guidelines for appropriate indications for blood transfusions have been distributed to physicians and hospitals. In addition, persons from high-risk groups have been encouraged not to donate blood.

The Current Situation

Implementation of the above-mentioned measures has reduced the prevalence of HIV infection among blood donors to 0.04%.

The percentage of cases associated with transmission through blood or blood products is 12% of all current cases. Previous estimates of the number of these cases that would occur in Mexico by 1991 put that figure at 25%, provided that no control program was established (9). Current projections indicate that the proportion of cases associated with transfusions will be 14% (Figure 1).

The new law has been in effect since October 1987. Implemented measures have been widely accepted by both the general public and health workers. Screening is performed to detect the presence of specific antibodies in virtually all the blood used for therapeutic purposes; however, in a few small hospitals this testing is still not being carried

out. Even though blood-supply shortages were briefly experienced, effective campaigns to promote volunteer donations have solved this problem for now.

Acceptance of reforms by health professionals has resulted in a more rational use of blood and blood products. It has been necessary to make the most efficient use of blood; that is, to ensure that blood components, instead of whole blood, are used for transfusion and that appropriate recommendations for transfusion are being followed. To this end, educational campaigns that foster rational use of blood products have been provided to health personnel through courses and the distribution of handbooks.

Problems and Alternatives

All blood used for transfusion should be screened for HIV infection. The problem rests in those small hospitals, located far away from screening laboratories, that must deal with emergencies requiring urgent transfusions. Although 70 laboratories have been established throughout the country to ensure the safety of all blood products, the number of laboratories that conduct screening tests should be at least tripled. Alternatives proposed

to screening for HIV infection in all blood units include performing screening tests on several sera at a time and the use of rapid screening techniques. The first alternative is a technique whose methodology is still controversial and has not been recommended internationally. The use of rapid screening has several advantages given the serious problems of laboratory infrastructure and financing. Presently, the network of laboratories that perform rapid screening to detect the HIV-1 antibodies is expanding. Current epidemiologic information does not yet justify mass screening for HIV-2 and HTLV-I among blood donors in Mexico.

The Need to Evaluate the Control Program

It is important to assess the impact that the above-mentioned measures have had on several indicators. In order to evaluate the short-term effects, the percentage of units that are effectively screened must be determined. This makes it possible to determine the effectiveness of the law requiring HIV-infection screening among

blood donors. For the medium term it is useful to determine the prevalence of HIV infection in blood donors. Long-term information will be provided by changes in the number of cases. Over the coming years, the number of cases associated with transmission through blood may even increase; nevertheless, this percentage should eventually diminish over time.

CONCLUSIONS AND RECOMMENDATIONS

Governments all over the world are responsible for ensuring a blood supply free from HIV infection. Some simple measures require only political will for implementation. Promoting self-exclusion of persons with risk behaviors is efficient and should be recommended. Inactivating the virus in blood products is easy to carry out and also very effective. Prohibiting the sale of blood wherever it occurs is also highly recommended. The most efficient means of ensuring a safe blood supply is by screening all blood intended for transfusions (Figure 2). Al-

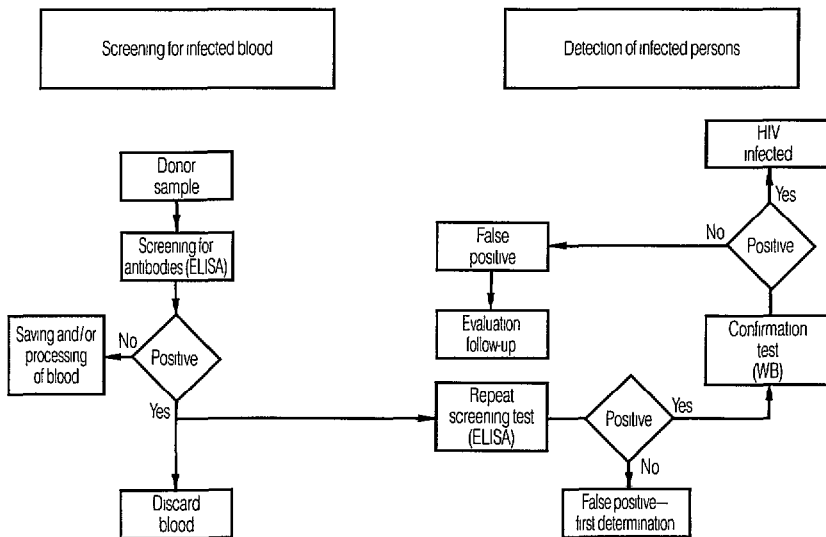


Figure 2. Model for a blood screening strategy.

though this measure may place burdens on programs in developing countries, it will, in all cases, be less expensive than the eventual hospitalization of patients.

In the absence of vaccines or drugs, prevention of the spread of AIDS must rely on education and sanitary precautions. The first involves changing individual behavior, whereas the second involves society as a whole. In developing countries, AIDS competes with other diseases for scanty health resources.

We are convinced that in Mexico it is possible, both technically and politically, to prevent HIV transmission through blood, and that this effort must be undertaken by those in charge of national health institutions and must be supported by international organizations.

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