Making the blood supply safe from HIV: The Sri Lankan experience

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SRI LANKA is an island situated in the Indian Ocean with an area of 65,610 km^2 and an estimated population of 17.5 million. The National Blood Transfusion Service (NBTS) of Sri Lanka is managed by the government and funded by an allocation from the Ministry of Health budget. This service, which was established in 1962 with a central blood bank and one regional blood bank, has now expanded to include 47 regional blood banks.

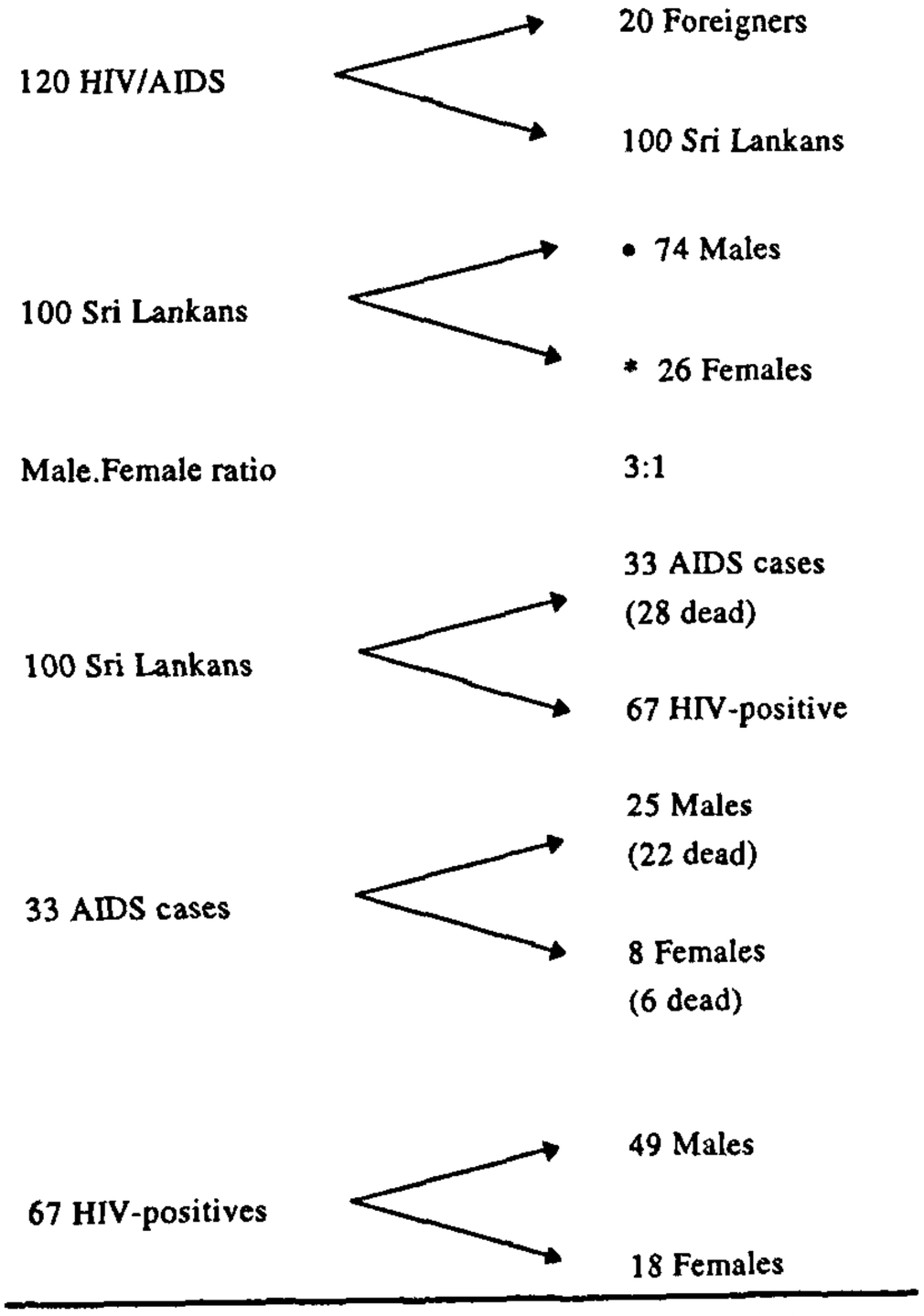
The central blood bank, which is located on the premises of Sri Lanka's premier hospital, fulfils the hospital's blood needs, including those of Accident Service and a nearby maternity hospital. It also serves as a reference centre for all the regional blood banks and as a training centre for medical, nursing and technical personnel appointed to the NBTS and their undergraduate and postgraduate trainees. The regional blood banks are located at teaching, provincial, base and district hospitals and handle the blood needs of those hospitals. The central blood bank and regional blood banks also undertake serological investigations, including antenatal serology, for hospitals. The NBTS collects blood from approximately 100,000 donors annually. Facilities for preparing and storing all blood components are available at the central blood bank and eight large regional blood banks, and facilities to prepare a few basic blood components are available in seventeen of the smaller regional blood banks. Blood is tested for syphilis, malaria, hepatitis B and HIV.

The HIV and AIDS situation

The first case of AIDS in Sri Lanka was detected in September 1986, in a foreigner who became ill while on vacation; the first Sri Lankan with HIV, a male homosexual who became infected when living abroad, was diagnosed in April 1987. Since then, as of 31 December 1993, 120 people had been found to be HIV-positive. Of these, 20 were foreigners and 100 were Sri Lankans (74 men, 26 women). Thirty-three of the Sri Lankans developed AIDS and twenty-eight of them are now dead.

The first HIV-positive blood donor was detected in January 1989, and as of 31 December 1993, a total of nine blood donors had been confirmed as infected with HIV out of a total of some 388,000. All the infected blood donors were men, and most were first-time donors.

Table 1. HIV/AIDS status in Sri Lanka, 31 December 1993



• 18 Seamen; • 9 Blood donors; * 2 following blood transfusions abroad.

Safety of the blood supply

Testing individuals for the HIV antibody cannot assure a safe blood supply, because an individual who donates blood during the period after HIV has entered the body but before the antibody appears in the blood can transmit the virus through blood transfusion. Although 95.0% of HIV-infected people test positive within three months of infection and a further 4.5% test positive within six months, 0.5% remain negative for as long as several years. Therefore, simply testing blood for HIV antibody prior to transfusion will not eliminate the transmission of HIV infection through blood. To make the blood supply as safe as possible, testing for the HIV

Table 2 HIV infection in blood donors in Sri Lanka (20 April 1988 to 31 December 1993)

HIV-antibody-positive donor	Sex	Date of testing	Blood bank where blood was donated	No. of donors tested from April 1988
1	Male	22 01.89	Central Blood Bank (Mobile Unit)	21,973
2	Male	24 04.91	Regional Blood Bank (Kalutara)	137,900
3	Male	03.10 91	Central Blood Bank	173,956
4	Male	12 12.91	Regional Blood Bank (Panadura)	188,681
5	Male	03.08.93	Central Blood Bank	342,848
6	Male	01.09.93	Regional Blood Bank (Castle Street Hospital Colombo)	351,489
7	Male	25 10.93	Regional Blood Bank (Negombo)	367,889
8	Male	05.11 93	Central Blood Bank (Mobile Unit)	372,415
9	Male	27.11.93	Regional Blood Bank (Ragama)	380,000

Table 3. HIV antibody testing in blood banks in the National Blood Transfusion Service 20 April 1988 to 31 December 1993

Year	No. of blood banks testing blood	Percentage of total blood supply covered	No. of blood donors tested	No. of positive blood donors detected
1988	CBB + 13 RBB	25.82	16,426	0
1989	CBB + 18 RBB	60.12	37,686	1
1990	CBB + 32 RBB	91 15	66,353	0
1991	CBB + 36 RBB	99.52	78,543	3
1992	CBB + 41 RBB	99.94	87,461	0
1993	CBB + 43 RBB*	99.96	102,022	5
		Total	388,491	9

*Includes two new RRBs established in 1993.
Prevalence of HIV infection in blood donors = 1 in 43000.

antibody must be considered only as a backup to donor selection, which must be done with meticulous care. The NBTS has adopted a number of strategies to prevent the transmission of the infection to donors during blood donation and to patients through blood transfusion.

HIV infection by blood donation

Instances have been reported from abroad in which blood donors have been infected with HIV during blood donation. This is possible if contaminated lancets, syringes and needles are reused without adequate sterilization. This risk can be eliminated completely by using only disposable sterile items to collect blood. Since 1988 the NBTS has used only disposable sterile items (replacing the earlier practice of reusing items sterilized by high-pressure steam). Therefore, no donor who donates blood at any of the NBTS's 48 blood banks, including mobile units, can contract HIV or any other infection by donating blood. Even the cotton wool and gauze used to clean the blood donor's arm before blood collection is sterilized under high pressure in dressings drums and discarded after use. Sharp bins are used to dispose of lancets, syringes and needles after use to prevent infection through accidental injury to blood donors, blood bank staff and visitors.

HIV infection by blood transfusion

Blood is collected only from voluntary, nonremunerated donors. The former system of partial remuneration was phased out by 1987. However, as in most developing countries, a 'hidden' system exists in which patients asked to get a relative or a friend to donate blood as a replacement for blood that has been or will be transfused to them instead pay money to people to donate

blood for them. This jeopardizes the safety of the blood supply, because these paid donors will not divulge vital information about their health and will donate blood even if they have indulged in high-risk behaviour. The staff responsible for donor recruitment and screening are alerted to this problem during their training and instructed to exclude these donors, or to collect the blood but discard it without informing the donors or the patients if they are unable to reject the donors. Blood for patients is then provided from the stocks available at the blood bank.

During the last five years, the NBTS and Sri Lanka's AIDS Control Programme have arranged confidential circulars, lectures and seminars to instruct staff responsible for blood donor screening and registration about individuals and groups at high-risk for HIV infection.

Blood donors are given a leaflet entitled 'Important message to blood donors – AIDS' which explains about HIV and AIDS infection and appeals for donors to exclude themselves if they belong to one of the high-risk groups listed. Staff are instructed to ask donors if they have read the leaflet prior to registration. If the donor reads the leaflet and goes away, no questions are asked. If the donor has any questions, a confidential interview is arranged with the medical officer. This leaflet was introduced in 1987.

Blood donors have always been required to sign certificates of fitness declaring that they do not have epilepsy, a sexually transmitted disease, tuberculosis, malaria or typhoid. This certificate has just been updated to include heart disease, high blood pressure, stroke, diabetes, cancer, kidney disease, abortion (within six months), and HIV or AIDS. The statements 'I also declare that I have read the leaflet explaining about AIDS and I do not belong to the high-risk groups mentioned in the leaflet' and 'I agree to have my blood tested for HIV (the AIDS virus) and other infections' have been added to this certificate, which the blood donor has to sign prior to registration for blood donation.

NBTS staff have been instructed to examine the forearms of blood donors for injection marks and to reject such donors so as to exclude possible intravenous drug abusers. Staff have also been told to look for skin lesions resembling Kaposi's sarcoma, which is sometimes seen in AIDS patients.

Safer blood and blood products

The NBTS collects blood into citrate phosphate dextrose-adenine blood bags with a shelf life of 35 days, and the blood is processed into blood components. Blood components are cellular and plasma components, which are separated from whole blood by conventional blood bank methods such as centrifuging and freezing. Blood is tested for HIV and other infections prior to transfusion.

NBTS staff question blood donors carefully about their present and previous occupations, travel abroad in the past ten years (including visits to African countries after 1977) and whether they have ever been sailors or in prison. They also look out for foreigners. The earlier practice of rejecting high-risk donors after explaining the problem to them was stopped because blood donors were offended. This was replaced by confidential unit exclusion in late 1991, whereby blood is collected from all donors who are otherwise fit to donate blood, but the blood of high-risk donors is discarded without informing the donor or the patient (if blood was donated for a particular patient), even if the HIV antibody test is negative, and blood for the patient is provided from stocks. Although sometimes a large number of blood units have to be discarded, this has not posed a major problem as yet, because the number of blood donors has increased considerably over the years.

Testing samples of the blood of high-risk donors, i.e. those who tested positive for syphilis or hepatitis B, was started in November 1987, and all 203 samples tested through April 1988 were negative for the HIV antibody.

Routine testing of blood for the HIV antibody using the ELISA technique started in April 1988. By the end of that year 25.8% of the blood collected by the NBTS was tested. This was gradually extended, and currently more than 99.9% of the blood supply is tested for the HIV antibody prior to transfusion. Two regional blood banks are not testing for HIV. These are located in the north in the war zone and cannot obtain a regular supply of test kits because of transport problems. However, these blood banks collect only a few units of blood, which accounts for less than 0.1% of the total blood supply.

At present, blood from the central blood bank and seven regional blood banks is tested for HIV at the anti VD Campaign in Colombo, and two regional blood banks are testing at the anti VD Campaign in Katugastota using the ELISA technique, or the particle agglutination test (Serodia) when ELISA test kits are unavailable. The other regional blood banks perform the HIV antibody test in their own laboratories using either the Serodia test or a quick test (HIV-check or HIV-spot). Trained medical and nursing officers do the HIV antibody test in all but the five regional blood banks that have laboratory technicians. The funds for the HIV antibody test kits were provided initially by the World Health Organization, later by the United Nations Development Programme, and currently are provided by the Asian Development Bank.

If a sample of blood from a donor is found to be HIV-positive, NBTS staff discard the blood even if the blood from the same donor is negative when tested again. If a blood donor is confirmed as being HIV-positive after repeat testing or confirmatory testing using the immunoblot (western blot) technique, this information is

communicated only to the directors of the AIDS Control Programme and the NBTS. The AIDS Control Programme then traces and contacts the HIV-infected blood donor and arranges for counselling. Confidentiality is maintained so that neither the blood bank staff nor the patient (if blood has been donated for a particular patient) are aware that the blood donor has been confirmed as being HIV-infected.

Blood products are plasma fractions that are separated by means of a plasma fractionation unit. This equipment is expensive and is currently not available in Sri Lanka. Therefore, a small quantity of lyophilized factor VIII concentrate (antihaemophilic factor) is imported to treat haemophilia patients who develop reactions to cryoprecipitate prepared locally. To ensure that the antihaemophilic factor is safe, only virus-inactivated products have been imported since 1987. As the products imported from France, Austria and United States before 1987 were not virus-inactivated, a haemophilia register was started in 1988, and haemophilia patients who seek treatment at government hospitals were registered at the central blood bank. As of December 1993, 132 haemophilia patients had been registered, of which 43 had received imported and antihaemophilic factor before 1987. All 132 patients were tested. All tested negative for HIV, but five were found to be positive for hepatitis B.

The NBTS also imports a limited quantity of 5% human serum albumin for patients who develop reactions to plasma transfusions and for use as a replacement fluid for therapeutic plasma exchange. This product is pasteurized and, therefore, is considered safe.

Conclusions

The strategies adopted by the NBTS of Sri Lanka to try to ensure a safe blood supply appear to have been effective because no case of HIV infection following blood transfusion in Sri Lanka has been reported to date. However, with the detection of 100 HIV-infected people in Sri Lanka as of 31 December 1993, and with an estimated 3500 people likely to be infected, resulting in an increased prevalence of HIV infection among blood donors, every effort will have to be made if the NBTS is to continue to provide a safe blood supply.