Transmission of HIV through blood or blood products in the Eastern Mediterranean Region

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انتقال فيروس العوز المناعي البشري عن طريق الدم ومنتجاته في إقليم شرق المتوسط

بوروشوتام نارايان شريستا

خلاصة : يحدث التحول المصلي في أكثر من 90% من الأفراد الذين يتلقون دماً ملوثا بفيروس العوز المناعي البشري . ولقد حدثت في إقليم شرق المتوسط 368 حالة انتقلت إليها العدوى عن طريق نقل الدم أو منتجاته . ومع تطبيق نظام تحري سلامة الدم من الفيروس HIV ، انخفضت نسبة حالات الإيدز الناجمة عن نقل الدم . وسيتواصل ظهور حالات الإيدز مدة من الزمن بسبب الفارق الزمني بين وقوع العدوى وحدوث المرض . أما الانتشار المصلي للفيروس HIV بين من يتكرر نقل الدم إليهم فقد انخفض من 270 في كل عشرة آلاف في المدة 1987 ـ 89 ، إلى 7 في كل عشرة آلاف في سنة 1995 . وتتاح الآن الوسائل الفعالة في منع انتقال الفيروس HIV عن طريق الدم . أما اختبارات المستضدات وتفاعل سلسلة البوليمراز فهي عالية التكلفة ولا يوصى باستعمالها لتحري سلامة الدم في البلدان النامية .

ABSTRACT Over 90% of recipients of HIV infected blood will seroconvert. In the Region 368 cases were due to transmission through blood or blood products. With establishment of HIV screening facilities, the proportion of AIDS cases due to blood transmission has decreased. AIDS due to blood transmission will continue to occur due to the time lag between the occurrence of HIV infection and appearance of AIDS. HIV seroprevalence among recipients of multiple blood transfusions decreased from 270 per 10 000 in 1987–89 to 7 per 10 000 in 1995. Effective methods are available for prevention of HIV transmission through blood, but antigen and PCR tests are expensive and not recommended for screening of blood donations in developing countries.

La transmission du VIH par le sang ou les produits sanguins dans la Région de la Méditerranée orientale

RESUME Plus de 90% des personnes qui ont reçu du sang contaminé par le VIH deviendront séropositifs. Dans les pays de la Région 368 cas étaient dus à une transmission par le sang ou les produits sanguins. Avec la mise en place de moyens de dépistage du VIH, la proportion de cas de SIDA dus à une transmission par le sang a diminué. Des cas de SIDA dus à une transmission par le sang continueront de se produire encore en raison du décalage entre le moment de l'infection par le VIH et l'apparition du SIDA. La séroprévalence du VIH parmi les polytransfusés est passée de 270 pour 10 000 en 1987-1989 à 7 pour 10 000 en 1995. Des méthodes efficaces sont disponibles pour prévenir la transmission du VIH par le sang mais la technique d'amplification génique et les tests de mise en évidence des antigènes ne sont pas recommandés pour l'examen systématique des dons de sang dans les pays en développement.

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Introduction

Acquired immunodeficiency syndrome (AIDS) is essentially a sexually transmitted disease but like many other sexually transmitted diseases, the human immunodeficiency virus (HIV) which causes AIDS can also be transmitted through blood or blood products and from infected mother to baby. Around 5% of the AIDS cases in the world are estimated to have occurred through blood or blood products [1]. However, the proportion may be 10% or higher in developing countries and also in those countries which import blood and blood products from countries with high HIV prevalence.

Blood is a very efficient means of transmitting HIV infection. The frequency of seroconversion after transfusion of HIV-infected blood is very high, over 90% [2]. Effective technology is available for prevention of HIV transmission through blood. After the HIV antibody test became available in 1985, the risk of getting HIV infection from blood transfusion was virtually eliminated in developed countries with the establishment of universal screening of blood donations. The risk was further reduced by the development of highly sensitive test kits and by such other means as donor selection, donor deferral and appropriate use of blood. In developing countries, the extent to which blood donations are screened against HIV is determined by the available resources and continuous efforts are being made to improve the coverage.

Considerable progress has been made to prevent transmission of HIV through blood in the countries of the Eastern Mediterranean Region. However, there are still a few countries which have yet to achieve universal screening of blood. This paper reviews the situation in the countries of the Region with regard to AIDS acquired through blood transmission, based upon the reports from the national AIDS programmes of these countries.

Reported AIDS cases due to blood

A cumulative total of 3745 AIDS cases were reported from the countries of the Region up to the end of 1995. All countries except Afghanistan have reported AIDS cases. Information about the mode of transmission is available for 3461 cases (92.4%). Of them, 368 (10.6%) cases were due to the receipt of blood or blood products. The largest number of cases due to the receipt of blood or blood products were reported from the Islamic Republic of Iran, followed by Tunisia, Morocco, Saudi Arabia, Egypt and Iraq (Table 1). The proportion of cases due to receipt of blood and blood products among all cases is higher in countries such as Iraq, the Islamic Republic of Iran and Saudi Arabia than in other countries, mainly because they used much larger quantities of imported blood and blood products than did other countries.

Although the reported number of new AIDS cases has continued to rise every year, the number of cases due to receipt of blood or blood products has not risen much during the past five years (Figure 1). In the early stages of the epidemic, a large proportion of total AIDS cases was due to the receipt of blood or blood products. The peak was reached in 1987 when almost half of the cases were due to this mode of transmission (Figure 2). After the establishment of facilities for screening of blood donations against HIV, the proportion of AIDS cases due to transmission through blood or blood products started decreasing. While about 9% of cases were due to the transfusion of blood or blood products in 1994, the proportion decreased to 4% in 1995.

In spite of the establishment of screening for blood donations. AIDS cases due to blood transmission will continue to occur for some time to come. This is mainly due to the time lag between the occurrence of HIV infection and the appearance of AIDS. This has been seen in Europe and the USA. About 6000 cases of AIDS associated with transfusions were registered in 14 European countries between 1985 and 1993 and over 8000 cases in the USA between 1985 and 1992 [*3*]. France had the highest overall incidence of AIDS related to transfusion in Europe (3.3 per million). Incidence rates of AIDS associated with transfusion were still increasing in some southern European

Table 1 **Distribution of reported AIDS cases due to transfusion of blood and blood products in the Eastern Mediterranean Region to end 1995**

Country	Total reported	Known mode of transmission	No. due to blood	%[a]
Afghanistan	0	0	0	0
Bahrain	28	26	5	19.2
Cyprus	50	43	2	4.7
Djibouti	880	878	0	0
Egypt	129	126	34	27.0
Iran, Islamic Republic of	118	108	70	64.8
Iraq	42	42	34	81.0
Jordan	40	36	19	52.8
Kuwait	19	19	4	21.1
Lebanon	91	84	14	16.7
Libyan Arab Jamahiriya	17	9	2	22.2
Morocco	306	284	36	12.7
Oman	55	43	18	41.9
Pakistan	55	33	5	15.2
Palestine	8	3	1	33.3
Qatar	80	10	4	40.0
Saudi Arabia	137	68	35	51.5
Somalia	13	12	4	33.3
Sudan	1341	1331	12	0.9
Syrian Arab Republic	36	36	1	2.8
Tunisia	270	256	64	25.0
United Arab Emirates	8	0	0	0
Yemen, Republic of	22	14	4	28.6
Total	3745	3461	368	10.6

[a] *Percentage due to blood among cases for whom mode of transmission is known*

countries in the early 1990s. About 1300 cases of AIDS associated with transfusion had been reported in France by June 1993 [4].

In countries where universal screening of blood donations against HIV has not been achieved, occurrence of HIV infection due to blood transfusion cannot be ruled out. Even in countries with universal screening of blood donations, a very small number of HIV infections can occur if the blood is collected during the window period, i.e. the interval between HIV infection and appearance of HIV-specific antibodies.

HIV seroprevalence among blood recipients

People who receive multiple transfusions of blood or blood products, such as those with haemophilia or thalassaemia, are at greater risk of HIV infection through blood than the general population. In the early stages, HIV prevalence among such recipients was quite high: nearly 10% in the Islamic Republic of Iran, 3% in Tunisia and 1% in Kuwait (Table 2). With the establishment of facilities for screening of blood and blood products for HIV, transmission of HIV through this means has decreased considerably over the years. This has been seen consistently in almost all countries which are carrying out surveillance among these risk groups.

Overall, the HIV seroprevalence among these risk groups has markedly decreased, from 270 per 10 000 during 1987–1989 to 7 per 10 000 in 1995 (Figure 3). Most of the HIV infections reported lately were old infections which were only detected recently, but that a few are new infections cannot be ruled out in countries where universal screening of blood or blood products against HIV has not been secured.

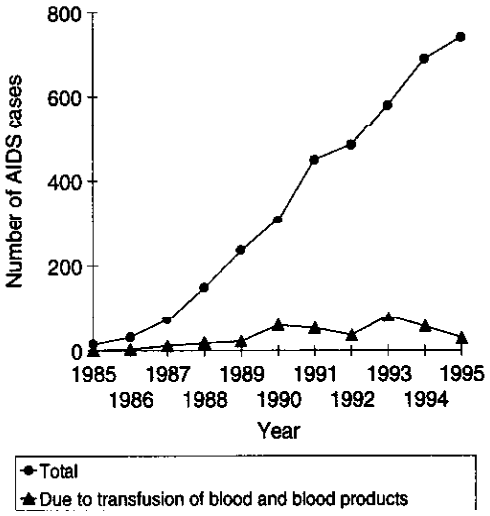

Figure1 **Reported AIDS cases in the Eastern Mediterranean Region, 1985–1995**

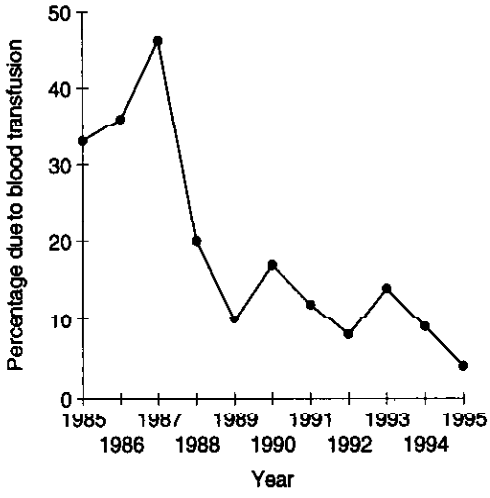

Figure 2 **Percentage of AIDS cases due to blood transfusion in the Eastern Mediterranean Region, 1985–1995**

Table 2 **HIV seroprevalence per 10 000 among recipients of blood and blood products in Eastern Mediterranean Region to end 1995[a]**

Country	1987–89	1990	1991	1992	1993	1994	1995
Cyprus	57	16	0	0	0	0	0
Iran, Islamic Republic of	950	444	184	137	42	23	0
Iraq	0	0	840	129	176	71	12
Kuwait	100	12	0	192	23	0	0
Lebanon	428	*	0	*	0	42	0
Pakistan	58	*	29	33	31	0	0
Syrian Arab Republic	97	476	138	21	285	0	25
Tunisia	269	0	0	42	44	68	0

[a] *In countries where these population groups are being kept under surveillance*
* *Information not available*

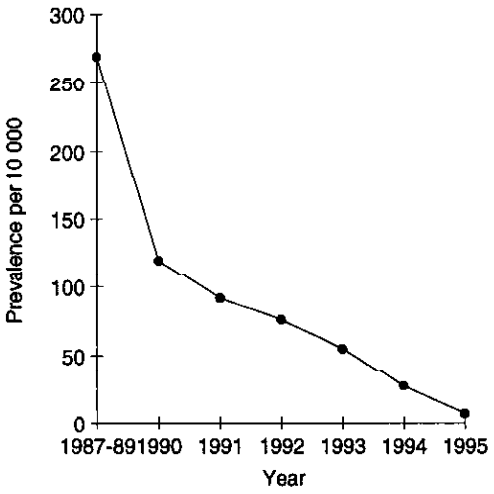

Figure 3 **HIV prevalence among blood recipients in the Eastern Mediterranean Region, 1987–1995**

Prevention of HIV transmission through blood

Effective technology is available to make blood and blood products safe for use. The surest means of making blood safe against HIV is by screening the blood for HIV antibodies. By this means, it has been possible to reduce HIV transmission through blood to a very low level in the developed countries. However, in many developing countries, including a few in the Eastern Mediterranean Region, lack of financial resources is still the main stumbling block to universal screening of blood. Persistent efforts are being made in these countries to improve the coverage.

In spite of screening of blood against HIV antibodies, there may be some, although very low, risk of HIV transmission from screened blood. This could happen due to: a) a donor being in the window period of HIV infection; b) a false-negative HIV antibody test; or c) human and operational error. No study has been reported in the Eastern Mediterranean Region on such risk but the risk has been documented elsewhere. In Thailand, 30 cases of transfusion-associated AIDS were reported during 1990–1992 and the risk of HIV from blood screened against HIV antibodies was estimated to vary from 1:3400 to 1:25 000 [5]. The risk has been estimated to vary be-

tween 1:25 641 and 1:90 909 in South Africa [6]; between 1:210 000 and 1:1 340 000 in Vienna, Austria, and between 1:380 000 and 1:234 000 in Göttingen, Germany [7]; and between 1:450 000 and 1:660 000 in the United States of America [8]. Two HIV infections have been reported in the United States Army out of 700 000 blood units which had been screened for HIV antibodies [9]. While more than 14 million units of blood and blood components are transfused yearly in the USA, only 29 documented AIDS cases have occurred in transfusion recipients who received HIV antibody-negative blood since HIV screening began in March 1985 [10].

Any risk of HIV transmission through blood, however small it may be, must be avoided as far as possible. In addition to routine screening for HIV antibodies, other measures should be taken to improve the blood safety. These measures include proper selection of blood donors, appropriate use of blood and use of sensitive HIV tests.

Professional or paid donors are known to be associated with sexual promiscuity or drug abuse and must be avoided. Similarly, replacement or patient-recruited donors should also be avoided because they have higher HIV seropositivity rates than voluntary donors. The rate among patient-recruited donors in a Kenyan hospital was reported to be three times higher than among voluntary donors [11]. Emphasis, therefore, should be on recruitment of non-remunerated voluntary donors. Sustained efforts including campaigns to promote voluntary donations will be required.

All potential donors should be provided with information to encourage "self-deferral" for those whose behaviour puts them at increased risk of HIV infection. Such information may be given in a written form to those who are able to read, followed by an interview which should include questions about risk behaviour. Potential donors should be examined for evidence of illicit drug use.

The larger the number of blood transfusions, the greater the risk of HIV infection. Lackritz et al. have reported 47% of paediatric transfusions as inappropriate and 68% of adult transfusions as single unit transfusions in a Kenyan hospital [11]. In order to improve blood safety, the aim should be to reduce the number of transfusions to the absolute minimum. The best option would be to avoid blood completely wherever feasible and to use blood substitutes.

Selection of sensitive tests also increases blood safety, by reducing the false-negative rate and by decreasing the window period. With the use of third generation ELISA tests, the window period decreases to 3 weeks from the previously reported period of 6–8 weeks [10]. To detect HIV infection earlier, other tests such as the antigen capture test and the polymerase chain reaction (PCR) test have been suggested. The US Food and Drug Administration recommended in August 1995 that all donated blood and plasma also be screened for HIV-1 p24 antigen, effective within 3 months of licensure of a test labelled for such use. This is expected to reduce the window period by 6 days and thus reduce the number of otherwise undetected infectious donations by approximately 25% per year [12]. But these tests will have limited value in detecting early infection or in improving transfusion safety [9,10]. Moreover, these tests are not affordable for developing countries.

Conclusion

The continuing development in technology for HIV tests supplemented by efforts to reduce the risk has meant that blood safety

has become a reality. Nevertheless, AIDS cases due to blood transmission will continue to occur in individuals who were infected many years ago but have not yet developed disease.

Mobilizing and sustaining the resources required to ensure blood safety pose a constant challenge to the developing countries. It would be wise to use the available resources judiciously. Priorities in blood safety should include universal screening of blood for HIV antibodies using sensitive tests, promotion of voluntary nonremunerated blood donations, donor deferral and appropriate use of blood. More sophisticated tests such as PCR and antigen tests are expensive and are not recommended until they become affordable.

References

1. Wahdan MH. *Epidemiology of acquired immunodeficiency syndrome*. Alexandria, World Health Organization, Regional Office for the Eastern Mediterranean, 1995 (unpublished document WHO-EM/GPA/014/E/L/95).
2. Donegan E et al. Infection with human immunodeficiency virus type 1 (HIV-1) among recipients of antibody-positive blood donations. *Annals of internal medicine*, 1990, 113:733–9.
3. Franceschi S, Dal Maso L, La Vecchia C. Trends in incidence of AIDS associated with transfusion of blood and blood products in Europe and the United States, 1985–93. *British medical journal*, 1995, 311:1534–6.
4. Le-Pont F et al. Estimation of the size of the HIV/AIDS epidemic due to blood transfusion in France. *International journal of epidemiology*, 1995, 24(2):441–5.
5. Isarangkura P et al. Transmission of HIV infection by seronegative blood in Thailand. *Journal of the Medical Association of Thailand*, 1993, 76, supp 2:106–13.
6. Sitas F, Fleming AF, Morris J. Residual risk of transmission of HIV through blood transfusion in South Africa. *South African medical journal*, 1994, 84(3):142–4.
7. Schwartz DW et al. Risk of human immunodeficiency virus (HIV) transmission by anti-HIV negative blood components in Germany and Austria. *Annals of hematology*, 1995, 70(4):209–13.
8. Lackritz EM et al. Estimated risk of transmission of the human immunodeficiency virus by screened blood in the United States. *New England journal of medicine*, 1995, 333:1721–5.
9. Roberts CR et al. Transfusion-associated human immunodeficiency virus type 1 from screened anti-body negative blood donors. *Archives of pathology and laboratory medicine*, 1994, 118(12): 1188–92.
10. Sloand EM, Pitt E, Klein HG. Safety of the blood supply. *Journal of the American Medical Association*, 1995, 274(17):1368–73.
11. Lackritz EM et al. Blood transfusion practices and blood-banking services in a Kenyan hospital. *AIDS*, 1993, 7: 995–9.
12. US Public Health Service guidelines for testing and counseling blood and plasma donors for human immunodeficiency virus type 1 antigen. *Morbidity and mortality weekly report*, March 1, 1996; Vol. 45, No. RR-2.