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HIV Infection Among Potential Blood Donors

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Abstract

The statistics on HIV in Russia in 2013 were studied and compared with the blood service data. It was found that among different contingents the minimum detection rate of HIV infection has been registered among blood donors. Maximum detection rate of HIV among men, who have sex with men, actualizes the need for a ban on their participation in blood donation. The detection rate of HIV among donors, as well as the ratio of detection of HIV among donors and other categories surveyed indicate a lack of efficiency of formation of donor contingent of supporters of a healthy lifestyle. A direct positive correlation of HIV was detected in blood donors and region population, the volume of blood processing, as well as all volumes of blood wastage due to markers of blood borne infections except the volume due to HBs-antigen.

Keywords: HIV; Infection; Donors; Statistics; Blood; Detection; Transfusion

Introduction

HIV transmission to a recipient is the most resonant adverse effect of blood transfusion [1]. From HIV infection epidemics onset and up to 2013 inclusive, 80 cases of HIV infection transmission during transfusion of fresh frozen plasma and blood products were registered in the Russian Federation. Since 2010, two such cases have been registered annually. In 2012-2013 the key reason for infection transmission during blood transfusion was red blood cell suspension transfusion from active donors in the seronegative period (Smolensk, Kemerovo regions). In March 2013 in St. Petersburg a child was transfused with red blood cells prior to donor's HIV infection test results were received [2].

HIV infection prevention should be undertaken comprehensively as regards sources of the virus, mechanisms, routes and factors of transmission as well as sensitive population, including representatives of vulnerable groups of population [3].

It would be interesting to compare HIV detectability in donors with similar characteristics in other population groups both on regional and national scale.

Materials and Methods

The following materials have been studied:

- Main statistics on HIV infection in Russia;

- Data on HIV antibody test results;

- Data on HIV antibody test results on various subpopulation in the regions of the Russian Federation in 2013 [4].

It is worth noting that personified data on new HIV infection cases in Moscow in 2012-2013 were not given; the data includes persons who were detected in the Federal Scientific and Methodology Centre for AIDS Prevention and Control for the first time as well as the data for Moscow taken from the health monitoring form of the Russian Agency for Health and Consumer Rights.

HIV antibody test results were compared to the industry statistics on the institutions affiliate to the Ministry of Health of Russia for 2013.

The results were evaluated using descriptive statistics and correlation analysis with the level of significance of 0.05.

Results and Discussion

The number of HIV infected persons who applied to a donor point was minimal among the groups examined (Table 1). However, as shown in Table 1, the number of seropositives per 100,000 of serum samples was maximum in MSM group. The possibility to lift the ban for men practicing sex with other men is widely discussed on the international level [5]. The observed maximum infection detectability rate in this group makes actual the need to introduce the same ban in Russia.

The maximum HIV detectability rate among donors is in the regions with the highest overall HIV detectability rate (Table 2).

Donors take a significant part of those who were tested for HIV: median and interquartile interval of this parameter made 14.3% (10.9-18.6) in 2012 and 13.3% (10.6-17.3) in 2013.

The maximum share of donors in those tested is in the regions where plasma fractioning and collection points are located (Tables 3 and 4). The share of donors in the number of HIV-positive persons is low: median and interquartile interval of this parameter made 1.3% (0.8-2.6) in 2012 and 1.4% (0.9-2.2) in 2013. The list of regions with the highest value of this parameter is quite varying (Table 5). In 2012 no HIV-positive donors were identified in 12 regions (Republic of Kalmykia, Belgorod region, Karachay-Cherkess Republic, Republic of Mari El, Republic of Sakha (Yakutia), Ryazan region, Yamalo-Nenets Autonomous District, Voronezh region, Kamchatka, Chukot Autonomous Area, Nenets Autonomous Area). In 2013 the number of such regions reduced to 8 (Amur region, Sakhalin region, Jewish Autonomous Region, Republic of Ingooshetia, Republic of Kalmykia, Karachay-Cherkess Republic, Chukot Autonomous Area, and Nenets Autonomous Area).

The ratio of HIV detectability among donors and other categories examined indirectly may show the quality of healthy donor recruiting.

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Group examined	2012			2013		
	Blood serum examined	HIV+	*	Blood serum examined	HIV+	*
Total	26,037,319	70,744	271.7	26,826,067	79,728	297.2
Men who have sex with men	2,701	153	5,664.6	2,188	161	7,358.3
Drug addicts	245,227	9,009	3,673.7	238,885	10,037	4,201.6
Examined during epidemiologic investigation	158,141	6,332	4,004.0	176,092	6,700	3,804.8
Persons in detention	415,707	8,589	2,066.1	398,807	8,953	2,244.9
People with sexually-transmitted infections	897,260	3,857	429.9	886,168	4,337	489.4
People examined due to clinical signs	5,724,621	18,060	315.5	5,914,421	21,744	367.6
Others	9,557,200	17,157	179.5	10,147,879	19,641	193.5
Foreigners examined	1,248,832	1,944	155.7	1,501,247	2,116	140.9
Pregnant women	5,138,303	6,449	125.5	5,223,644	6,972	133.5
Medical staff working with HIV-positive patients or materials containing HIV	451,312	162	35.9	455,737	166	36.4
Donors	3,446,847	976	28.3	3,382,246	1,017	30.1
Note: * number of seropositive per 100,000 of serum samples examined						

Table 1: Number of new HIV infection cases among various categories of examined persons in Russia in 2012 – 2013.

All groups		Donors	
RF constituent territory**	*	**RF constituent territory**	*
Kemerovo region	1,291.5	Tomsk region	109.2
Tomsk region	951.0	Kemerovo region	93.1
Sverdlovsk region	883.6	Novosibirsk region	83.8
Samara region	812.5	Samara region	68.6
Novosibirsk region	790.0	Altai Territory	67.9
Irkutsk region	726.6	Tver region	67.6
Perm region	621.1	Irkutsk region	62.4
Leningrad region	603.6	Republic of Bashkortostan	54.7
St. Petersburg	531.2	Ulyanovsk region	53.7
Orenburg region	524.6	St. Petersburg	52.9
Note: *number of seropositive per 100,000 of serum samples examined; RF: Russian Federation			

Table 2: Regions with the highest HIV infected detectability in 2013.

2012		2013	
RF constituent territory	**%**	**RF constituent territory**	**%**
Kirov region	41.7	Tyumen region	35.3
Ivanovo region	30.9	Ivanovo region	34.1
Lipetsk region	27.7	Kirov region	30.6
Yaroslavl region	27.6	Yaroslavl region	26.2
Republic of Mordovia	25.9	Jewish Autonomous Region	25.1
Jewish Autonomous Region	24.9	Lipetsk region	24.2
Tyumen region	23.1	Republic of Mordovia	23.9
Republic of Karelia	21.5	Republic of Karelia	22.1
Pskov region	21.5	Arkhangelsk region	20.6
Sverdlovsk region	21.4	Altai Territory	19.9

Table 3: Regions with the highest number of donors among HIV examined in 2012 and 2013.

2012		2013	
RF constituent territory	**%**	**RF constituent territory**	**%**
Bryansk region	8.8	Moscow region	8.6
Kamchatka	8.4	Chukot Autonomous Area	8.1
Kabardino-Balkarian Republic	8.2	Bryansk region	8.0
Chukot Autonomous Area	8.1	Kamchatka	7.5
Primorsky Kray	7.8	Primorsky Kray	7.5
Volgograd region	7.6	Volgograd region	7.4
Transbaikal Territory	6.8	Transbaikal Territory	7.4
Republic of Tatarstan	6.5	Republic of Tatarstan	5.7
Moscow	5.5	Moscow	4.5
Republic of Ingooshetia	4.2	Republic of Ingooshetia	4.5

Table 4: Regions with the lowest number of donors among HIV examined in 2012 and 2013.

2012		2013	
RF constituent territory	**%**	**RF constituent territory**	**%**
Republic of Tuva	7.7	Republic of Tuva	15.4
Orel region	7.6	Chuvash Republic	6.5
Amur region	6.7	Republic of Khakassia	5.4
Republic of Altai	6.3	Yaroslavl region	4.4
Sakhalin region	5.4	Astrakhan region	3.7
Republic of North Ossetia	5.1	Republic of Karelia	3.7
Magadan region	4.9	Chechen Republic	3.3
Kaluga region	4.9	Kamchatka	3.3
Chuvash Republic	4.5	Tambov region	3.1
Chechen Republic	4.3	Kirov region	2.9

Table 5: Regions with the highest number of HIV positive donors in 2012 and 2013.

2012		2013	
RF constituent territory	**%**	**RF constituent territory**	**%**
Republic of Ingooshetia	51.6	Republic of Tuva	87.4
Chechen Republic	45.7	Chuvash Republic	44.0
Republic of Altai	45.4	Kamchatka	42.7
Kaluga region	43.2	Chechen Republic	32.1
Magadan region	42.1	Republic of Khakassia	31.7
Kabardino-Balkarian Republic	40.0	Republic of Adygeya	28.2
Republic of Tuva	37.4	Astrakhan region	22.5
Orel region	35.9	Voronezh region	22.1
Republic of North Ossetia	32.0	Stavropol region	22.0
Amur region	30.0	Republic of Dagestan	19.9

Table 6: Regions with the highest ratio of HIV detectability among donors and other categories examined in 2012 and 2013.

Median and interquartile interval of this parameter made 7.9% (4.5-15.7) in 2012 and 9.0% (5.9-13.1) in 2013. In the regions with the highest value for this parameter, special attention should be paid to recruitment of donors without any HIV infection risk (Table 6).

The correlation relationship of HIV detectability in donors and other groups examined (Table 7) demonstrates epidemic process similarity among potential donors and the population in general, save for those who were examined during epidemiologic investigation and foreign subjects.

The drawback of this study is generalization of the results of new and regular donor examination. Usually the blood service identifies two infection safety indicators: blood transmission infection incidence and occurrence rate. Incidence, or prevalence, is the number of cases of a certain disease among the population at a certain moment. In blood transfusion it means the number of diseases among new donors (usually, per annum).

Group examined	2012		2013	
	r	p	r	p
Non-donors	0.71	<0.001	0.82	<0.001
People examined due to clinical signs	0.65	<0.001	0.80	<0.001
Pregnant women	0.68	<0.001	0.79	<0.001
Drug addicts	0.51	<0.001	0.69	<0.001
People with sexually-transmitted infections	0.57	<0.001	0.52	<0.001
Persons in detention	0.28	<0.05	0.47	<0.001
Medical staff working with HIV-positive patients or materials containing HIV	0.28	<0.05	0.24	<0.05
Examined during epidemiologic investigation	0.05	>0.05	0.11	>0.05
Foreign subjects examined	0.11	>0.05	0.10	>0.05

Table 7: Correlation relationship of HIV detectability in donors and other groups examined.

Parameter	r
Blood rejection due to ALT, l	0.58
Absolute rejection, l	0.57
Blood rejection due to syphilis, l	0.49
Blood rejection due to other reasons, l	0.48
Blood plate concentrates obtained, doses	0.46
Red blood cells produced, l	0.45
Plasma spent for blood components, l	0.44
Blood rejection due to HIV, l	0.44
Blood rejection due to HCV, l	0.43
Cell production for blood components, l	0.41
Cell production by centrifugation, l	0.40
Cell production from blood, l	0.40
Population of the RF constituent territory	0.40
Positions involved in blood collection	0.40

Table 8: The strongest (r>0.39) correlation relationship of HIV detectability in donors with other donorship parameters in 2013 (p<0.05).

Occurrence rate is the number of cases of a disease occurring during a certain period of time in a certain population. In blood transfusion it means disease finding in regular donors [6].

In this study it is not possible to differentiate between the results for new and regular donors.

HIV detectability in donors demonstrates positive correlation with all parameters of blood rejection rate using blood transmitted infection markers (Table 8). The only exception is the blood rejection rate on HBs antigen, where no correlation is present. We may assume the identity of transmission mechanisms of HIV, HCV and syphilis as well as liver lesions as a result of alcohol consumption among persons with deviant behaviour who apply to a donor point. Positive HIV test results are more common for large regions and centres with the highest blood collection rates.

Conclusions

1. It was found that among different contingents the minimum detection rate of HIV infection in regions of the Russian Federation in 2013 has been registered among blood donors.

2. Maximum detection rate of HIV among men practicing sex with men actualizes the need for a ban on their participation in blood donation.

3. The detection rate of HIV among donors, as well as the ratio of detection of HIV among donors and other categories surveyed indicate a lack of efficiency of formation of donor contingent of supporters of a healthy lifestyle.

4. A direct positive correlation detection of HIV in blood donors and region population, the volume of blood processing, as well as all volumes of blood wastage due to markers of bloodborne infections except the volume due to HBs-antigen.

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