UDC 616-097-022:578.826.6

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# NOSOLOGY AND AGE-GENDER STRUCTURE OF HIV-INFECTED PATIENTS AT EMERGENCY MEDICAL SERVICE CLINICS

## Abstract

We retrospectively studied the age-gender structure and nosology of urgent pathology among HIV-infected persons at N. V. Sklifosovsky Research Institute of Emergency Medicine. For the period from 2008 to 2015, the number of patient's hospitalizations with HIV to the emergency medical service clinics increased by 1.5 times among men ($R^2 = 0.63$, $p = 0.0188$) and women ($R^2 = 0.84$, $p = 0.0013$). The greatest number of HIV-infected persons registered at the emergency departments ($R^2 = 0.57$, $p = 0.03$). The main shares of people with HIV infection were in the age groups of 18–30 and 31–40. At the same time, we revealed multidirectional trends connected with decreasing number of hospitalized patients in the age group of 18–30 ($R^2 = 0.51$, $p = 0.04$) and increasing in groups of 31–40 ($R^2 = 0.71$, $p = 0.008$) and 41–50 ($R^2 = 0.89$, $p = 0.0004$). The share of HIV-infected men decreased from 68.1 to 65.1% while for women it increased from 31.9 to 34.9%. The differentiation of the epidemic process for HIV-infection among patients in different clinical departments was noticed.

***Key words:*** *HIV, HIV-infection, prevalence, hospital, emergency room, retrospective study*

**For citation:** Solonin S. A., Shakhova O. B., Belova M. V., Godkov M. A. NOSOLOGY AND AGE- GENDER STRUCTURE OF HIV-INFECTED PATIENTS AT EMERGENCY MEDICAL SERVICE CLINICS. The Russian Archives of Internal Medicine. 2018; 8(3): 194-203. [In Russian]. DOI: 10.20514/2226-6704-2018-8-3-194-203

**DOI:** 10.20514/2226-6704-2018-8-3-194-203

UNAIDS — Joint United Nations Programme on HIV/AIDS, MSC AIDS — Moscow City Center for AIDS Prevention and Control, SRIEM — N. V. Sklifosovsky Research Institute of Emergency Medicine, PSs — psychoactive substances, EMSC — emergency medical service clinics

## Introduction

According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), Russia as well as Ukraine, Estonia and Moldova lead the world in the growth of the HIV incidence rate. In 2015, of all the member countries of the WHO Regional Office for Europe, our country accounted for 80% of all new HIV infections [1]. The territorial centers for the prevention and control of AIDS have reported 95,475 new cases of infection, and the total number of HIV-infected citizens of the Russian Federation has exceeded 1 million. Currently, an increase in the incidence and prevalence of HIV infection in the population is observed in most regions [2]. The main reason for the high HIV prevalence in the population is associated with the high rate of viral shedding among drug users. According to the Ministry of Internal Affairs of the Russian Federation, the number of people who use psychoactive substances (PSs) at varying degrees of frequency is more than 2.2 million people [3]. Sharply increased migration flows also contribute to the development of the epidemic process [4].

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Previously it was believed that HIV infections are concentrated mainly among socially marginalized groups of people whose way of life is socially stigmatized or is associated with crime [5]. Recent data indicate that the HIV epidemic is spreading from vulnerable groups to the general population [2]. HIV is actively spreading among socially advantaged members of society [6, 7]. The increase in HIV infection rate among women has caused much concern: in 2016 more than 39,000 new cases of infection were revealed; in total there were more than 410,000 such cases [2]. The main reason for this is related to the active sexual transmission of the virus. An important piece of evidence that HIV is being transmitted sexually is the increasing number of cases of infection detected in pregnant women [8].

One of the key priorities for combating the HIV epidemic in Russia is to ensure that a large percentage of the population undergoes testing in order to detect infection and prescribe antiviral therapy in a timely fashion [4]. However, when assessing the incidence, it is extremely important to take into account not only the coverage of testing, but also the demographic characteristics of the surveyed population. In our country, an annual increase in the number of completed HIV tests is associated with a low level of testing of members of vulnerable groups [9]. These groups are traditionally thought to include injecting drug users, men who have sex with men, commercial sex workers, homeless, prisoners, and illegal migrant workers [4]. Representatives of these groups avoid seeking treatment at outpatient clinics or do not indicate their membership in these cohorts for fear of social discrimination and stigmatization [10]. Rules and regulations at institutions of outpatient care prevent these individuals from obtaining necessary medical assistance for the diagnosis, prevention, and treatment of HIV infection [11]. According to the evaluation of experts at the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing (Rospotrebnadzor), up to a third of infected Russians are not aware that they have HIV [12]. In such a situation, a high percentage of the population that is vulnerable to HIV infection remains outside the existing epidemiological surveillance system.

One way to estimate the prevalence of HIV infection among such cohorts is to analyze the results of a screening survey of patients seeking specialized care at emergency medical service clinics (EMSC). This approach is particularly relevant due to increased rates of physical trauma reported by citizens suffering from drug abuse and socially deviant behavior (alcoholism, drug addiction, etc.), that is, among those most at risk of HIV infection.

**Objective:** To study the nosology and age-gender structure of HIV-infected patients entering the emergency medical service clinic.

## Materials and Methods

A retrospective analysis of the types of requests for treatment of patients with HIV infections at the specialized departments of EMSCs was conducted. Testing for HIV infection was carried out with the informed consent of the patient or his legal representative. HIV testing was performed at the Department of Laboratory Diagnostics of the N. V. Sklifosovsky Research Institute of Emergency Medicine (SRIEM). The enzyme-linked immunosorbent assay and test systems, which have been approved for use in the Russian Federation in accordance with established procedure, were used. Confirmation of the results of the screening study was performed by immunoblotting in the laboratory of the Moscow City Center for AIDS Prevention and Control (MCC AIDS). The incidence of HIV was assessed in absolute terms and in terms of the rate of detection as a percentage. The amount of HIV-positive blood samples was estimated as the amount of HIV-infected patients' requests to EMSCs. Epidemiological evaluation was carried out according to departments specialization and also while taking into account the data on the age-gender structure of the patient population for 2008–2015. Statistical processing of the data was performed using Graph Pad Prism 7 (Graph Pad Software, USA). Pairwise comparison of the distribution of HIV incidence rates in groups was performed using the Fisher's exact test (two-tailed P values). A regression analysis (ordinary least squares) was used to determine trends. In order to assess the informativeness and significance of the regression equation, the coefficient of

determination $R^2$ was calculated. Differences were assessed as statistically significant at the 95% probability ($p < 0.05$) or higher.

## Results

For the period from 2008 to 2015, 191,564 patients were examined for HIV infection at the clinical and intensive care departments of SRIEM. There were 2,946 cases of admission of HIV-infected patients, which amounted to 1.5% of the total number of those who were surveyed. Over the course of seven years, the number of HIV-infected patients applying to the hospital increased by 1.5 times ($p = 0.0068$) from 273 to 410 people, and the detection rate increased by 0.3% (from 1.2 to 1.5%) (Fig. 1). Statistics on the number of identified HIV cases in patients at SRIEM during the analyzed period did not follow any clear trends: linear growth was recorded in 2008–2013 ($R^2 = 0.87$, $p = 0.005$) with peaks in 2012–2013, though that trend was reversed by a gradual decline in 2014–2015. The causes of changes in admission trends of patients with HIV at SRIEM require further thorough study.

It should be noted that the detection of HIV infection in patients at the Institute exceeds the comparable data for other Moscow clinics specialized in non-infectious diseases by double on average [13]. The high incidence of HIV infection in the SRIEM patients can be attributed to the fact that the EMSC has specialized units that provide emergency and primary medical care to victims with injuries and acute illnesses of various origins, including an overdose of PSs. In addition, this is due to the characteristics of the contingents of patients who are in need of emergency and primary medical care. It is shown that among the patients at SRIEM, the share of citizens suffering from various kinds of drug abuse and socially deviant behavior is high. They lead ways of life that are associated with increased rates of various kinds of physical trauma [14].

Fig. 1 presents a very general picture of the HIV situation at the hospital. When assessing the epidemiological situation at SRIEM, it is important to consider not only the trends in admissions and rates of detection, but also the specialization of the units in which they are identified.

A retrospective study of the types of calls for medical care of HIV-infected people at the specialized EMSC departments has revealed a statistically significant trend towards an increase in the number of admissions to the intensive care units at the Institute ($R^2 = 0.57$, $p = 0.03$). During the analyzed period, the number of infected patients admitted to the resuscitation department at SRIEM increased by 1.8 times ($p = 0.0004$) (from 126 in 2008 to 224 in 2015), which was 46 and 55% of the number of all patients admitted to the hospital with HIV, respectively (Tables 1, 2).

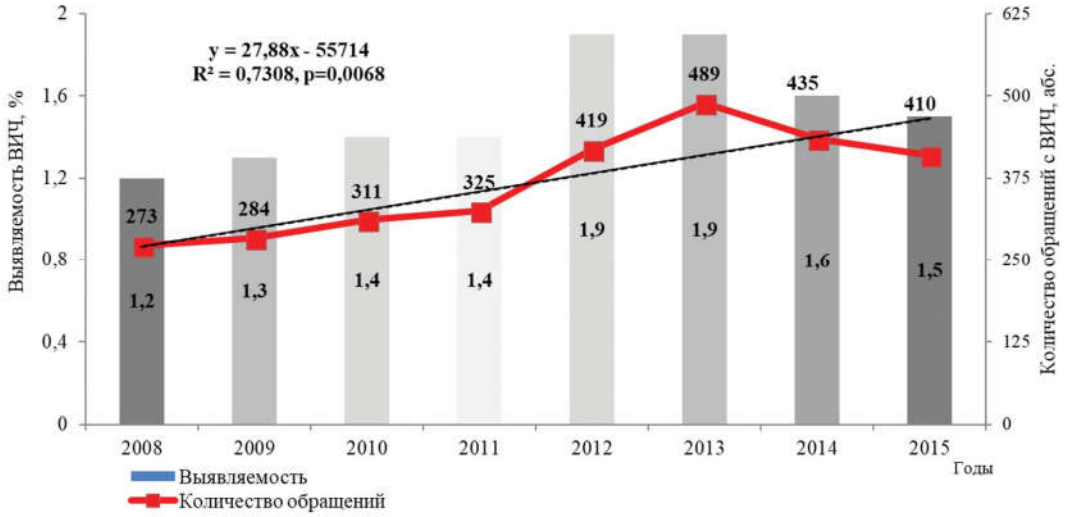


***Fig. 1** — Number of cases and detection of HIV-infection in patients at the N. V. Sklifosovsky Research Institute of Emergency Medicine, 2008–2015*

***Table 1*** *— Detection and admission profile of HIV-infected patients to N. V. Sklifosovsky Research Institute ofEmergency Medicine, 2008–2011*

| Profile/year | 2008 | | | 2009 | | | 2010 | | | 2011 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *NTP | n | % | NTP | n | % | NTP | n | % | NTP | n | % |
| Toxicological resuscitation | 1,903 | 91 | 4.8 | 1,697 | 100 | 5.9 | 1,515 | 119 | 7.9 | 1,618 | 143 | 8.8 |
| 1st Unit of acute poisoning treatment | 1,477 | 22 | 1.5 | 1,385 | 26 | 1.9 | 1,329 | 32 | 2.4 | 1,296 | 22 | 1.7 |
| 2nd Unit of acute poisoning treatment | 858 | 27 | 3.1 | 853 | 23 | 2.7 | 834 | 28 | 3.4 | 788 | 34 | 4.3 |
| Mental health unit | 777 | 20 | 2.6 | 708 | 21 | 3.0 | 674 | 23 | 3.4 | 627 | 23 | 3.7 |
| Neurosurgical intensive care unit | 89 | 0 | 0.0 | 72 | 2 | 2.8 | 87 | 0 | 0.0 | 123 | 0 | 0.0 |
| Neurosurgery | 1,806 | 16 | 0.9 | 1,679 | 11 | 0.6 | 1,608 | 6 | 0.4 | 1,631 | 9 | 0.6 |
| Burn unit | 459 | 3 | 0.7 | 443 | 5 | 1.1 | 443 | 1 | 0.2 | 375 | 3 | 0.8 |
| Burn resuscitation | 312 | 6 | 1.9 | 283 | 6 | 2.1 | 269 | 4 | 1.7 | 306 | 3 | 1.0 |
| General intensive care unit | 1,165 | 20 | 1.7 | 1,050 | 15 | 1.4 | 1,209 | 13 | 1.1 | 1,218 | 22 | 1.8 |
| Surgical intensive care unit | 595 | 7 | 1.2 | 626 | 9 | 1.0 | 500 | 3 | 0.6 | 442 | 4 | 0.9 |
| Traumatology | 3,003 | 19 | 0.6 | 2,975 | 19 | 0.6 | 2,814 | 19 | 0.7 | 2,648 | 11 | 0.4 |
| Surgery | 4,807 | 32 | 0.7 | 4,377 | 32 | 0.7 | 4,314 | 26 | 0.6 | 4,260 | 22 | 0.5 |
| Cardiac resuscitation | 933 | 2 | 0.2 | 971 | 10 | 1.0 | 804 | 9 | 1.1 | 876 | 8 | 0.5 |
| Cardiology | 550 | 0 | 0.0 | 575 | 1 | 0.2 | 1,236 | 8 | 0.6 | 1,530 | 6 | 0.4 |
| Gynecology | 1,891 | 3 | 0.2 | 1,929 | 2 | 0.1 | 1,904 | 8 | 0.4 | 2,135 | 12 | 0.6 |
| Other units | 2,529 | 5 | 0.2 | 2,372 | 2 | 0.1 | 2,218 | 12 | 0.5 | 2,746 | 3 | 0.1 |
| **Total** | **23,154** | **273** | **1.2** | **21,995** | **284** | **1.3** | **21,919** | **311** | **1.4** | **22,619** | **325** | **1.4** |

***** NTP — the number of tested patients.

***Table 2*** *— Detection and admission profile of HIV-infected patients to N. V. Sklifosovsky Research Institute of Emergency Medicine, 2012–2015*

| Profile/year | 2012 | | | 2013 | | | 2014 | | | 2015 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *NTP | n | % | NTP | n | % | NTP | n | % | NTP | n | % |
| Toxicological resuscitation | 1,932 | 223 | 11.5 | 2,253 | 266 | 11.8 | 1,969 | 183 | 9.3 | 1,839 | 173 | 9.4 |
| 1st Unit of acute poisoning treatment | 1,320 | 31 | 2.3 | 1,408 | 27 | 1.9 | 1,471 | 32 | 2.2 | | | |
| 2nd Unit of acute poisoning treatment | 900 | 33 | 3.7 | 1,004 | 47 | 4.7 | 1,049 | 50 | 4.8 | 1,205** | 42** | 3.5** |
| Mental health unit | 609 | 31 | 5.1 | 591 | 16 | 2.7 | 622 | 20 | 3.2 | 841 | 33 | 3.9 |
| Neurosurgical intensive care unit | 134 | 3 | 2.2 | 65 | 0 | 0.0 | 77 | 0 | 0.0 | 129 | 4 | 3.1 |
| Neurosurgery | 1,544 | 9 | 0.6 | 1,717 | 9 | 0.5 | 1,438 | 5 | 0.3 | 1,572 | 3 | 0.2 |
| Burn unit | 439 | 5 | 1.1 | 429 | 5 | 1.2 | 413 | 10 | 2.4 | 411 | 4 | 1.0 |
| Burn resuscitation | 268 | 0 | 0.0 | 305 | 5 | 1.6 | 337 | 5 | 1.5 | 327 | 5 | 1.5 |
| General intensive care unit | 1,230 | 15 | 1.2 | 1,391 | 33 | 2.4 | 1,283 | 28 | 2.2 | 1,301 | 20 | 1.5 |
| Surgical intensive care unit | 500 | 3 | 0.6 | 543 | 8 | 1.5 | 503 | 8 | 1.6 | 633 | 10 | 1.6 |
| Traumatology | 1,730 | 9 | 0.5 | 2,157 | 12 | 0.6 | 2,569 | 17 | 0.7 | 2,928 | 18 | 0.6 |
| Surgery | 4,086 | 30 | 0.7 | 4,874 | 31 | 0.6 | 5,083 | 35 | 0.7 | 5,865 | 50 | 0.9 |
| Cardiac resuscitation | 925 | 4 | 0.4 | 1,172 | 7 | 0.6 | 1,197 | 10 | 0.8 | 1,181 | 8 | 0.7 |
| Cardiology | 1,371 | 3 | 0.2 | 1,627 | 3 | 0.2 | 1,676 | 4 | 0.2 | 1,610 | 2 | 0.1 |
| Gynecology | 2,093 | 7 | 0.3 | 2,461 | 5 | 0.2 | 2,672 | 8 | 0.3 | 2,829 | 12 | 0.4 |
| Other units | 4,563 | 13 | 0.3 | 5,484 | 15 | 0.3 | 5,798 | 20 | 0.3 | 5,111 | 26 | 0.5 |
| **Total** | **22,273** | **419** | **1.9** | **25,341** | **489** | **1.9** | **26,481** | **435** | **1.6** | **27,782** | **410** | **1.5** |

****** In 2015, the 1st and 2nd Units of acute poisoning were merged into the Department of acute poisoning treatment.

The detection of HIV infection varied significantly, depending on the specialization of the departments, and, consequently, the type of emergency medical care that the patients received. Among the departments in the intensive care unit, the highest rate of detection of HIV infection was recorded in the toxicology (4.8–11.8%), general care (1.1–2.4%), burn (0.0–2.1%) and cardiology (0.2–1.1%) intensive care units. Among the departments with a clinical specialization that reported the highest incidence rate were the 1st (1.5–2.4%) and 2nd departments for the treatment of acute poisonings in mental patients (DTAP) — 2.7–4.8%, the department of crisis states and psychosomatic disorders (further somatopsychiatry) — 2.6–5.1%, the departments of surgery (0.5–0.9%), traumatology (0.4–0.7%), and gynecology (0.1–0.6%) (Tables 1, 2). Particular attention should be paid to the fact that among the departments in the intensive care, the proportion of patients requiring toxicological resuscitation over various years accounted for 70 to 90% of all admissions of HIV-infected patients.

Based on the data on the number of admissions and the rates of detection of HIV infection in patients, the departments at SRIEM can be divided into several subgroups:

- With a high rate of detection of HIV with a statistically significant upward trend — toxicological resuscitation ($R^2$ = 0.51, ρ = 0.04), 2nd DTAP ($R^2$ = 0.77, ρ = 0.004).
- With a high rate of detection of HIV, which does not have a statistically significant upward trend — 1st DTAP, somatopsychiatry, burn unit, general, surgical, neurosurgical and burn resuscitation.
- With a low rate of detection of HIV, which has a statistically significant downward trend — department of neurosurgery ($R^2$ = 0.67, ρ = 0.01).
- With a rate of detection of HIV fluctuating within a relatively narrow range of values — cardiac resuscitation, surgery, traumatology, cardiology, and gynecology.

At SRIEM, there are thus distinct differences in the trends in the frequency of requires of patients with HIV for medical care, depending on the specialization of the EMSC unit. Among the patients of toxicological resuscitation, 2nd DTAP, somatopsychiatry, general and surgical resuscitation, there is an increase in the rate of detection and number of admissions of HIV-infected people. In the group of other specialized departments, on the contrary, there is either a decrease in or stabilization of the number and proportion of infected patients at the previous level. However, in the group of specialized departments with low rates of detection of HIV infection, for example, gynecology, there are also certain observations that, in our opinion, require changes in the approaches to organizing medical care for HIV-positive patients. This, in particular, concerns patients with complications of early pregnancy, especially with progressive uterine pregnancy and HIV infection, which account for more than 40% of HIV-positive patients with pregnancy complications. The prevention of vertical transmission of infection in this group of patients requires a comprehensive approach, aimed at advising patients and encouraging them to get treatment [15].

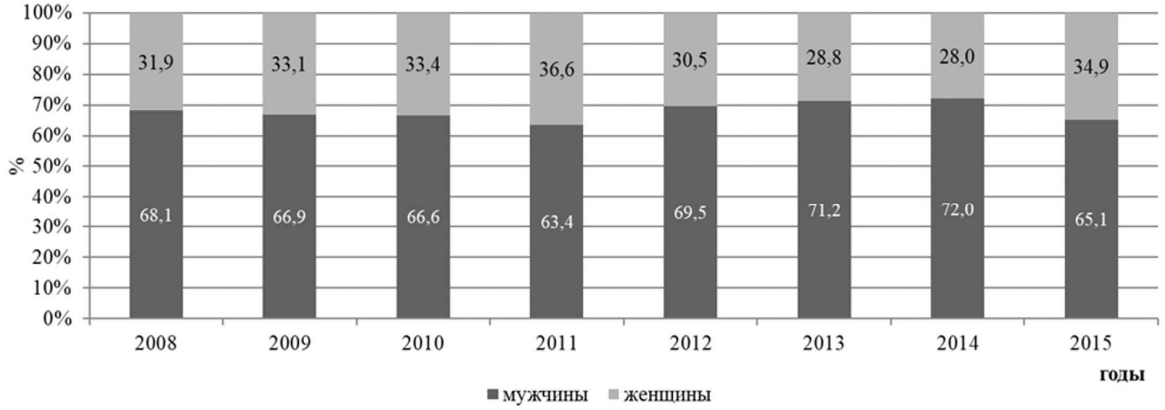


***Fig. 2** — The distribution of HIV-positive patients by gender for the period from 2008 to 2015*

We analyzed the age-gender characteristics of patients who require emergency and primary medical care who were admitted with HIV. Among this group of patients, the incidence of HIV infection in men exceeded the reported rates for women during the entire observation period ($p < 0.05$) (Tables 3, 4). At the same time, statistically significant tendencies of an increasing number of calls to the EMSC among both HIV-infected men ($R^2 = 0.63$, $p = 0.0188$) and women ($R^2 = 0.84$, $p = 0.0013$) were noted. However, over the course of seven years of observations, the proportion of hospitalized men affected by HIV declined from 68.1 to 65.1%, and women, on the contrary, increased from 31.9 to 34.9% (Fig. 2). The increase in the proportion of women was observed in all age groups: 18–30 — from 38.9 to 44.8%, 31–40 — from 24.7 to 29.6%, 41–50 — from 11.8 to 34.8%, 51–60 — from 0.0 to 44.5% and over 61 — from 33.3 to 66.7%, respectively (Table 5).

***Table 3*** — *The distribution of HIV-positive patients at N. V. Sklifosovsky Research Institute of Emergency Medicine in age groups by gender, 2008–2011, per cent*

| Age, gender/ year | 2008 | | | | 2009 | | | | 2010 | | | | 2011 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | male | | female | | male | | female | | male | | female | | male | | female | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 18–30 | 96 | 51.6 | 61 | 70.2 | 75 | 39.5 | 57 | 60.6 | 64 | 30.9 | 53 | 51.0 | 56 | 27.2 | 55 | 46.2 |
| 31–40 | 70 | 37.6 | 23 | 26.4 | 89 | 46.8 | 27 | 28.7 | 110 | 53.1 | 40 | 38.5 | 118 | 57.3 | 51 | 42.9 |
| 41–50 | 15 | 8.1 | 2 | 2.3 | 17 | 9.0 | 6 | 6.4 | 23 | 11.1 | 6 | 5.8 | 21 | 10.2 | 8 | 6.7 |
| 51–60 | 3 | 1.6 | 0 | 0.0 | 9 | 4.7 | 3 | 3.2 | 10 | 4.8 | 3 | 2.9 | 8 | 3.9 | 3 | 2.5 |
| > 61 | 2 | 1.1 | 1 | 1.1 | 0 | 0.0 | 1 | 1.1 | 0 | 0.0 | 2 | 1.9 | 3 | 1.5 | 2 | 1.7 |
| **Σ** | **186** | **100.0** | **87** | **100.0** | **190** | **100.0** | **94** | **100.0** | **207** | **100.0** | **104** | **100.0** | **206** | **100.0** | **119** | **100.0** |

***Table 4*** — *The distribution of HIV-positive patients at N. V. Sklifosovsky Research Institute of Emergency Medicine in age groups by gender, 2012–2015, per cent*

| Age, gender/ year | 2012 | | | | 2013 | | | | 2014 | | | | 2015 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | male | | female | | male | | female | | male | | female | | male | | female | |
| | n | % | n | % | n | % | n | % | n | % | n | % | n | % | n | % |
| 18–30 | 62 | 21.3 | 47 | 36.7 | 91 | 26.1 | 42 | 29.8 | 77 | 24.6 | 43 | 35.2 | 48 | 18.0 | 39 | 27.3 |
| 31–40 | 189 | 64.9 | 74 | 57.8 | 204 | 58.6 | 86 | 61.0 | 176 | 56.2 | 60 | 49.2 | 162 | 60.7 | 68 | 47.6 |
| 41–50 | 30 | 10.3 | 5 | 3.9 | 39 | 11.2 | 10 | 7.1 | 41 | 13.1 | 14 | 11.5 | 45 | 16.9 | 24 | 16.8 |
| 51–60 | 10 | 3.4 | 1 | 0.8 | 11 | 3.2 | 3 | 2.1 | 15 | 4.8 | 3 | 2.5 | 10 | 3.7 | 8 | 5.6 |
| > 61 | 0 | 0.0 | 1 | 0.8 | 3 | 0.9 | 0 | 0.0 | 4 | 1.3 | 2 | 1.6 | 2 | 0.7 | 4 | 2.8 |
| **Σ** | **291** | **100.0** | **128** | **100.0** | **348** | **100.0** | **141** | **100.0** | **313** | **100.0** | **122** | **100.0** | **267** | **100.0** | **143** | **100.0** |

***Table 5*** — *The share of HIV-infected men and women in patients of N. V. Sklifosovsky Research Institute of Emergency Medicine in different age groups, 2008–2015*

| Age | 2008 | | 2009 | | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | male | female | male | female | male | female | male | female | male | female | male | female | male | female | male | female |
| 18–30 | 61.1 | 38.9 | 56.8 | 43.2 | 54.7 | 45.3 | 50.5 | 49.5 | 56.9 | 43.1 | 68.4 | 31.6 | 64.2 | 35.8 | 55.2 | 44.8 |
| 31–40 | 75.3 | 24.7 | 76.7 | 23.3 | 73.3 | 26.7 | 69.8 | 30.2 | 71.8 | 28.2 | 70.3 | 29.7 | 74.6 | 25.4 | 70.4 | 29.6 |
| 41–50 | 88.2 | 11.8 | 73.9 | 26.1 | 79.3 | 20.7 | 72.4 | 27.6 | 85.7 | 14.3 | 79.6 | 20.4 | 74.5 | 25.5 | 65.2 | 34.8 |
| 51–60 | 100.0 | 0.0 | 75.0 | 25.0 | 76.9 | 23.1 | 72.7 | 27.3 | 90.9 | 9.1 | 78.6 | 21.4 | 83.3 | 16.7 | 55.5 | 44.5 |
| > 61 | 66.7 | 33.3 | 0.0 | 100.0 | 0.0 | 100.0 | 60.0 | 40.0 | 0.0 | 100.0 | 100.0 | 0.0 | 66.7 | 33.3 | 33.3 | 66.7 |

***Table 6*** — *The share of HIV-infected patients of N. V. Sklifosovsky Research Institute of Emergency Medicine in different age groups, 2008–2015*

| Age/years | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|
| 18–30 | 57.5 | 46.5 | 37.7 | 34.2 | 26.0 | 27.1 | 27.6 | 21.2 |
| 31–40 | 34.1 | 40.8 | 48.2 | 52.0 | 62.7 | 59.3 | 54.3 | 56.1 |
| 41–50 | 6.2 | 8.1 | 9.3 | 8.9 | 8.4 | 10.0 | 12.6 | 16.8 |
| 51–60 | 1.1 | 4.2 | 4.2 | 3.4 | 2.6 | 3.0 | 4.1 | 4.4 |
| > 61 | 1.1 | 0.4 | 0.6 | 1.5 | 0.3 | 0.6 | 1.4 | 1.5 |
| **Total** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** | **100.0** |

It should be noted that the maximum increase in the proportion of men among HIV-positive people (2012–2014) almost completely coincides with peaks of increase in the total number of people with HIV at time of admission and the rate of detection of HIV infection in the hospital.

The ranking of patients by age showed that the largest proportion of people affected by HIV infection was in the age groups of 18–30 and 31–40 (Table 6). It should be noted that in the 18–30 age group there was a decrease in the number of visits ($R^2 = 0.51$, $p = 0.04$), whereas in the age group of 31–40 ($R^2 = 0.71$, $p = 0.008$) and 41–50 ($R^2 = 0.89$, $p = 0.0004$), on the contrary, growth was recorded (Table 3, 4). It should be specially emphasized that the significant reason why the rate of detection of HIV infection in the EMSC in the 18–30 age group declined was mainly due to the sharp decrease in the number of infected women ($R^2 = 0.94$, $p < 0.0001$), which was not true of men ($R^2 = 0.17$, $p = 0.3$).

The detection of HIV in patients admitted to the intensive care units during the entire period of observation was higher than in the clinical units. Such differences, apparently, are due to the medical backgrounds and social characteristics of citizens. Most often, these are people who practice socially deviant behavior. The deviations from the accepted norms of behavior are associated in such contingents with an extremely high level of accidents, poisoning and injuries, including those resulting from the use of alcohol and PSs.

## Discussion

According to the UNAIDS report, Russia is among the top twenty countries in terms of the number of new HIV infections [1]. The key reasons for the worsening of the HIV epidemic in our country include the high level of drug use, active sexual transmission of the disease, and poor access to antiretroviral therapy within the affected population [16]. At present, in most of the federal subjects of the Russian Federation, the incidence of HIV infection has been increasing. In 2016, in five regions that make up the Ural Federal District, specialists of Rospotrebnadzor recorded that the HIV epidemic had spread from concentrated pockets to the general overall region [17]. At the same time, over the last ten years in Moscow, the incidence of HIV infection has stabilized. In 2014, this indicator was 3.8 times lower than the average for the Russian Federation [9].

The spread of HIV infection is significantly affected by the socio-economic conditions of life. When these conditions deteriorate, rates of drug addiction grow uncontrollably, alcoholism becomes widespread, and the behavioral habits of people and their socio-psychological health worsen. HIV-infected people need specialized psychological help, as they are often in a state of social maladjustment and are prone to suicide [18].

According to the Ministry of Internal Affairs of the Russian Federation, the kinds of PSs that have been seized and confiscated in Russia have changed [3, 19]. "Classic" opioid drugs, such as heroin, are being replaced by "designer" PSs, including synthetic cannabinoids, mephedrone, methylone, methylenedioxymethamphetamine, methylenedioxypyrovalerone, etc. [20]. It is often difficult for doctors to diagnose poisoning by such drugs because of similar clinical symptoms with general-somatic diseases as manifested in the cardiovascular and nervous systems [21]. Synthetic PSs have

a pronounced empathogenic effect. Their use provokes risky sexual behavior and greatly increases the risk of HIV transmission during sexual intercourse [22].

Often, the occurrence of serious injuries is due to the aberrant social behavior of people, which does not comply with officially established or actually established rules and norms in our society. This kind of behavior is regarded by sociologists as deviant (from the Latin *deviatio*) [23]. Persons with deviant behavior tend to engage in asocial (alcoholism, drug addiction, prostitution, vagrancy, disorderly conduct, etc.), and risky (engaging in sports with a high risk of injury, sexual perversions, etc.) behavior. Quite often deviant behavior is observed among people who come from a socially vulnerable part of the population. These features can usually be identified by analyzing the medical and social characteristics of the victims [14, 24]. Often, the injury can be attributed to chronic intoxication with alcohol and PSs as well as the presence of mental disorders [25]. Persons who are intoxicated or who suffer from alcoholism are at increased risk of victimization, i.e., they are more often victims of various crimes and traffic accidents [23].

According to S. F. Bagnenko, one third of the Russian population seeks emergency medical care for emergency situations each year; every tenth inpatient is admitted for emergency indications; more than 60% of those admitted for inpatient care require emergency care [26]. Multi-specialization hospitals that provide general care are increasingly becoming the institutions that provide the "first line" of diagnosis of HIV infection. In some patients, HIV infection is detected accidentally in the course of seeking emergency and primary specialized care [15, 27, 28].

HIV infection has a negative effect on the clinical course of physical illnesses and increases the length of stay in the hospital [29]. In HIV-infected people, complications often occur in the form of hospital-acquired pneumonia, recurrent purulent-inflammatory diseases and sepsis [30]. The frequency by which antibiotic-resistant isolates of opportunistic microorganisms are identified in patients with HIV is also significantly higher than in comparison groups [31].

Data on the rate of detection of HIV infection in patients in the clinical and emergency care departments of SRIEM reflect the changes that are occurring in the contingents at risk of being HIV-infected. On the one hand, we observed a stably high incidence of HIV infection in patients with poisonings with various causes. On the other hand, there have been changes in the kinds of patients who are admitted to SRIEM, mainly due to an increase in emergency and primary surgical pathology. This may be associated with worsening of the overall physical condition of patients compounded with progressive HIV infection.

It is necessary to pay attention to the steady trend towards an increase in the number of infected women entering the EMSC and their share among all admitted HIV-infected patients (feminization of the epidemic), as well as the dynamic spread of the virus among male and female patients in the age groups of 31–40 and 41–50.

The increased incidence of HIV infection in these age groups can occur due to both aging of PSs users and the active sexual transmission of the disease among different segments of the population of the megalopolis, as well as an increase in the life expectancy of HIV-infected citizens due to the effect of antiretroviral therapy.

The high rate of detection of HIV in the EMSC makes it possible to consider patients in need of emergency and primary care as a risk group for the spread of HIV infection related to the provision of medical care [32]. Urgent medical care for such patients is associated with a high risk of occupational exposure. According to the Federal Scientific and Methodological Center for AIDS Prevention and Control, in 2014 151 new cases of HIV infection among medical personnel were registered in the Russian Federation (code 115) [33]. Infection of medical personnel can occur during emergency situations because they are injured by piercing-cutting sharp medical tools as the result of the emergence of a complex clinical situation; a lack of time; long-term exposure to a large volume

of infected biological material; improper use of personal protective equipment by employees; non-observance of sanitary and epidemiological rules in the collection and disposal of medical waste; as well as the delayed performance of post-exposure measures to prevent infection [34, 35].

The treatment of diseases in patients with HIV infection requires a complex interdisciplinary approach. In this situation, it is extremely important to constantly enhance the professional knowledge of specialists who provide emergency and primary care to treat and diagnose patients with HIV while taking into account nosological features.

The study of the admissions trends for HIV-infected patients at the EMSC has broad epidemiological significance. It allows us to provide an objective evaluation of the prevalence of HIV infection and the specific features of emergency pathology among different segments of the population, especially in vulnerable and socially maladaptive population groups. Based on the data that has been obtained, it is possible to develop operational guidelines and technologies for providing emergency medical care to HIV-infected patients in the hospital. The revealed age-gender differences and the incidence of physical trauma of HIV-infected citizens require further study and analysis targeted at the development and implementation of programs for the prevention of the spread of HIV among different segments of the population.

## Conflict of Interests

The authors declare no conflict of interests.

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Article received on 26.03.2018
Accepted for publication on 21.05.2018