HEALTH MANAGEMENT POLICIES AIMED AT PREVENTING THE PROLIFERATION OF HBV, HCV AND HIV INFECTIONS IN EUROPE AND ROMANIA

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ABSTRACT: *The paper addresses the issue of global progresses in reducing viral hepatitis' and HIV's incidences, acknowledged as a top priority on the agenda of European health systems. Starting from the data provided by the Surveillance Atlas of Infectious Diseases, we have analysed Pearson correlations among the HVB, HVC and HIV infection rates per 100,000 inhabitants. Thus, we have identified two significant correlations: the first one was established between HIV infection rate and HVC infection rate, while the second association had relevance for the relationship between the HVB infection rate and the HVC infection rate. The amount of experience accumulated at an international level has shown that HVB, HVC and HIV infections should be handled efficiently through: early detecting of positive individuals; maintaining contact with risk groups and providing proper counselling services; implementing treatments that determine, on a long term, the decrease of the number of illnesses; increasing patients' life quality etc.*

KEY WORDS: *the prevalence of HVB, HVC and HIV viruses; the incidence of HVB, HVC and HIV infections; HVB, HVC and HIV infection rates per 100,000 inhabitants; the Pearson correlation coefficient; health management policies; risk/vulnerable groups; screening programs.*

JEL CLASSIFICATIONS: *H00; I00, M00.*

1. INTRODUCTION

The beginning of shedding light on hepatitis and HIV cases, on the extent of their spreading, on their treatment and palliation is rooted in the relatively recent history of mankind. The mentioning of an "inoculation jaundice" spread in the harbours of Bremen, in 1885, among the dock workers who were vaccinated against smallpox, opens the path to identifying virus B. The identification occurs in the case of

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the solders belonging to the American and British armies, in 1942, when the hepatitis epidemics was triggered by the vaccination against yellow fever as individual sterile syringes were not in use at the time. (Faria et al., 2014). Hepatitis C was confirmed as a variant in itself in April 1989, in Science Magazine (Faria et al., 2002). As far as HIV is concerned, the homosexual minority in the cities of New York and Los Angeles represented, in 1979, the starting point for several studies. In 1983, both in France and in the United States of America, they identified the virus displaying a tropism on the T lymphocyte, called HIV, and linked to AIDS (Faria et al., 2014).

Being aware of the prevalence of these viruses in the present-day population acquires a growing importance with the opening of the borders and the easy migration worldwide. One may talk about an "import" of illnesses, about the difficulty of geographically limiting a possible subtype as well as about the more and more difficult controlling of the infected population.

The sexual revolution of the 20th century brought a quicker transmissibility of these illnesses and an increase of the number of individuals infected, yet asymptomatic, who might increase exponentially the population incidence. At the moment when the number of infected individuals' increases, the protection means available for those exerting professions that might determine new propagation paths of the virus (medicine, stomatology, cosmetics, etc.) should largely focus on sanitizing medical stuff, on anamnesis and a steadily awareness for optimizing the means of prevention.

Identifying the prevalence of these infections at the level of small communities may help responsible authorities to implement education and protection methods owing to a better knowledge of infections' distribution in accordance to age and sex categories, while employing proper communication and information means. Furthermore, such an identifying becomes part of a larger perspective, both national and international, and, owing to such statistics, specialists are able to know the exact situation and to estimate the impact of the infections as compared with other similar researches, with a view to providing an optimal use of the medical, public health, educational, media, etc. resources during the process of disease control.

2. VHB, VHC AND HIV INCIDENCE IN EUROPE AND ROMANIA

In accordance to the data displayed mid-2018 by TESSy, there were 26,907 cases of HVB infections reported at the level of the 30 states members of the EU (European Union /EEA (European Economic Area) for 2017, meaning an incidence raw rate of 6.7 cases per 100,000 inhabitants. From the total amount of these cases, only 9% represented cases of acute illnesses, while 58% were associated to the chronic form of the illness and 32 % represented cases reported as unknown. In comparison with the previous years, these statistic data show a decreasing trend of the incidence of acute cases versus chronic cases, an aspect that is in accordance to the tendencies manifested worldwide and that might have been determined by the positive outcomes registered as a result of the implementation of a series of national vaccination strategies at a European level. As far as the distribution of the cases depending on age groups is concerned, the most affected group is that of the individuals ranging between 25 and 34 years old, which represented about 30 % of the cases registered in Europe.

Moreover, the incidence was higher in the case of men, the ratio between the cases in men and the cases in women representing 1.6 against 1. Besides, based on the estimations made by ECDC, the prevalence of HVB in the EU/EEA represents about 0.9%, as compared to 1.1% HVC (National Institute of Public Health, 2019).

As far as the incidence of HVC is concerned, the same data basis shows the fact that, at the European level, 31,273 HVC cases were registered, displaying an incidence raw rate of 7.3 cases per 100,000 inhabitants. From these cases, only 3% (that is 861) were reported as acute, 22% (6,805) were chronic cases, and for 75% (23,311 cases) classification was not known. Also in the case of HVC, the young age groups are more strongly affected: 49% of the total number of cases represents individuals between 25 and 44 years old, while 6% of the cases represented individuals under 25 years old.

The analysis of the statistical data regarding HVC should, nonetheless, be made with caution as there are still a series of incongruences among the national surveillance systems as well as a series of ambiguities concerning the classification of the cases reported as acute or chronic. Considering, as is known, the fact that hepatitis C is an asymptomatic illness until its advanced evolution stages, surveillance relying on notification thresholds is difficult and the data systematised at the level of various states rather show testing practices than the manifestation of the illness in its initial forms (National Institute of Public Health, 2019).

In accordance to Decision no. 1082/2013/EU of the European Parliament and Council regarding the serious health cross-border threatening, the European network for epidemiological surveillance and control of transmissible illnesses has been strengthened. Romania observed this demand so that a *National Centre for the Surveillance and Control of Transmissible Diseases (NCSCTD)* operates in our country, displaying clearly defined responsibilities in the field. In accordance, based on the data provided by NCSCTD, in Romania, during 2018, the national surveillance system for HVB and HVC registered 241 new cases, which shows a slight increase (only 3 cases) in comparison with the previous year (in 2017, our country registered a total number of 238 cases). 28% of hepatitis B cases ranged in the age group 35-44 years old, while the specific incidence according to gender represented 2.5 ‰ in the case of women and 4.6 ‰ in the case of men. As far as HVC is concerned, the most significant values of the incidence rates belonged to the age group 55-64 years old in the case of women (1 ‰), and the age group 35-44 years old in the case of men (0.7 ‰). The specific incidence rate according to gender was equal in the case of female patients and male patients (0.4 ‰) (National Institute of Public Health & National Centre for the Surveillance and Control of Transmissible Diseases, 2018).

The dynamics of the incidence of HVB and HVC in Romania, during the period 2006-2018, is synthetically displayed by the graph in Figure 4. The analysis of the statistical data displayed by this figure enables the emphasizing of a significant downward trend of the incidence of HVB; in the case of HVC, variations oscillate during the analysed interval. Nonetheless, despite certain conjectural increases/decreases of the incidence rate, one may observe a reduction of more than 25% of the rate in 2018 as compared with the rate registered in 2006.

As can be seen, the rate of HVB incidence in Romania, in 2018, displayed a decreased level in comparison to the notification rate for 2017 at the level of the EU/EEA (6.7%000). Furthermore, the incidence of HVC is much lower as compared to the average registered at a European level (7.3%000). Nevertheless, epidemiological researches made during the period 2006-2017 in Romania showed high rates of the prevalence of HVB and HVC infection in the adult population of our country (these rates ranged between 3.2% and 5.1%, depending on the analysed samples and are higher in the countryside) (Romanian Ministry of Health, 2017).

As far as the situation of HIV/AIDS infections in Europe is concerned, let's mention the fact that the European Region of WHO remained, during the last years, the only geographic area where the number of new cases of HIV infections have displayed an upward trend. No less than 2.4 million HIV-infected individuals live in this area. In accordance to the data provided by TESSy, in the EU/EEA, a total number of 25,353 HIV cases were reported in 2017, by 31 countries; the incidence rate of the cases per 100,000 individuals represented 6.2%0000. A similar amount, of about 75% of these cases, was registered among men, while, among women, an amount of 25 % of the cases was registered (National Institute of Public Health & National Centre for the Surveillance and Control of Transmissible Diseases, 2018). About 75% of the total number of HIV-infected individuals in Europe is also chronically infected with VHC. The most exposed groups at being infected and manifesting co-infection risks are the injectable drug users as well as the men who have sexual intercourse with other men.
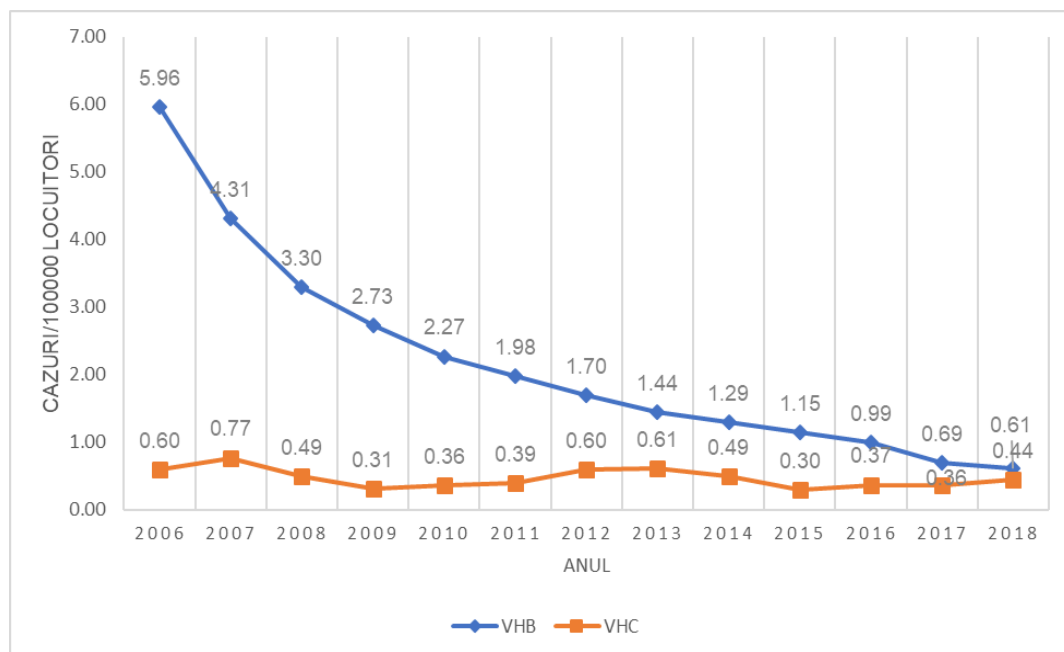

Source: National Institute of Public Health & National Centre for the Surveillance and Control of Transmissible Diseases, 2018

Figure 1. Dynamics of HVB and HVC incidence, in Romania, between 2006 and 2018

The documentary research of a series of reports issued at a national level and regarding the incidence and evolution of the HIV/AIDS infections in Romania showed a similar distribution of the cases depending on gender: 74% of the cases registered during the period 1985-2018, in Romania, occurred among male individuals (Romanian Government, 2019).

The lowest values of HIV incidence rate in the EU/EEA – under 2 ‰000 – were registered in Slovakia and Slovenia. Romania ranged within the category of the low rate HIV infection incidence, between 2 ‰000 and 5 ‰000 (for Romania, the value of this rate represented 3.3 ‰000). To the same category of low HIV infection incidence, in 2017, the following European countries ranged: Norway, Sweden, Finland, Denmark, Nederland, Poland, Austria, Czech Republic, Hungary, Croatia and Bulgaria. Higher rates of HIV infection, ranging between 5 ‰000 and 10 ‰000 were reported in the following states: France, Spain, Belgium, Italy, Greece, Great Britain and Island. The European countries that registered extremely high rates (ranging between 10 ‰000 and 15 ‰000) of HIV infection were Ireland, Portugal and Lithuania. Alarming values of HIV infection, over 15 ‰000, were registered in Estonia and Latvia as well.

Figure 2 displays the evolution of HIV incidence rates in Romania and EU/EEA. One may notice that the rate of new HIV cases registered in Romania is constantly below the average registered at a European level during the period 2008-2017.
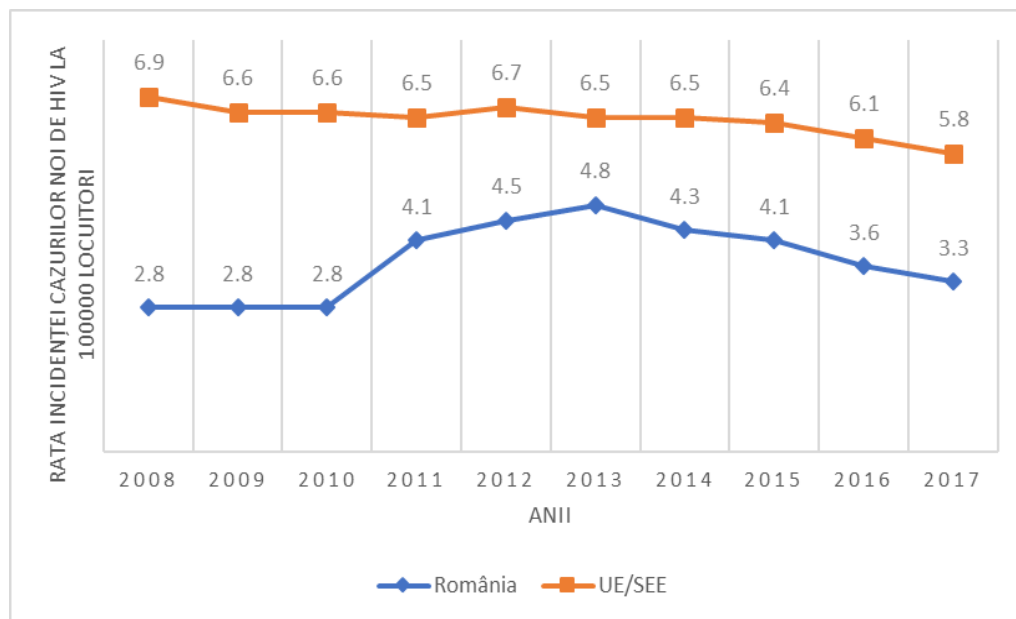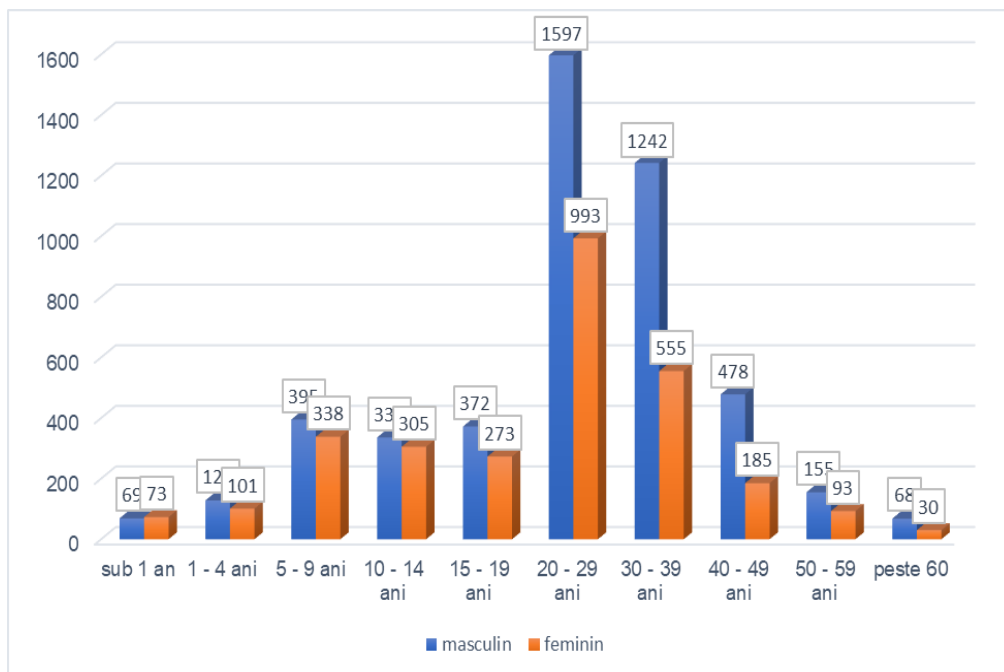

Source: Romanian Government, 2019

Figure 2. New HIV cases/100.000 inhabitants diagnosed in Romanian vs. EU/EEA, during the period 2008-2017

HIV/AIDS prevalence among the adults in Romania ranges under 0.1%; nonetheless, there are certain risk groups in the case of which prevalence is much higher: men who have intercourse with other men – 18%, users of injectable drugs – 11. 2% and those who resort to commercial sex (PPSC) – 1%. A large number of individuals in penitentiaries also caught HIV/AIDS infection (312 cases in 2016).

The gender and age distribution of HIV cases in Romania, during the period 1992-2017, is displayed in detail by Figure 3.

During this period, 62.16% of the total number of reported cases was registered among male individuals, while 37.83% was registered among female individuals. The most affected age groups were the following ones: the group of individuals between 20 and 29 years old (having registered 33.26% of the total number of reported cases) and the group of individuals between 30-39 years old (representing 23% of the total number of cases).

Source: Romanian Government, 2019

Figure 3. Gender and age distribution of HIV cases in Romania during the period 1992-2017

3. ANALYSIS OF THE CORRELATION AMONG HVB, HVC AND HIV INFECTION RATES PER 100,000 INHABITANTS

In paragraph 3 we are going to use Pearson coefficient with a view to study the connections among the infection rates corresponding to HVB, HVC and HIV at a European level.

Pearson correlation coefficient enables both the identifying of a lineal connection between two numeric variables and the quantifying of the intensity of this interdependence. The calculation relation employed for determining the correlation coefficient is the following one:

$$r = \frac{\sum (x_i - \overline{X})(y_i - \overline{Y})}{\sqrt{(\sum (x_i - \overline{X})^2)(\sum (y_i - \overline{Y})^2)}} \tag{1}$$

where: x_i – individual values of dependent variable x; y_i – individual values of independent variable y; $\overline{X}$ - arithmetic mean of all values x; $\overline{Y}$ - arithmetic mean of y values.

The values of the correlation coefficient range within the interval [-1;+1], where the following elements are of a remarkable relevance:

- $r = 1$ shows a perfectly positive correlation between variables x and y, and their variation occurs in the same direction (the increase/decrease of variable y entails the increase/decrease of variable x);
- $r = 0$ shows the absence of a connection between variables x and y analysed;
- $r = -1$ shows a perfectly negative correlation between variables x and y, within which their variation occurs in the opposite direction (the increase of variable y determines the decrease of variable x, while the decrease of variable y determines the increase of variable x).

Specialized studies display several interpretative tables of the intensity of the correlation among the variables analysed in accordance to Pearson correlation coefficient. One of the mostly used tables is Hopkins approach (Table 1):

Table 1. Interpretation of the values of coefficient *r* (in accordance to Hopkins)

Values of correlation coefficient	Descriptor
0←0.1	Very low, insignificant, non-substantial
0.1↔0.3	Low, minor
0.3↔0.5	Moderate, average
0.5↔0.7	High, increase, major
0.7↔0.9	Very high, very increased
0.9→1	Almost perfect

Source: Noaghi, S., Dura, C., Elemente de statistică aplicată, Editura Risoprint, Cluj-Napoca, 2018

Starting from the statistical data provided at a European level by the *Surveillance Atlas of Infectious Diseases*, we have operated Pearson correlation among the HVB, HVC and HIV infection rates per 100,000 inhabitants.

SPSS software generated Table 2 for the analysis of the connections among the HVB, HVC and HIV infection rates at a European level.

In accordance, we have identified a first correlation, statistically significant, between HIV infection rate and HVC infection rate; consequently, the value of Pearson coefficient (0.669) shows a moderate correlation in this case. There is also a relevant

association between the HVB infection rate and the HVC infection rate, relying on the value, almost similarly high, of the correlation coefficient: 0.649.

Table 2. Correlation among the infection rates corresponding to HVB, HVC and HIV at a European level

		HIV rate per 100,000 inhabitants	HVB rate per 100,000 inhabitants	HVC rate per 100,000 inhabitants
HIV rate per 100,000 inhabitants	Pearson Correlation	1	.143	.669[**]
	Sig. (2-tailed)		.444	.000
	N	31	31	31
HVB rate per 100,000 inhabitants	Pearson Correlation	.143	1	.649[**]
	Sig. (2-tailed)	.444		.000
	N	31	31	31
HVC rate per 100,000 inhabitants	Pearson Correlation	.669[**]	.649[**]	1
	Sig. (2-tailed)	.000	.000	
	N	31	31	31

Note: Correlation is significant at 0.01 level (2-tailed).

4. HEALTH MANAGEMENT POLICIES FOR DECREASING THE IMPACT OF INFECTIOUS DISEASES UPON POPULATION'S HEALTH

The analysis of the statistical data published at a national and European level and regarding the incidence of the infection with the three analysed viruses among the population shows the following aspects:
- ✓ At a European level, the issue of eliminating viral hepatitis that threatens public health should be focused upon, during the next years, as it is a priority on the agenda of European health systems. Exhibiting *raw rates of incidence ranging between 6.7 and 7.3 cases per 100,000 inhabitants, HVB and HVC viral hepatitis affects male individuals to a larger extent* (the ratio between the number of cases among men and the number of cases among women is 1.6 vs. 1, in the case of HVB) and *the individuals belonging to younger age categories: 24-44 years old.* Under such circumstances, the states members of WHO should conceive specific plans focused on significantly decreasing morbidity and mortality due to the spreading of viral hepatitis, targeting the groups mostly exposed to the disease risks;
- ✓ In accordance to the data provided by *NCSCTD* in Romania and transmitted to the European Centre for Diseases Control (ECDC), *the incidence rates of HVB and HVC hepatitis in 2018 showed significantly decreased levels as compared to the notification rates in 2017 at the level of the EU/EEA.* Despite such a

fact, the *National Plan Regarding the Control of Viral Hepatitis in Romania during the period 2018-2020* shows an *increased prevalence of HVB and HVC infections (between 3% and 5%),* especially in the case of rural population. Furthermore, as the Plan stipulates and due to the fact that the number of chronic hepatitis cases reported in the informatics system implemented at a national level is very low, it is possible that the table of the incidence of HVB and HVC in Romania is an incomplete one. In accordance, with a view to increase the knowledge decisional factors own regarding the infections and the designing and implementing of efficient intervention measures*, an important role should be played by screening programs,* which enable a gradual approach and access to a proper treatment for those individuals who are HVB and HVC carriers;

✓ Despite the fact that the last decades have witnessed an important quantitative leap in the knowledge of the factors that determine the spreading of HIV/AIDS infection and in the practical action instruments, *HIV fighting is still a major public health issue in the European area of WHO.* Although the epidemic has shown signs of decrease during the last years, there are still states displaying incidence rates higher than 10%000: Estonia, Latvia, Ireland, Portugal and Lithuania. As far as the gender distribution of the analysed cases is concerned, statistic data showed that *about 75% of these cases were registered among men, while only 25% were registered among women.* The situation might be explained due to the *population groups vulnerable to this epidemic that mainly include male individuals:* injectable drug users, men having intercourse with other men, detainees, migrants, transgender, etc.;

✓ Although *Romania ranges among the European states that display decreased incidence rates of HIV infection* (3.3% in 2017), our country also include risk groups for which prevalence is quite high: *men who have intercourse with other men – 18%, injectable drug users – 11.2%,* individuals who resort to commercial sex – 1% and detainees – 0.2%. This is the reason why, in 2019, they elaborated and started implementing the *National Plan for the Surveillance, Control and Prevention of HIV/AIDS infection cases during the period 2019-2021.* The main health objective that represents the core of the strategic plan previously mentioned is the *preserving of the country's profile displaying a decreased HIV incidence and the targeting of vulnerable groups with a view to decrease infection risks* through intervention measures adapted to their characteristics;

✓ Pearson correlation resulting owing to the informatics software SPSS when using HVB, HVC and HIV infection rates, published at a European level, displayed *significant associations both between HIV infection rate and HVC infection rate per 100,000 inhabitants, and between HVB infection rate and HVC infection rate per 100,000 inhabitants.* As far as the first correlation is concerned, it might be explained owing to the fact that, in accordance to the data provided by the National Institute of Public Health in Romania*, about 75% of the total number of HIV-infected individuals in Europe is also chronically infected with HVC.* For instance, injectable drug users represent a

high-risk group possibly getting both viruses: HIV and HVC (it is well-known that in the case of HVC the main channel for transmission is blood). The correlation between *HVB infection rate and HVC infection rate per 100,000 inhabitants* shows the co-infection with the two viruses that might come out as a HVC acute infection or as a HVC and HVB simultaneous infection.

5. CONCLUSION

The section synthetizing conclusions should obviously emphasize the importance of early diagnosis and prevention of the illnesses determined by HVB, HVC and HIV in close connection with the results of the statistical analyses carried out in paragraph 3. Chronic hepatitis B and C are infectious illnesses whose worsening might determine serious hepatic lesions, cancer and the premature death of the patients.

The statistic studies and researches that substantiated this study showed the fact that hepatitis B and C are often asymptomatic illnesses that affect vulnerable population groups: injectable drug users, detainees, men having intercourse with other men, HIV/AIDS individuals, and migrants. It is estimated that more than 300 million people live worldwide not knowing that they are HVB/HVC-infected. In accordance, about 90% of the individuals that are HVB-infected worldwide and 80% of those who got HVC did not resort to screenings and do not know that they are virus carriers; consequently, they are not at all aware of the risks that come out of this condition: possibility of developing lethal hepatic illnesses or liver cancer as well as the possibility of transmitting involuntarily the infection to other individuals they have contact with. As far as HIV/AIDS infection is concerned, the consequences for untraced patients are similarly grim: occurrence of opportunistic infections, increased exposure to various forms of cancer, progressive destruction of the body's immune system, etc. WHO estimates that, worldwide, about 50% of the HIV-infected individuals do not know they are seropositive, while among vulnerable groups, the access to voluntary screening and medical counselling services is even lower.

In Romania, in accordance to the *National Plan for the Surveillance, Control and Prevention of HIV/AIDS infection cases during the period 2019-2021*, HIV testing is approached as a the "gateway to treatment". This Plan recommends the increase of the capacity for free HIV testing (no matter if the presumed infected individual owns or does not own a medical insurance) through fixed diagnosis centres, mobile units or even self-testing methods. HIV self-testing, a more recent screening method, will determine, in accordance to WHO, the significant increase of the number of individuals that benefit from HIV testing as it removes stigmatizing and discriminations the seropositive individuals belonging to vulnerable groups have to face.

Furthermore, the first objective of the *National Plan Regarding the Control of Viral Hepatitis in Romania during the period 2018-2030*, is the implementation of a series of systematic measures and campaigns for the screening of HVB and HVC-infected individuals, where important steps have already been taken. In accordance, they elaborated and implemented the *Methodology for the surveillance of HVB and HVC*, having as a main purpose the monitoring of the dynamics that regulate the evolution of HVB and HVC in Romania, while *Ag HVBs testing and Ac anti-HVC*

have been included in the list of free medical investigations that may be recommended by family doctors. This is about those circumstances when it is necessary to evaluate the risks of infection in the case of asymptomatic adults over 40 who have been exposed to specific risk factors (they are contacts of infected individuals, they underwent surgeries or blood transfusions, use injectable drugs, etc.). It is known that this population group still includes a significant number of individuals who do not own health insurance and, consequently, cannot have access to the screening tests paid by CNAS.

With these in view, we consider that the implemented measure represents a major step forward in the development of the prevention strategies capable of contributing to the decrease of the incidence rates of these infectious illnesses. Further, the strengthening of the screening methods and the carrying out of vast awareness campaigns represent a course of action, which, besides the other measures adopted in the field of complementary treatments and services, are able to minimize the magnitude of viral hepatitis and HIV infections as issues of public health

To conclude, the experience already accumulated at an international level has shown that, although HVB, HVC and HIV infections represent an extremely important health threatening, they can and should be handled efficiently through: early detecting positive individuals; maintaining contact with vulnerable groups and providing proper counselling services; implementing treatment and care schemes that determine, on a long term, the decrease of the number of illnesses; increasing patients' life quality; decreasing the costs of health care incumbent upon the entire society (Romanian Health Ministry, 2017, 2018).

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