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Knowledge, Attitudes, and Practices of Health-Care Workers about Viral Hepatitis B and C in South Kivu

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Abstract. Health-care workers (HCWs) are at risk of infections associated with accidental exposure to blood, including viral hepatitis B (HBV) and C (HCV). A survey using a questionnaire was conducted on 250 HCW in Bukavu, an eastern town of the Democratic Republic of Congo, to analyze their attitude and knowledge about these two viruses. A response rate of 86.8% (217/250) was obtained. The mean age of the respondents was 39.6 ± 9.8 years, in majority from paramedical staff (66.4%) and with more than 5 years of professional experience (60.8%). The mean proportion of adequate answers on HBV and HCV was 33.2% (±11%) and 30.6% (±7%), respectively. Ninety-three HCW (42.8%) reported recent experience of blood exposure accident, more frequently among the paramedical staff (50%) than physicians (28.8%; $P = 0.002$). This was mainly related to inadequate protection resources (76.9%). Among all participants, only 24.4% had a history of at least one injection of HBV vaccine; this was more frequently found among physicians than among paramedical staff (49.3% versus 11.8%; $P < 0.001$). Moreover, only 3.8% of vaccinated HCW received the complete vaccination schedule of three vaccine doses. The efficiency of this vaccine is not well recognized by HCW, and the majority of them seemed to be more worried about the risk of infection by human immunodeficiency virus than by viral hepatitis. Our study reveals that the level of knowledge about HBV and HCV is rather low among HCW in Bukavu.

INTRODUCTION

Viral hepatitis B and C remain a major public health problem in developing countries where the prevalence of these viruses is high. In 2011 and according to a World Health Organization (WHO) estimate, about 2 billion people were infected with hepatitis B virus (HBV) including 370 million HBV chronic carriers, whereas nearly 200 million people were infected by hepatitis C virus (HCV).[1–3]

Both conditions have variable distribution throughout the world, sub-Saharan Africa remaining one of the most affected area.[2]

Education of health-care workers (HCW) who are at the forefront of the fight against these viral diseases is sometimes forgotten. For example, occupational exposures from percutaneous injuries remain a substantial source of viral hepatitis infections among them.[4,5] So, physicians, nurses and laboratory technicians are exposed to risks of contamination due to hazardous contacts with fluids from infected patients or needle stick through percutaneous injuries.

In developed countries, preventive measures have contributed to a very significant reduction in the incidence of these infections associated with accidental exposure to blood.[6,7]

Although vaccination against hepatitis B is widely available, the coverage is not optimal in many countries. Moreover, preventive measures against accidental exposure to blood products in those countries are not always adequately applied.[4]

Several studies have shown that a better knowledge of HBV and HCV infections could positively influence the preventive attitude toward these viruses (vaccination, wearing gloves, and other universal precautions against biological fluids). Optimization of practitioners' knowledge remains an essential goal in the fight against these diseases.[5,6]

In the Democratic Republic of Congo (DRC), a country where the health and educational systems have been disrupted because of multiple sociopolitical instabilities and where the prevalence of HBV and HCV infections is among the highest in the world, the overall risk of infection in HCW is poorly known.

In a recent study evaluating the level of knowledge, attitudes, and practices of HCW regarding blood transfusion in South Kivu (DRC), 54.4% of them reported to have a recent experience of accidental exposure to blood. The level of knowledge observed was globally low concerning blood safety and basics about blood-borne pathogens.[8]

The aim of this study was to assess the level of knowledge, attitudes, and practices of HCW toward HBV and HCV in Bukavu, an eastern town of DRC.

METHODS

Study design and population of study. This was a multicentric cross-sectional study conducted in three hospitals in Bukavu (Hopital Provincial General de Reference of Bukavu, Hopital General de Reference of Panzi, and Hopital General de Reference of Bagira) in 2014. These three hospitals are the most important ones in Bukavu and include the majority of health-care staff working ($N = 358$; 117 physicians and 241 nurses or laboratory technicians) in Bukavu, the capital of South Kivu Province. The survey consisted of self-administered questionnaires.

Sampling recruitment. Using each hospital data, a proportionate sample was established taking into account the respective size of employees and each professional category (specialists, general practitioners (GP), nurses, and laboratory technicians). Individuals were randomly selected during the survey. Six subjects declined their participation to the survey and were randomly replaced by other colleagues from the same category.

The minimum calculated sample size was 202 subjects taking into account the formula sampling and a probability

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of 15.5%. This fixed probability was based on the level of knowledge of medical staff on blood transfusion as reported in the study of Kabinda and others.[8] To increase the power of the study, the sample size was fixed to 250. A total of 217 filled questionnaires with complete answers were returned (86.8% of response rate).

Questionnaire. The questionnaire included a series of items divided into four sections (Supplemental Appendix):

- Sociodemographic and professional parameters: age, gender, marital status, education level, socio-professional categories, years of professional experience.
- Knowledge assessment: prevalence, transmission routes, tools of diagnosis, complications, preventive measures, and treatment. This part contained six questions on HBV and HCV, respectively. There was a possibility of a total of 12 correct answers for HBV and nine answers for HCV. The respective proportion of good answers was reported in percentage.
- Individual characteristics and attitudes on the risk of infection: vaccination status, risk of exposure to blood accidents.
- Global attitudes and practices evaluation toward blood exposure accidents.

The study was approved by the faculty of Medicine of the Catholic University of Bukavu and respective administrations also gave approval for the conduct of our study in their hospital. Informed consent was obtained from all participants before the survey.

Statistical analysis. Analyses were made using the STATA 11.2 (StataCorp, College Station, TX) software and SPSS 17 (SPSS Inc., Chicago, IL). Continuous and qualitative variables were reported as mean ± standard deviation and number (frequencies and/or proportions). The analysis of variance test was used to compare continuous variables and χ^2 test for qualitative variables. The significance level of $P < 0.05$ was used for all analyses.

RESULTS

General characteristics of the study population. The mean age of respondents was 39.6 ± 9.8 years, with 60.4% male and 84.3% married people. As shown in Tables 1 and 2, paramedical staff (nurses and laboratory technicians) was the most important group with 66.4% of the respondents, and the majority of all participants had more than 5 years of professional experience (60.8%).

HCWs' knowledge about hepatitis B and C and main blood-borne diseases. The mean proportion of correct answers on HBV and HCV basic knowledge was 33.2% (±20%) and 30.6% (±19%), respectively. There was no statistically significant difference in knowledge regarding participants' age, gender, marital status, and years of professional experience ($P > 0.05$). However, there was a statistically significant difference in knowledge scores between professional categories. Specialists had the highest number of correct answers regarding these two viruses (Table 1).

No difference was observed between groups of items associated with the level of knowledge about HBV and HCV, except answers linked to treatment, of which the rate of correct answers was significantly higher for HBV ($P < 0.05$).

HCWs' practices after blood exposure accidents. Table 3 shows the frequencies of answers to questions based on the staff's practices toward viral hepatitis and blood exposure accidents. It appeared that blood products are the most frequent possible sources of contamination in practice with globally 95.4% (207) of reports. Out of all participants, 93 HCW (42.8%) experienced a blood exposure accident during the last 6 months. This was more frequently observed among the paramedical staff (50%) than the physicians (28.8%) ($P = 0.002$).

After blood exposure accident, local disinfection was the most frequent immediate reaction (79.5%). Human immunodeficiency virus (HIV) serological status of the involved subject was also more frequently assessed than HBV and HCV status (68.8% versus 10.7% of case). Only six of 93 victims of blood exposure accident have been reported to authorities. It must be outlined that no physician reported such an event to authorities.

Of all participants, only 24.4% had a history of vaccination against HBV. This vaccination was more frequently found among physicians than paramedical staff (49.3% versus 11.8%) ($P < 0.001$). However, only 3.8% of vaccinated

TABLE 1
Health-care workers' knowledge in association with sociodemographic characteristics

Variable	*n* (%)	Mean % of correct answers (hepatitis B)	*P* value	Mean % of correct answers (hepatitis C)	*P* value
Age (years)					
≤ 40	112 (56.2)	33.4 ± 20	0.417	29.7 ± 18	0.618
> 40	95 (43.8)	32.3 ± 21		31.9 ± 19	
Gender					
Male	131 (60.4)	32.8 ± 15		31.3 ± 15	
Female	86 (39.6)	33.3 ± 15	0.548	29.5 ± 13	0.718
Marital status					
Married	183 (84.3)	33.4 ± 15		30.1 ± 15	
Unmarried	34 (15.7)	30.9 ± 15	0.293	33.3 ± 11	0.624
Professional groups					
Specialists	19 (8.7)	38.1 ± 14		39.1 ± 15	
GP	54 (24.9)	32.3 ± 14	0.042	33.1 ± 13	0.046
Nurses	121 (55.8)	29.9 ± 15		28.9 ± 15	
Technicians	23 (10.6)	29.7 ± 12		27.9 ± 14	
Years of professional experience					
≤ 5	85 (39.2)	36.7 ± 15		27.3 ± 15	
6–10	61 (28.1)	30.6 ± 12	0.431	31.0 ± 17	0.705
> 10	71 (32.7)	32.0 ± 14		27.3 ± 15	
Global mean %		33.2 ± 20		30.6 ± 19	0.731

TABLE 2
Proportion of correct answers about basic knowledge of viral hepatitis B and C

Variables	Proportion of good answers		*P* value
	HBV (%)	HCV (%)	
Prevalence	14.7	18.6	0.276
Transmission routes	32.7	32.4	0.947
Tools of diagnosis	29.4	29.0	0.927
Prevention	22.1	21.1	0.800
Complications	42.2	40.2	0.672
Treatment	58.6	42.5	< 0.001

participants completed the administration of three vaccination doses. Among vaccinated participants, no one had checked hepatitis B surface antibody levels after the vaccination schedule (not represented in any table).

HCWs' attitudes toward blood exposure accidents. Table 4 shows the frequencies of answers to questions on HCW attitudes toward blood exposure accidents. For the majority of participants, blood exposure accidents were mainly due to inadequate protection resources (76.9%). About blood-borne infections, participants seemed to be less aware about hepatitis virus risks compared with HIV. The majority of them thought that risks of viral contamination after blood exposure accidents were more related to HIV than HBV and HCV (91.7%). Only 67.3% of participants believed that HBV vaccination should be compulsory and only 60.8% agreed for a systematic screening of pregnant women. Less than half of participants (44.2%) were informed of the existence of a postexpositional program in their respective hospitals.

DISCUSSION

We present here the results of a study in a sample of HCWs in Bukavu. The aim of this study was to assess their level of knowledge, attitudes, and practices regarding the risks of HBV and HCV contamination by blood exposure accidents.

HCW' knowledge. The results showed that the participants' basic knowledge on HBV and HCV was at a suboptimal level. The majority of respondents reported that the prevalence (mainly for HBV) was medium while according to WHO estimations, DRC is placed among areas with the highest prevalence worldwide.[1,2] This underestimation could be a source of bad behavior and defective application of universal precautions during practice. A number of participants were aware of the main routes of HBV and HCV transmission, their complications, and the existence of treatments, but the tools of diagnosis and prevention were less known. The global rate of correct answers is slightly higher than in a previous study of blood transfusion safety conducted in Bukavu where the mean percentage of good answers on HIV, HBV, and HCV was very low: around 15.5%.[8] The difference in mean knowledge rates is probably related to the fact that the first study was more based on safety of blood transfusion and not on risks linked to HBV and HCV. Moreover, in our study, there was a more important proportion of physicians in comparison with this previous study: 73 (33.6%) versus 29 (6.5%).

Our findings are also in accordance with a survey conducted in Ivory Coast by Benie and others showing that the level of knowledge on HBV there was also very low.[9] As in our study, mother-to-child mode of transmission remained generally unknown (data not shown) while sub-Saharan Africa is considered as an area of high HBV seroprevalence and perinatal transmission.[1–3]

As found in other studies, the level of knowledge is not influenced by age, gender, marital status, and years of professional experience but rather by the degree of professional qualification. Physicians have in majority better knowledge than nurses and laboratory technicians, probably due to their advanced background on infectious and gastrointestinal diseases.[10–12]

TABLE 3
Health-care workers' practices toward blood exposure accidents

Variables	Total	Physicians	Paramedical staff	*P* value
What is the main biological product which you are most exposed to in your practice	*N* = 217	*N* = 73	*N* = 144	
Blood	207 (95.4)	71 (97.3)	136 (94.4)	0.349
Soiled linen	2 (0.9)	0	2 (1.4)	0.55*
Other biological materials/fluids	8 (3.6)	2 (2.7)	6 (4.2)	0.720*
Have you been the victim of an accident of blood exposure during the last 6 months				
Yes	93 (42.8)	21 (28.8)	72 (50)	0.002
What was your immediate action after blood exposure accidents	*N* = 93	*N* = 21	*N* = 72	
Doing nothing	23 (24.7)	2 (9.5)	21 (29.2)	0.066
Soap washing	66 (70.9)	21 (100)	45 (62.5)	< 0.001
Disinfection	74 (79.5)	19 (90.4)	55 (76.4)	0.158
Bleeding	1 (1.1)	0	1 (1.4)	0.587
Patient's serological assessment for HBV and HCV	10 (10.7)	6 (28.5)	4 (5.5)	0.002
Patient serological assessment for HIV	64 (68.8)	18 (85.7)	46 (63.8)	0.057
Declaration	6 (6.4)	0	6 (8.3)	0.171
Have you received a vaccine against HBV	*N* = 217	*N* = 73	*N* = 144	
Yes	53 (24.4)	36 (49.3)	17 (11.8)	< 0.001
If yes, how many dose(s)				
1	38 (71.7)	23 (63.9)	15 (88.2)	
2	13 (24.5)	11 (30.5)	2 (11.8)	
3	2 (3.8)	2 (5.5)	0 (0)	

*Fisher exact test.

TABLE 4
Health care workers' attitudes toward blood exposure accidents (N = 217)

Items of issues	*n* (%)
In your opinion, blood exposure accidents are mainly due to	
Pure occupational accidents	5 (2.3)
Inadequate vulgarization of preventive measures	10 (4.6)
Inadequate protection resources	167 (76.9)
Overwork	24 (11)
Training insufficiency	22 (10.1)
Is it important to conduct HBV and HCV screening in all in-patients?	101 (46.5)
It is important to conduct HBV and HCV screening in all pregnant women?	132 (60.8)
Should vaccination be recommended against HBV to all practitioners?	193 (88.9)
Is the vaccination against HBV important and should be compulsory to all practitioners?	146 (67.3)
Is the risk of contamination after blood exposure accidents more important with HIV than viral hepatitis B and C?	199 (91.7)
Do you have the habit of wearing gloves "all the time" for phlebotomy or for any gesture with possible blood exposure?	149 (68.7)
Should needles be recapped after use?	93 (42.8)
Is there a postexpositional program in the hospital?	96 (44.2)

HBV = hepatitis B virus; HCV = hepatitis C virus; HIV = human immunodeficiency virus.

The level of knowledge about the treatment is statistically higher for HBV in comparison to HCV, which can be related to the fact that several drugs used in HBV treatment are also useful against HIV. These antiviral HBV drugs are generally available in Bukavu.

HCWs' practices. This study reveals a great risk for HCW due to accidents from blood exposure. Nearly half of the respondents have been exposed to blood accidents in the last 6 months. Despite of this, universal precautions are not always observed (regular use of gloves, correct disinfection, etc.). Moreover, it seemed that the blood exposure accidents were more frequently observed in the paramedical staff than in physicians, in concordance with many others studies.[13–15]

The rate of reports to authorities after exposure was very low in our study and concerned only nurses (6.4%). Similar rates were also observed in Togo (8.8%) and in Morocco (8.3%).[16,17] Many studies have shown that physicians usually do not report needle stick injuries or other occupational accidents.[18–21] In a survey concerning Iranian specialists, only 3.7% and 0.8% of them reported blood exposure accidents from HBV- and HCV-positive patients, respectively.[11] Nevertheless, HCWs are aware of the fact that vaccination against HBV is one of the important modes of prevention, but its efficiency is not correctly acknowledged. Only 67.3% consider that HBV vaccination should be compulsory to all practitioners. Moreover, of all participants, 24.4% reported to have been vaccinated against HBV but in our study only two of 53 participants did complete the whole vaccination schedule (three doses). We suspect the reason for not completing the vaccination to be fear for the vaccine or fear for the side effects. One should also point out that the real vaccination coverage in our population is not known because none of them have checked their antibody level after vaccination.

Unlike the vaccination rates in western countries, which usually exceed a level of 80–90%, the observed rates in Africa are generally low. A rate of 51.3% was reported in Togo (but without information about the number of administered doses), 47.4% of adequate vaccination in Morocco, 6.2% in Uganda, and only 4.5% in Rwanda in which only few of them have received the recommended three doses of vaccines.[15–17,11,22] Among reasons of low vaccination coverage are ignorance, absence of clear policy, administrative difficulties, self-care system for vaccination, and lack of attention to standard precautions.[16,23] Ignorance is probably the most important contributing factor since these persons have lower general knowledge about HBV and HCV and they have more risks to be exposed to blood contamination. In DRC, the disorganization of the current health system following recent sociopolitical instabilities could also play a role.

Participants were more worried about the risk of contamination by HIV than by viral hepatitis. So after blood exposure accidents, practitioners more often checked for HIV status of the involved patient than for viral hepatitis (68.8% versus 10.7%). In 91.7% of participants, it was estimated that the risk of contamination after blood exposure accidents was more important with HIV than with viral hepatitis. This misinformation is probably due to a poor continuous training, absence of preventive program on occupational risks, and the insufficient awareness of hepatitis compared with the HIV. In our study, only 44.2% of participants were informed about the existence of a postexpositional program in their respective hospitals. In contrast, in South Kivu, numerous campaigns have been conducted by nongovernmental organizations and the government regarding the risks linked to HIV.

HCWs' attitudes. Blood exposure accidents are frequent in HCW but correct measures of prevention and prophylaxis are not always applied. Universal precautions for better protection of both practitioners and patients from blood-borne infections are poorly known. For this reason, some dangerous or aberrant practices are sometimes found such as recap needles after use or performing a venous phlebotomy after a needle-stick injury. Our study revealed that the main reason of blood exposure accidents was the absence of adequate protection resources. This was also reported in other studies in addition to lack of knowledge about viral diseases and protective measures.[15,24,25] One should emphasize that the higher vaccination rate in the physician group may lead to a feeling of reassurance and less reporting about HBV and HCV exposure.

In conclusion, our study shows that the overall level of knowledge in HCW about HBV and HCV transmission is generally low in South Kivu. The result of this situation is the ignorance of universal precautions on blood exposure accidents to prevent the risk of patient or medical care

contamination. The DRC had endorsed "the call of RABAT" in 2009, and this was in favor of the implementation of concrete strategies for the reduction of HBV and HCV prevalence.[26] This strategy includes the promotion of preventive actions such as reduction in mother-to-child HBV transmission, a mandatory vaccination of all HCWs: medical doctors, students, nurses, laboratory students, and laboratory technicians. There is also a need to focus on efforts made to improve the work environment (to implement postexposure programs in each hospital, to emphasize continuous training courses, to improve the availability of protective equipment as gloves, masks, etc.).

In addition, it would be important to improve the quality and the content of undergraduate course programs and continuous training of medical staff on blood-borne diseases, especially viral hepatitis.

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