

Original Article

Knowledge, attitudes and practice survey on blood-borne diseases among dental health care workers in Georgia

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Abstract

Introduction: In Georgia limited data exists about awareness of blood borne-diseases among dental health care workers (DHCW).

Methodology: To assess DHCW knowledge, attitudes and practices related to infection control practice guidelines designed to limit transmission of blood-borne diseases, a cross-sectional study was conducted. All respondents were asked to voluntarily complete a self-administered questionnaire. Doctors of Dental Medicine, nurses, and dental residents were recruited from 13 private and governmental dental units in three large Georgian cities: Tbilisi (the capital city), Batumi (Western Georgia) and Rustavi (Eastern Georgia).

Results: Of 244 DHCWs recruited, 196 (80%) agreed to participate. Nearly 42% DHCWs did not know the prevalence of hepatitis B virus (HBV) and hepatitis C virus (HCV) in Georgia. Knowledge about risk factors for transmission of human immunodeficiency virus (HIV), HCV and HBV was low; correct response proportions among all DHCWs were 45.3%, 37.9% and 34.2% for these pathogens, respectively. The 59.7% of DHCWs were uninformed about post-exposure prophylaxis for HIV. Only 37.3% reported being well informed on infection control guidelines. Nearly all (95.6%) DHCWs expressed interest in receiving additional education on occupational transmission of blood-borne pathogens.

Conclusions: Overall, the study suggests DHCWs are aware they have insufficient knowledge of universal precautions. There is a need for developing a continuous education program that is accessible to practicing DHCWs.

Key words: Dental health care worker; blood-borne infections; knowledge and attitudes.

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Introduction

Nosocomial transmission of blood-borne pathogens continues to be a major public health problem worldwide. High income countries have substantially reduced the frequency of infections over the past three decades through widespread implementation of infection control measures, including the use of single-use equipment, careful attention to sterilization of multiuse equipment, and education on procedures that minimize the opportunity for disease transmission [1-4]. Still, transmission occurs sporadically [2]. In low- and middle-income countries, nosocomial transmission of viruses and bacteria is more common, largely due to reduced resources, limited education on infection control and fewer enforcement structures [3]. The World Health Organization (WHO) estimates that three million percutaneous injuries worldwide expose health care workers to blood-borne pathogens annually [5].

Dental care offers substantial opportunity for nosocomial transmission of organisms. Typically, dental health care workers (DHCWs) treat many patients a day, thus careful adherence to infection control practices is needed to prevent transmission to the dental team and subsequent patients. Private dentists' offices rely on education to implement and maintain infection control practices as no external oversight, like that found in hospitals, exists. Yet, in many low- and middle-income countries dentists and dental staff appear to have moderate to low knowledge about blood-borne viruses, such as hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV) [6-9]. The risk of transmission in dental practices depends on the type of exposure and viral burden of the patient; estimated risks based primarily on needle stick injuries among health care workers in general may be reasonably extrapolated

to dental care given the sharps environment and routine exposure to blood (0.3% for HIV, 1.8% HCV, and 30% for HBV) [10-13].

Georgia, a country of 3.7 million in the Caucasus region of Eurasia, is among the high prevalence countries for HCV (anti-HCV (7.7%), RNA (5.4%)) [14,15]. Similar to other countries in Eastern Europe and Central Asia, illicit injecting drug use is an important reservoir among men [16]. However, women in Georgia rarely use illicit drugs; the HCV RNA seroprevalence pattern for women increases with age, a pattern consistent with nonsocial transmission [17]. HBV exposure is also more common in Georgia than in neighboring countries [18]. Prevalence of HIV infection among adults aged 15-49 is 0.4% [19].

While a lack of data exists related to DHCWs, research on medical health care workers indicates benefits of prevention measures and pre-exposure immunization against HBV in reducing the risk of transmission of blood-borne pathogens [20,21]. The use of protective barriers confers additional insurance against occupationally acquired infections [22]. Together, these practices have resulted in substantial reductions in occupational exposures to blood-borne infections as demonstrated in an Italian cohort study that followed hospital workers for a decade [23].

Improvements in infection control to reduce transmission of HIV, HCV and HBV among DHCWs will be difficult to achieve without understanding the contribution of unsafe practices in clinics. Scarce data are available on this topic. In Georgia, only one study

conducted in Western Georgia has been published; it found that only 18.6% of study participants reported to always wear gloves [24].

The goal of this study was to determine DHCW knowledge, attitudes and practices related to the principles of universal safety precautions and methods for reducing occupational exposure. Identifying opportunities for nosocomial transmission of blood-borne pathogens in the dental care setting is an important step in further reducing the risk of exposure among patients and DHCWs.

Methodology

Study sample

The goal of this cross-sectional study was to evaluate DHCW knowledge, attitudes and behaviours related to risk factors for transmission of these pathogens. The study participants included Doctors of Dental Medicine (DMD), nurses, and dental residents rotating in dental practices recruited from 13 private and governmental dental units in three large Georgian cities: Tbilisi (the capital city), Batumi (Western Georgia) and Rustavi (Eastern Georgia).

The sample size for the study was based on estimating the prevalence of HCV for another component of the study. Given the high prevalence of HCV in Georgia, the expected prevalence of HCV infection was estimated to be 5-7%. To obtain a 95% confidence interval for $6\% \pm 3\%$, 241 DHCWs were needed for the study. This sample size would be sufficient to obtain descriptive data on the knowledge,

Table 1. Dental Health Care workers (DHCWs) demographic characteristics.

Characteristic	Total		Doctor		Nurse		Residents		p value
	N	%	N	%	N	%	N	%	
Gender									
Male	27	13.8	21	18.3	2	4.1	4	12.5	0.053
Female	169	86.2	94	81.7	47	95.9	28	87.5	
Age									
≤ 20	2	1.1	0	0.0	1	2.1	1	3.2	< 0.001
21-30	78	42.2	24	22.4	26	55.3	28	90.3	
31-40	62	33.5	51	47.7	10	21.3	1	3.2	
≥ 41	43	23.2	32	29.9	10	21.3	1	3.2	
Residence									
Tbilisi	135	68.9	85	73.9	29	59.2	21	65.6	0.244
Rustavi	33	16.8	15	13.0	13	26.5	5	15.6	
Batumi	28	14.3	15	13.0	7	14.3	6	18.8	
Type of Practice									
Private	163	85.8	92	81.4	43	89.6	28	96.6	0.78
Governmental	27	14.2	21	18.6	5	10.4	3.7	3.4	
Year of Graduation									
≤ 1999	46	26.0	38	36.2	7	16.3	1	3.4	< 0.001
> 2000	131	74.0	67	63.8	36	83.7	28	96.6	

attitudes and practices of DHCWs. The study was approved by the institutional review boards of the Health Research Union (HRU) in Tbilisi (IRB#: 00009520; IORG#: 0005619) and the State University of New York (SUNY) Downstate Medical Center (FWA#: 0000362).

Enrollment and Data Collection

After the informed consent form was reviewed and written informed consent obtained, respondents were asked to complete a self-administered questionnaire to assess knowledge, attitudes and practices related to blood-borne diseases (HIV, HCV, HBV). The questionnaire included a series of questions about demographic and professional characteristics, knowledge of the prevalence of blood-borne pathogens in the country, the principles of universal safety precautions used by DHCWs, and recommendations to prevent occupational exposures in dental clinics during daily duties.

Statistical Analyses

Data entry, management and analyses were conducted using the statistical package SPSS v.22.0 (IBM Corp. Released 2013; IBM SPSS Statistics for

Windows, Version 22.0. Armonk, NY). Descriptive statistics were computed to describe socio-demographic data, universal safety precautions, personal behaviour and the frequency of sterilization testing. In bivariate analyses, prevalence ratios (PRs) and 95% confidence intervals (CIs) were computed for each study variable by type of DHCW (i.e., dentist, nurse, resident); the Chi square or Fisher’s exact tests were performed to assess correlations.

Results

Among the 244 DHCWs invited to participate in the study, 196 (80.3%) agreed to participate in the study. The self-administered questionnaires were completed and samples were collected during a one-year period between 2013 and 2014. The demographic characteristics of study participants are shown in Table 1. Most study participants were female, consistent with the gender distribution among DHCWs in Georgia. The work experience of participants ranged from 1 to 36 years with a mean of 10.4 years.

Knowledge

General knowledge about blood-borne infections among DHCWs was very low. Most participants did not

Table 2. Knowledge of Blood Borne Infection among DHCWs.

Characteristic	Total		Doctor		Nurse		Residence		p value
	N	%	N	%	N	%	N	%	
Prevalence of anti HBc+ (ever infected with HBV*) in Georgia									
0%-1%	2	1.1	2	1.8	0	0.0	0	0.0	0.026
2%-8%	36	18.9	28	24.8	2	4.3	6	19.4	
9%-15%	38	20.0	24	21.2	7	15.2	7	22.6	
> 15% (correct)	42	22.1	21	18.6	11	23.9	10	32.3	
Do Not Know	72	37.9	38	33.6	26	56.5	8	25.8	
Prevalence of HBsAg+ (active HBV) in Georgia									
0%-1%	2	1.0	1	0.9	0	0.0	1	3.1	0.007
2%-8% (correct)	42	21.9	31	27.4	6	12.8	5	15.6	
9%-15%	43	22.4	25	22.1	9	19.1	9	28.1	
> 15%	29	15.1	15	13.3	4	8.5	10	31.2	
Do not know	76	39.6	41	36.3	28	59.6	7	21.9	
Prevalence of HCV** in Georgia									
0%-1%	5	2.6	4	3.6	1	2.1	0	0.0	0.010
2%-8% (correct)	32	16.8	27	24.3	4	8.5	1	3.1	
9%-15%	39	20.5	20	18.0	9	19.1	10	31.2	
> 15%	48	25.3	25	22.5	10	21.3	13	40.6	
Do not know	66	34.7	35	31.5	23	48.9	8	25.0	
Number of HIV*** registered persons in Georgia									
< 500	8	4.2	6	5.4	2	4.3	0	0.0	0.302
500 - 1500	28	14.7	16	14.3	8	17.4	4	12.5	
1600 – 3000	45	23.7	27	24.1	8	17.4	10	31.2	
> 3000 (correct)	28	14.7	22	19.6	3	6.5	3	9.4	
Do not know	80	42.1	40	35.7	25	54.3	15	46.9	

* HBV- Hepatitis B; ** HCV- Hepatitis C; *** HIV- Human Immunodeficiency Virus.

Table 3. Knowledge of blood borne infection among DHCWs.

Characteristic	Dental health care workers	
	N	%
Modes of transmission of HBV		
Correctly identified	63	33.7
Could not identify	124	66.3
Modes of transmission of HCV		
Correctly identified*	72	37.9
Could not identify	118	62.1
Modes of transmission of HIV		
Correctly identified	87	45.3
Could not identify	105	54.7

* respondents correctly noted transmission ways (sexual, perinatal and parenteral) of blood borne diseases, such as HBV, HCV and HIV.

have an accurate understanding of the prevalence of HCV, HBV and HIV (Table 2).

Knowledge about the risk factors for transmission of HIV, HCV and HBV and pre- and post-exposure prophylaxis was variable (Table 3, Figure 1). For example, knowledge regarding pre-exposure prophylaxis for HBV was quite high (86.7%) but knowledge about post-exposure prophylaxis was limited (41.4%). Half of all respondents substantially overestimated the probability of transmission of blood-borne infections after a single contaminated needlestick injury with estimates in the range of 50-70%.

We found a significant correlation between professional status ($p < 0.001$) and age ($p = 0.006$) with the respondent’s knowledge on the presence of HIV in human saliva. Most doctors (54.5%) were aware that HIV cannot be detected in saliva, compared to only 29.3% of nurses and 32.3% of residents ($p < 0.001$). We also found a statistically significant correlation between geographic location of the clinics and level of awareness about HIV in body fluids with Tbilisi doctors being more likely to respond accurately than those employed in Batumi and Rustavi ($p < 0.001$). There was wide understanding about HIV transmission in all

regions of Georgia, and awareness that viral load tends to be higher among urban DHCWs compared to rural DHCWs ($p = 0.009$).

The results suggest generally good knowledge among DHCWs about the availability of vaccines and effectiveness of treatment of blood-borne infections (Table 4).

Figure 1. Knowledge of post-exposure prophylaxis of blood-borne infections among DHCWs.

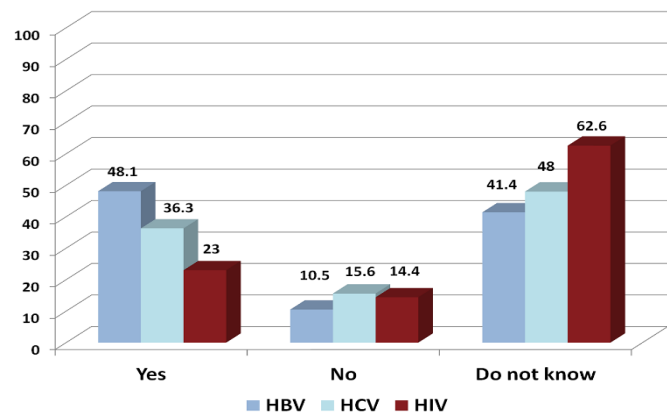


Table 4. Knowledge of existence of HBV, HCV and HIV vaccine and effective treatment among DHCWs.

Characteristic	Doctor		Nurse		Resident		p value			
	Vaccine	Treatment	Vaccine	Treatment	Vaccine	Treatment	Vaccine	Treatment		
	N	%	N	%	N	%	N	%		
Hepatitis B										
Yes	87	87.0	75	77.3	32	76.2	28	66.7	0.281	0.005
No			6	6.2			0	0.0		
Do not know	13	13.0	16	16.5	10	23.8	14	33.3		
Hepatitis C										
Yes	17	17.2	79	80.6	14	34.1	23	57.5	< 0.001	< 0.001
No	57	57.6	3	3.1	8	19.5	4	10.0		
Do not know	25	25.3	16	16.3	19	46.3	13	32.5		
HIV										
Yes	8	8.0	45	46.4	10	23.8	15	38.5	0.002	0.009
No	59	59.0	24	24.7	11	26.2	3	7.7		
Do not know	33	33.0	28	28.9	21	50.0	21	53.8		

Occupational Exposure

The majority of DHCWs (65.1%) reported exposures to contaminated needlesticks in the past six months; while the proportion was slightly lower for reports of accidental blood splash in eyes, nose or mouth (48.3%); or a cut with contaminated instruments (35.1%). Accidental cuts during a procedure were reported by 20.4% of DHCWs; exposures sustained when a colleague handed a sharp instrument were infrequent but did occur (3.1%).

The willingness of DHCWs to treat patients with blood-borne diseases is noteworthy: 91.2% and 94.4% of the participants were willing to treat HCV- and HBV-infected patients, respectively. Most (76.6%) DHCWs were confident treating patients with HIV.

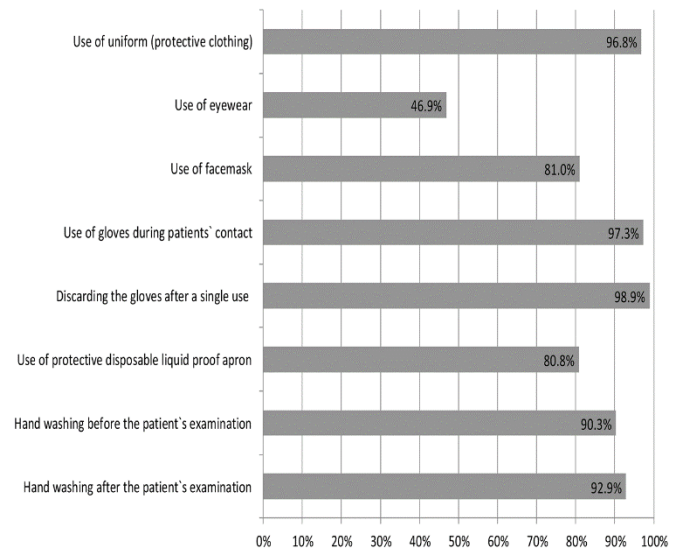
Infection control practices

Most DCHWs reported wearing gloves during patient contact (92.3%) and almost all participants reported discarding the gloves after a single use (98.9%). The practice of using a facemask (81%), eyewear (46.9%) and protective clothes (96.8%) was reported to be widespread among DCHWs in Georgia (Figure 2). Wearing protective gear did not correlate significantly with age, professional status or gender among the DCHW participants in this study. However, we did note a statistically significant correlation between the use of protective eyewear and willingness to treat a patient with HIV infection. Dentists who wear protective eyewear routinely (51.9%) rarely refuse treating HIV-positive patients ($p = 0.006$).

Most DHCWs noted that they wash hands before (90.3%) and after (92.9%) patient examinations. Furthermore, they routinely complete a medical history of new patients (83.1%) and ask these patients about their HIV status (70.1%). More than half of all respondents (57.0%) reported taking extra precautions, such as double gloving and wearing an apron, when treating HIV-positive patients.

With regard to disposal and disinfection, nearly all DHCWs (95.6%) pointed to ineffective sterilization as a source for disease transmission. Most DHCWs (76.6%) used an autoclave for instrument sterilization in the facility. The majority (58.8%) of doctors dispose of used syringes and needles in designated sharps containers compared to nurses and residence ($p \leq 0.027$) (Figure 3). While more than half of the DHCWs discard used syringes and needles properly, 16% of respondents mentioned that they disposed of used needles in the normal recycle bin, 8.6% use a plastic bag, and 4% use a disinfection solution. There was a statistically significant correlation between professional status and

Figure 2. Percentage of DHCWs’ reported behavior (%) routinely adopted during dental care.



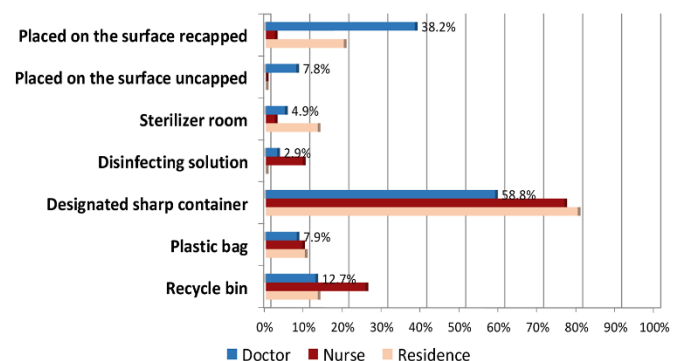
handling of used syringes and needles: compared to nurses and residents (2.3% and 20%, respectively) 38.2% of doctors placed used instruments on a surface after capping ($p < 0.001$).

Regarding DHCW awareness about universal safety precautions, only 37.3% reported feeling well informed. Nearly all (95.6%) DHCWs expressed eagerness to receive more information about occupational transmission of blood-borne pathogens. The preference among these professionals is to receive training in small group sessions (69.9%).

Discussion

Widespread implementation of universal safety precautions under infection control guidelines is now a standard operational procedure in modern healthcare facilities. This adoption has resulted in a dramatic reduction in the transmission of blood-borne pathogens among DHCWs. However, an existence of infection

Figure 3. Percentage of DHCWs’ reported behavior (%) for disposal of used syringes and needles by professional status.



control protocol as a document in dental clinics is only part of the solution to reduce transmission of viral infections; practitioners must also be aware of the particular risks of transmission inherent in their workplaces, and how to implement the relevant infection control practices. This study is among the first to examine the data on occupational exposures to blood and other body fluids among DHCWs in Georgia.

The majority of Georgian DHCWs responding to our survey had an inadequate understanding of the possible routes of HIV, HBV and HCV transmission. Meanwhile, the respondents overestimated the probability of contracting HIV, HCV and HBV after one contaminated needlestick. Inadequate knowledge among DHCWs is a problem reported by most countries suggesting that continuous education is needed for those working in dental care [25].

Despite these concerns, we found that most Georgian DHCWs report using additional precautions, such as wearing gloves/eyewear when dealing with HIV-positive patients. However, from these data we must infer that Georgian DHCWs are not equally cautious with all patients. In other words, universal precautions are not universally applied. All patients should be treated as potential blood-borne infection carriers irrespective of their awareness of their infection status.

The present study identified that a substantial number of dentists dispose of used syringes and needles in normal recycle bins, plastic bags or even in a disinfection solution. Another major issue is the practice of capping needles: 25.6% of dental health care workers experience needlestick injuries (related to recapping a needle). The proportion of needlestick injuries is lower in the reports from other countries, for example: 19.7% in Washington State [26] and 22.8% in Iran [27]. This practice should be strongly discouraged because it leads to a higher incidence of needlestick injuries.

An optimistic finding was the relatively good knowledge of HBV pre- and post-exposure prophylaxis which may be attributed to a hepatitis B catch-up vaccination program for at-risk health care workers, medical students, and adolescents implemented by the National Center for Disease Control in 2009 [28]. This finding suggests that strategies implemented during this program may confer durable knowledge and might be used as a leverage to improve awareness in other areas highlighted by our study. While DHCW awareness of HCV was quite low, we expect this to improve considerably concurrent with the HCV elimination program which is currently underway in Georgia.

The major study limitation is self-reported behavior. We did not validate the compliance to universal safety precautions by direct observations. Use of a questionnaire is common in studies of DHCWs around infection control, thus the findings are reasonably comparable to other studies.

Conclusion

The results of this study indicate a low to moderate level of knowledge among Georgian DHCWs regarding blood-borne pathogen transmission and universal precautions. We believe our data provide a baseline metric as well as they suggest the development of a comprehensive educational program for DHCWs. A reporting system for Georgian dental care settings would provide the ability to monitor accidental injuries with contaminated needles and devices and develop appropriate interventions to mitigate these risks. Finally, all dental health care facilities should establish a post-exposure prophylaxis program to protect DHCWs and to prevent further transmission of blood-borne diseases. We are encouraged that the recent legislation from the Ministry of Labour, Health and Social Affairs of Georgia “Surveillance, Control and Prevention of Nosocomial Infections” [29] will elaborate on such a protocol.

In 2015, Georgia launched an HCV elimination program with support of the USA Centers of Disease Control and Prevention (CDC) and other international partners. The program aims for free treatment of all HCV infected individuals and for prevention of new HCV cases, including in health care facilities. The findings of this study can be used for planning educational interventions in dental care settings in Georgia.

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Conflict of interests: No conflict of interests is declared.