



Original Article

Predictors of Hepatitis B Preventive Behavioral Intentions in Healthcare Workers



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ABSTRACT

Background: Healthcare workers' practices regarding hepatitis B have an important effect on the control of this problem in workplaces.

Methods: A questionnaire-based cross-sectional study was used to investigate the role of knowledge, cues to action, and risk perceptions as predictors of preventive behavioral intentions for hepatitis B among healthcare workers in Broujen, Iran ($n = 150$). History of hepatitis B vaccination, hepatitis B surface antigen test, and demographic characteristics were investigated. The psychometric properties of the questionnaire were established.

Results: Those who had a history of hepatitis B surface antigen test had a statistically significant higher level of risk perceptions (30.89 ± 4.08 vs. 28.41 ± 3.93 , $p < 0.01$) and preventive behavioral intentions (5.05 ± 1.43 vs. 4.45 ± 1.29 , $p < 0.01$). The mean score of cues to action was significantly correlated with age and work history ($r = 0.20$, $p = 0.02$ and $r = 0.19$, $p = 0.02$). Preventive behavioral intentions were significantly correlated with cues to action and risk perceptions but not with knowledge level. Cognitive factors were responsible for a 17% change in observed variance of preventive behavioral intentions, which was statistically significant.

Conclusion: Risk perceptions were the most important determinant of preventive behavioral intentions for hepatitis B among health personnel; thus, emphasizing risk perceptions is recommended in educational programs aimed at increasing health personnel's practices regarding hepatitis B.

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1. Introduction

The hepatitis B virus (HBV) is a member of the hepadnaviridae virus family, with 370 million chronic carriers worldwide. It is transmittable through percutaneous, prenatal, and sexual routes [1]. Hepatitis B (HB) is an acute systemic infection, caused by HBV. HB is characterized by extrahepatic and possible long-term complications such as liver failure, liver cancer, and hepatocellular carcinoma [2,3]. HB is a well-recognized cause of occupational hazard in healthcare workers (HCWs). Occupational exposures are responsible for about 40% of HBV infection in HCWs [4]. For example, dentists have a three-times higher HBV infection rate in comparison with the general population [5]. Epidemiology of

occupational exposure to HBV is reviewed extensively elsewhere [6].

Approximately 90% of the at-risk workforce are aware of the necessity of HB vaccination in the workplace, but only 56.5% of workers completed their vaccination program against HB [7]. It seems that the current level of HBV vaccination is not sufficient to protect HCWs from HB infection [8]. Belief in the safety and efficacy of the HB vaccine is the most influential parameter in the acceptance of the vaccine in comparison with perceiving severity [9]. There are numerous psychological and behavioral predictors that can be used to predict the behavior of HCWs toward occupational hazards [10]. For example, healthy behaviors in HCWs are age and sex dependent [6,11]. The risk of HBV infection can be controlled by

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the application of suitable prevention control measures. Exposure prevention through education is one of the most important preventive measures in HBV infection control in the workplace. Therefore, it is essential to understand the key influential parameters and barriers to enhance the level of safe behaviors among HCWs [7].

To the best of our knowledge, studies regarding the psychosocial and cognitive predictors of preventive behavioral intentions of HB are few, especially in developing countries. However, the predictors may be differentiated based on culture and ethnicity. As mentioned before, the use of a suitable prevention strategy can reduce the risk of HBV infection. It depends on the application of elements that are responsible in the behavior of HCWs [6,11]. We conducted a cross-sectional questionnaire-based study to investigate the role of knowledge, cues to action (as strategies to activate readiness), and risk perceptions as predictors of preventive behavioral intentions about HB in a sample of HCWs in Iran.

2. Materials and methods

2.1. Participants and data collection

The cross-sectional descriptive study was conducted on all ($n = 150$) HCWs in the Brujen health network, Chahrmahal and Bakhtiari province, Iran, which includes 14 urban and rural healthcare centers, during 2011–2012. Participants' enrolment in the study was based on census. A letter of formal ethical approval of the research was obtained from ethics committee of Shahid Sadooghi University of Medical Sciences (Yazd, Iran). Participation in the study was voluntary and all participants were asked to sign the informed consent form. Data were only collected for the personnel present at the centers at the relevant time.

2.2. Instruments

A seven-part, 28-item researcher-designed questionnaire was used for the purpose of data collection. It included a demographic section and four other scales for measuring knowledge about HB, general risk perceptions on HB, personal risk perception on HB, participant exposure status to cues to action about HB, and HB prevention behavioral intentions. Cues to action (defined as *strategies to activate readiness*) and a history of tests for HB surface antigen (HBsAg) and HB vaccination were also obtained. The demographic section included age, sex, education level, work history, and work department. Descriptions of the scales used in the study are presented in Table 1. The questionnaire's content validity was approved by a panel of experts composed of health education specialists ($n = 3$), occupational hygienists ($n = 2$), and infectious diseases specialists ($n = 2$). Minor revisions were conducted based on comments from the experts on the first version of the questionnaire. The appropriateness of the final version of the questionnaire was approved by all experts.

2.3. Data analysis

SPSS for Windows, version 15 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Constructs showed normal distribution according to the Kolmogorov–Smirnov test. Significance of mean difference was statistically evaluated using Student *t* test. Spearman's rank correlation test and Pearson correlation were used to analyze possible correlations for nonparametric and parametric purposes, respectively. Chi-square test was designed for categorical data analyses. The level of significance was set at $p < 0.05$. One-way analysis of variance (ANOVA) was used to test for construct differences among the different job groups. Hierarchical multiple

regression analyses was performed to investigate the role of cognitive factors on preventive behavioral intentions as dependent variables.

3. Results

Table 2 shows the demographic frequency of participants. The mean \pm standard deviation age was 36.90 ± 7.60 years. Most of the participants (67.3%) had a university education. The average score of participants' knowledge was 5.23 ± 1.01 . Sex, education level, and department had no significant effect on participants' knowledge. The average score in cues to action was 3.13 ± 1.04 . Cues to action were significantly different according to departments. Tukey's *posthoc* test showed that disease control personnel had a statistically significant higher cues to action score (3.08 ± 0.40) in comparison with the environmental health department (2.72 ± 1.12) and *other services* (2.93 ± 1.16). Sex and education level differences on the basis of cues to action were not statistically significant.

The mean score for general perceived risk was 21.49 ± 3.28 . Personal risk perception was 7.53 ± 1.89 out of 10. Preventive behavioral intention was 4.6 ± 1.3 out of 6. General and personal risk perceptions were not different statistically according to sex, education level, or department. The simple correlations between cues to action and age as well as cues to action and work history were statistically significant ($r = 0.20$, $p = 0.02$ and $r = 0.19$, $p = 0.02$). General risk perceptions had a negative correlation with work history ($r = -0.164$, $p = 0.045$), which was statistically significant. Correlation coefficients matrix of other studied constructs are shown in Table 3. Only 24.7% of the participants had a history of HBsAg test. The cues to action, perceived risk, and preventive behavioral intentions of the participants who had a history of HBsAg test were statistically higher than those of other participants (Table 2).

Training methods (cues to action) were significantly different among departments. Approximately 70% of the participants stated that they had taken a training course in HB prevention; 90% had studied books, guidelines, or pamphlets about HB; 83% had seen posters related to HB, and 66.7% reported that they had heard or seen about HB on radio or television programs.

Hierarchical multiple linear regressions were performed in three blocks to assess the predictability of cognitive scales over and above the influence of demographic parameters and past behaviors. Predictors were classified into three different blocks according to their nature:

Block 1: Demographic characteristics block: sex, age, education, experience, and workplace type.

Block 2: Cognitive constructs: knowledge, cues to action, individual risk perception, and general risk perception.

Block 3: History of HbsAg test.

Demographic characteristics of the participants explained 2.6% of observed variance in Protection Motivation Theory (PMT), which was not significant (Table 4). However, cognitive factors were responsible for a 17% change in observed variance, which was statistically significant. Among cognitive scales, the role of cues to action and individual risk perception were statistically significant. Past behavior also defined 1% of observed variance, which was not significant.

4. Discussion

The present study was performed to determine key factors in *preventive behavior intentions* against HB infection in HCWs. Risk

Table 1
Characteristics of the designed questionnaire

Construct	Sample questions	Item No.	Scale and scoring	α	Possible range
Knowledge	Can HB be transmitted as a nosocomial infection?	7	Yes/no/don't know Don't know and wrong answers (0)/ correct answers (1)	—	0–7
General risk perceptions	HB affects people of all ages	6	Completely disagree (1)/disagree (2)/ neither disagree nor agree (3)/agree (4)/completely agree (5)	0.90	6–30
Personal risk perceptions	I am at risk for HB	2	Completely disagree (1)/disagree (2)/ neither disagree nor agree (3)/agree (4)/completely agree (5)	0.75	2–10
Preventive behavioral intention	How likely are you to seek more information about HB	2	Unlikely (1)/likely (2)/completely likely (3)	0.72	2–6
Cues to action	Did you take a training course in HB prevention? Did you study a book or other printed materials about HB?	4	Yes (1)/no (0)	—	0–4

HB, hepatitis B.

perception was the best predictor of preventive behavioral intentions, which was consistent with other studies [12,13]. This suggests that focus on risk perceptions is an important component of educational programs aimed to promote preventive behavioral intentions in HCWs. The mean scores of personal risk perception and preventive behavioral intentions in the present study were higher than those reported by Gonzales et al [12]. Different job categories in two studies could be a source of the difference observed in personal risk perceptions. The higher level of preventive behavioral intentions in our study may be due to the high-level of knowledge and risk perceptions in participants [12]. The mean knowledge scores of participants in our study was 5.23 (75% of the total knowledge score), which is comparable with a previous study [14] on HCWs. Approximately 72% of participants had completed the vaccination schedule, which is slightly lower than the average global coverage estimated by the World Health Organization: global HB vaccine coverage is 75%, and is as high as 91% in the western Pacific and 90% in the Americas. Coverage in the South-East Asia Region reached 56% in 2011 [15].

Printed resources were the most important source of cues to action. This is in contrast with Reiter's [16] findings on HPV

vaccination that the most common cues to action was a doctor's recommendation. This may be because of cultural differences and also the education level of participants in our study. Other studies conducted on industrial workers in Iran found that television and radio are the leading sources of knowledge toward occupational hazards such as carcinogens and HB infection [17,18]. This finding suggests that printed resources are more suitable to enhance cues to action in HCWs than other educational materials. More than half of participants reported previous educational courses in HB prevention, but the study by Hosseini Ahagh [19], found that only 11% had taken such courses, which is a sign of Iran's efforts to improve the training of HCWs regarding HB prevention during recent years.

As expected, those who did not have a history of HBsAg test reported a lower level of risk perceptions and preventive behavioral intentions, which suggests that the level of risk perceptions could increase the level of preventive behavioral intention. This subsequently causes the HCWs to have an HBsAg test through preventive behavioral intention.

As expected, we found that cues to action and individual risk perception are positively associated with the preventive behavioral intentions. The results of hierarchical multiple regression showed

Table 2
Mean knowledge, risk perceptions, cues to action, and preventive behavioral intentions scores according to sociodemographic factors

Variable	Level	No. (%)	Knowledge	General risk perceptions	Personal risk perceptions	Cues to action	Preventive behavioral intentions
Sex	Male	59 (39.3)	5.17	20.85	7.69	3.76	4.78
	Female	91 (60.7)	5.27	21.91	7.43	3.49	4.48
	<i>p</i>		0.533	0.052	0.402	0.075	0.172
Department	Family health	49 (32.70)	5.48	22.10	8.29	4.19	5.10
	Disease control	21 (14.00)	5.20	21.86	7.47	3.16	4.57
	Environmental health	18 (12.00)	5.56	21.11	6.83	3.33	4.11
	Injection unit	11 (7.30)	5.00	22.29	8.43	4.43	4.57
	Pharmacy	12 (8.00)	5.36	21.73	7.36	4.09	5.09
	Dental clinic	7 (4.70)	5.08	21.67	6.75	2.92	3.92
	Other services	32 (21.30)	5.00	20.44	7.69	3.94	4.69
	<i>p</i>		0.468	0.507	0.134	0.003	0.094
Education	< High school diploma	9 (6.00)	5.33	22.33	7.44	3.22	4.56
	High school diploma	40 (26.70)	5.03	21.38	7.57	3.20	4.40
	Technical degree	58 (38.70)	5.33	22.10	7.45	3.79	4.86
	Bachelor's degree	26 (17.30)	5.38	20.96	7.31	3.62	4.23
	Medical doctor degree	17 (11.30)	5.12	20.06	8.12	4.06	4.76
	<i>p</i>		0.542	0.161	0.715	0.097	0.221
HbsAg test	Yes	37 (24.70)	5.13	22.43	8.45	3.43	5.05
	No	113 (75.30)	5.26	21.18	7.23	2.99	4.45
	<i>p</i>		0.50	0.04	0.01	0.02	0.01

Table 3
Correlations matrix of selected constructs

Constructs	Knowledge	Cues to action	Total risk perceptions	General risk perceptions	Personal risk perceptions	Behavioral intention
Knowledge	1					
Cues to action	0.138	1				
Total risk perceptions	0.000	-0.023	1			
General risk perceptions	-0.065	-0.091	0.891 [†]	1		
Personal risk perceptions	0.114	0.109	0.617 [†]	0.193 [*]	1	
Behavioral intention	0.130	0.378 [†]	0.156	0.032	0.282 [†]	1
Age	-0.112	0.196 [*]	-0.056	-0.103	0.056	0.013
Experience	-0.116	0.190 [*]	-0.146	-0.164 [*]	-0.031	-0.162 [*]

* Correlation is significant at the 0.05 level (two-tailed).

† Correlation significant at the 0.01 level (two-tailed).

that cognitional constructs by itself can predict 17% of observed variance, which is efficient in comparison with demographic characteristics. The past behavior was entered as a last block in the regression to test the sufficiency of cognitional constructs. We found that the addition of this block does not change the predicted variance significantly. We suggest that focusing on cognitional characteristics such as cues to action and individual risk perception are essential in making behavioral changes in health care personnel.

The study limitations should be taken into consideration in using the results. First, the data were based on self-reports, which may be subject to over- or under-reporting, potentially distorting results. Second, due to the nonexperimental nature of the study, no causal inferences were drawn and due to the nonprobabilistic nature of the sampling technique, external validity was limited to the study participants. It is also interesting to measure the effect of other behavior and personal factors such as level of exercise and other lifestyle factors on observed protective behaviors.

Although no causal inferences are suggested, based on the results of the study, it can be concluded that preventive behavioral intention is positively correlated with risk perceptions. Additionally, it may be argued that knowledge may also play an important role in influencing perceptions of sensitivity and risk. Distance education during employment is a practical strategy by which HCWs can be trained to deal with HB.

Table 4
Hierarchical regression analysis of preventive behavioral intentions predictors in health care workers

Step/variable	Parameter	β (Step 1)	β (Step 2)	β (Step 3)
demographic factors	Age	0.084	-0.085	-0.155
	Experience	-0.009	0.145	0.225
	Sex (male/female)	0.078	0.080	0.073
	Education [*]	0.113	0.091	0.080
	Workplace [†]	-0.017	-0.008	-0.017
Cognitional constructs	Knowledge		0.093	0.095
	Cues to action		0.188 [‡]	0.152 [‡]
	General risk perception		0.158 [§]	0.154 [§]
	Individual risk perception		0.235 [‡]	0.209 [‡]
Past behavior	HbsAg test frequency			0.069
R ²		0.026	0.170	0.180

HbsAg, hepatitis B surface antigen.

* Education was recoded into dichotomous variable (0, preuniversity education; 1, university degree).

† Workplace was recoded into a dichotomous variable. Those with work in health sections totally recoded into one group and clinical specialists recoded into to other group.

‡ $p < 0.05$.

§ $p < 0.1$.

|| 0, no history of HbsAg test; 1, one HbsAg test; 2, two HbsAg tests; 3, three HbsAg tests.

Conflicts of interests

The authors declare that there are no conflicts of interest.

References

- Alter MJ. Epidemiology of viral hepatitis and HIV co-infection. *J Hepatol* 2006;44(Suppl. 1):S6–9.
- Ma GX, Fang CY, Shive SE, Toubbeh J, Tan Y, Siu P. Risk perceptions and barriers to hepatitis B screening and vaccination among Vietnamese immigrants. *J Immigr Minor Health* 2007;9:213–20.
- Fauci AS. *Harrison's principles of internal medicine*. 17th ed. New York (NY): McGraw-Hill Medical; 2008.
- Habib F, Khan DK, Shan-E-Abbas, Bhatti F, Zafar A. Knowledge and beliefs among health care workers regarding hepatitis B infection and needle stick injuries at a tertiary care hospital, Karachi. *J Coll Physicians Surg Pak* 2011;21:317–8.
- Alavian SM, Izadi M, Zare AA, Lankarani MM, Assari S, Vardi MM. Survey of the level of anti-HBs antibody titer in vaccinated Iranian general dentists. *Spec Care Dentist* 2008;28:265–70.
- MacCannell T, Laramie AK, Gomaa A, Perz JF. Occupational exposure of health care personnel to hepatitis B and hepatitis C: prevention and surveillance strategies. *Clin Liver Dis* 2010;14:23–36.
- Maltezou HC, Gargalianos P, Nikolaidis P, Katerelos P, Tedoma N, Maltezos E, Lazanas M. Attitudes towards mandatory vaccination and vaccination coverage against vaccine-preventable diseases among health-care workers in tertiary care hospitals. *J Infect* 2012;64:319–24.
- Mahboobi N, Agha-Hosseini F, Mahboobi N, Safari S, Lavanchy D, Alavian SM. Hepatitis B virus infection in dentistry: a forgotten topic. *J Viral Hepat* 2010;17:307–16.
- Bodenheimer Jr HC, Fulton JP, Kramer PD. Acceptance of hepatitis B vaccine among hospital workers. *Am J Public Health* 1986;76:252–5.
- Zaidi MA, Griffiths R, Newson-Smith M, Levack W. Impact of stigma, culture and law on healthcare providers after occupational exposure to HIV and hepatitis C. *Cult Health Sex* 2012;14:379–91.
- McCarthy GM, MacDonald JK. A comparison of infection control practices of different groups of oral specialists and general dental practitioners. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1998;85:47–54.
- Gonzales R, Glik D, Prellip M, Bourque L, Yuen J, Ang A, Jones M. Risk perceptions and preventive behavioral intentions for hepatitis B: how do young adults fare? *Health Educ Res* 2006;21:654–61.
- Brewer NT, Chapman GB, Gibbons FX, Gerrard M, McCaul KD, Weinstein ND. Meta-analysis of the relationship between risk perception and health behavior: the example of vaccination. *Health Psychol* 2007;26:136–45.
- Hwang JP, Huang CH, Yi JK. Knowledge about hepatitis B and predictors of hepatitis B vaccination among Vietnamese American college students. *J Am Coll Health* 2008;56:377–82.
- Samuel SO, Aderibigbe SA, Salami TAT, Babatunde OA. Health workers' knowledge, attitude and behaviour towards hepatitis B infection in southern Nigeria. *Int J Med Sci* 2009;1:418–24.
- Reiter PL, Brewer NT, Gottlieb SL, McRee AL, Smith JS. Parents' health beliefs and HPV vaccination of their adolescent daughters. *Social Sci Med* 2009;69:475–80.
- Miri M, Mogharab M, HoseinPour F. Knowledge, attitude and performance of male workers of Birjand factories toward AIDS & hepatitis B. *Modern Care J* 2009;6:12–8.
- Zare Sakhvidi MJ, Aliabadi MM, Zare Sakhvidi F, Halvani G, Morowatisharifabad MA, Dehghan Tezerjani H, Firoozichahak A. Occupational cancers risk perception in Iranian workers. *Arch Environ Occup Health* 2014;69:167–71.
- Hosseini Ahagh M. The knowledge and operation of health workers in Khalkhal about hepatitis B. *J Ardabil Univ Med Sci* 2002;1:1–6.