RESEARCH COMMUNICATION

Predisposing, Reinforcing and Enabling Factors Associated with Hepatitis B Testing in Chinese Canadians in British Columbia

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Abstract

Background: Liver cancer, a significant health problem in Chinese, can be controlled through HBV blood testing, vaccination, and community education about HBV. The PRECEDE framework has been very helpful in identifying factors associated with health practices. Objectives: The objective was to identify factors associated with HBV testing in Chinese Canadians, using the PRECEDE framework. Methods: Five hundred and thirty-three randomly selected Chinese Canadian adults were interviewed about HBV blood testing practices. Factors were grouped as predisposing, reinforcing and enabling. Results: Fifty-five percent had received HBV blood testing. Several predisposing factors, all reinforcing factors and one enabling factor were associated with HBV testing in bivariate analysis. A physician's recommendation for testing was the strongest factor associated with testing in multiple logistic regression analysis (OR=4.4, p<0.0001). Interpretation: Many Chinese Canadian adults in Vancouver have not been tested for HBV. Continuing educational efforts are needed and the PRECEDE framework can inform the development of health education interventions.

Key Words: Liver cancer - cancer information

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Introduction

Although Chinese are one of the fastest growing minority populations in Canada, with over 1 million ethnic Chinese living in Canada in 2001 (Statistics Canada, 2001), little is known about disease prevention behavior and cancer control in this population (Jenkins and Kagawa-Singer, 1994). Liver cancer, a preventable disease, is the most common cancer in many Asian countries (Di Bisceglie et al, 1988; London and McGlynn, 1996; Euler, 1997). It also occurs more frequently among Chinese in North America than the general population (Perkins et al, 1995; Miller, 1996), and among Asian-born as compared to North American-born Chinese (Rosenblatt et al, 1996).

The excess risk of liver cancer in Chinese is attributed to chronic hepatitis B virus (HBV) infection resulting from high rates of HBV infection combined with low levels of HBV vaccination (Di Bisceglie et al, 1988; Hwang et al, 1996; London and McGlynn, 1996; Euler, 1997; Merican et al, 2000; Jenkins et al, 2001). HBV infection is endemic in most Asian countries (Nguyen and Keeffe, 2003) and between 30% and 50% of Chinese immigrants to North America have serologic evidence of past HBV infection (Walker and Jaranson, 1999; Merican et al, 2000). In Canada, approximately 250,000 persons are estimated to be infected with HBV, 70% being immigrants from foreign countries (Sherman et al, 2004).

Although the literature is limited, there have been several recent reports on HBV-related knowledge and behaviour in Asian immigrants, including Korean (Choe et al, 2005), Vietnamese (Taylor et al, 2004; Burke et al, 2004; Taylor et al, 2005), Cambodian (Taylor et al, 2002a), and Chinese (Thompson et al, 2002; Thompson et al, 2003; Taylor et al, 2006; Hislop et al, in press). Potential strategies for controlling HBV infection include routine testing of persons at high risk of HBV infection, including immigrants from regions with high HBV endemic rates, vaccinating those never exposed to HBV, and educating communities about routes of HBV transmission (Jenkins et al, 2001; BC Health Services, 2005). Chronic carriers may benefit from anti-viral therapy and regular surveillance to detect early liver cancer (Nguyen and Keeffe, 2003), and should take precautions to avoid infecting others (Tong and Hwang, 1994; Malik and Lee, 2000; Lin and Keefle, 2001; Lok and McMahon, 2001).

There are very few data addressing HBV testing among Chinese Canadians. Health education programs should be based on a thorough understanding of HBV-related knowledge, beliefs, and practices (Hubbell et al, 1995). This paper presents findings from a community-based survey of Chinese Canadian adults in Vancouver, using the PRECEDE framework to identify barriers and facilitators to HBV testing. The information could be used to develop intervention strategies for Chinese Canadians.

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Materials and Methods

Study Group and Survey Procedures

In 2005, households were randomly selected for interview in Vancouver postal code areas with high proportions of Chinese residents. Chinese households were identified by applying a previously validated list of Chinese last names to an electronic version of the Vancouver telephone book (Lauderdale and Kestenbaum, 2000). A total of 1,500 households were selected and mailed introductory letters (in traditional Chinese, simplified Chinese, and English) with a calendar as a small incentive. The letter explained the purpose of the study, how the household was selected, and invited Chinese adults to participate.

Each household was subsequently approached by a trained trilingual Chinese interviewer in order to identify eligible adults and to conduct the interview in the language of choice. Individuals were eligible if they were Chinese; aged 20 to 64 years; and able to speak Cantonese, Mandarin, or English. If there was more than one eligible adult in the household, the interviewer selected the adult with the most recent birthdate. Interviewers made at least five door-to-door attempts at contacting each household (including daytime, evening, and weekend attempts). Participants were offered $20 as a token of appreciation. Interviewers and participants were gender matched. A more detailed description of the sampling procedure is given elsewhere (Hislop et al, in press).

A community advisory committee (including 4 local Chinese organizations and 3 physicians) advised the research team throughout the study.

Survey Instrument

The survey development was guided by an earlier qualitative study of 40 Chinese adults (Chen et al, 2006), survey experience in other Asian immigrant communities (Taylor et al, 2002a; Thompson et al, 2002; Thompson et al, 2003; Burke et al, 2004; Taylor et al, 2004; Taylor et al, 2005; Taylor et al, 2006), and the diagnostic component of the PRECEDE framework (Gielen and McDonald, 1996). The survey instrument was developed in English, translated into Cantonese and Mandarin, and pretested with 8 Chinese adults (2 Cantonese and Mandarin speakers of each gender). Response options for most survey items were 'yes', 'no' and 'not sure/don't know'.

Respondents were read the following statement: "Hepatitis B is an inflammation of the liver caused by a viral infection. It sometimes makes the skin and eyes go yellow. People with hepatitis sometimes lose their appetite and experience nausea as well as vomiting." They were then asked if they had ever had a blood test for HBV. They were also queried about their age, marital status, educational level, number of years of residence in North America, English proficiency, and birth country. Their gender was noted by the interviewer. The survey interview took on average 45 minutes to complete.

According to PRECEDE, factors affecting behavior can be broadly grouped as predisposing, reinforcing, and enabling. Predisposing factors include an individual's knowledge, beliefs, and perceptions. Social support of a behavior by important referents and previous experiences is considered reinforcing. Enabling factors are those skills and resources that positively or negatively facilitate change.

The survey instrument included 13 questions about predisposing factors, with 5 addressing knowledge about HBV, 2 addressing perceived susceptibility to HBV, 5 addressing perceived severity of HBV, and 1 addressing perceived effectiveness of treatment for HBV. Specifically, for knowledge, respondents were asked whether HBV can be spread during sexual intercourse, during childbirth, by sharing toothbrushes, by sharing razors, and by someone who looks and feels healthy. For perceived susceptibility, respondents were asked whether HBV was more easily spread between persons than AIDS, and if Chinese are more likely to be infected with HBV than whites. For perceived severity, they were asked if they thought people with HBV can be infected for life, people with HBV are sometimes avoided by others, HBV can cause cirrhosis and also liver cancer, and people can die from HBV. For perceived effectiveness, they were asked if medicines are available to treat HBV.

The survey instrument included 5 questions about reinforcing factors. Specifically, participants indicated whether physician(s) had ever recommended HBV testing, family member(s) had ever suggested testing, friend(s) had ever suggested testing, employers had ever asked for testing, and any of their family members were chronically infected with HBV.

The survey instrument included 8 questions about enabling factors. Participants were asked how often they had seen a doctor in the last year, if they had a complete physical exam during the last year, had a particular hospital/clinic/doctor's office where they usually go for health care, had one doctor they usually see, the doctor's gender and ethnicity, had needed an interpreter when seeing a doctor, and had ever received obstetric services in North America (women only).

Table 1. Sociodemographic Characteristics and Bivariate Associations with HBV Testing (n=533)

Factor		N	Tested for HBV	p-value
Gender	Male	230 (43%)	49%	0.01
	Female	303 (57%)	60%	
Age (years)	< 35	88 (17%)	60%	0.046
	35-49	210 (40%)	60%	
	≥ 50	231 (44%)	49%	
Marital status				
Currently married		440 (83%)	55%	0.77
Previously/never married		92 (17%)	52%	
Education (yr)	< 12	167 (32%)	48%	0.049
	≥ 12	362 (68%)	58%	
Length of time in North America (years)				
	< 20	313 (59%)	64%	<0.0001
	≥ 20	217 (41%)	41%	
English proficiency				
	Fluent	358 (67%)	57%	0.04
	Not fluent	174 (33%)	51%	
Birth country	China	275 (52%)	55%	0.002
	Hong Kong	172 (32%)	59%	
	Taiwan	17 (3%)	76%	
	Other	68 (13%)	38%	

Missing values: age=4, marital status=1, education=4, length of time in North America=3, English proficiency=1, birth country=1.

Table 2. PRECEDE Factors and Bivariate Associations with HBV Testing (n=533)

Factor	N	Tested for HBV	p-value
Predisposing factor: Knowledge			
a) Hepatitis B can be spread during sexual intercourse			
Yes	352 (66%)	58%	0.09
No	180 (34%)	50%	
b) Hepatitis B can be spread during childbirth			
Yes	401 (75%)	58%	0.006
No	132 (25%)	45%	
c) Hepatitis B can be spread by sharing toothbrushes			
Yes	462 (87%)	56%	0.20
No	71 (13%)	48%	
d) Hepatitis B can be spread by sharing razors			
Yes	364 (68%)	59%	0.01
No	168 (32%)	47%	
e) Hepatitis B can be spread by someone that looks and feels healthy			
Yes	429 (80%)	55%	0.97
No	104 (20%)	55%	
Predisposing factor: Perceived susceptibility			
a) Hepatitis B can be more easily spread between persons than AIDS			
Yes	194 (36%)	58%	0.35
No	338 (64%)	54%	
b) Chinese are more likely to get hepatitis B than whites			
Yes	200 (38%)	58%	0.28
No	333 (62%)	53%	
Predisposing factor: Perceived severity			
a) People with hepatitis B can be infected for life			
Yes	244 (46%)	63%	0.0009
No	289 (54%)	48%	
b) People with hepatitis B are sometimes avoided by others			
Yes	326 (61%)	54%	0.68
No	205 (39%)	56%	
c) Hepatitis B can cause cirrhosis			
Yes	433 (81%)	58%	0.006
No	99 (19%)	42%	
d) Hepatitis B can cause liver cancer			
Yes	428 (80%)	58%	0.002
No	104 (20%)	41%	
e) People can die from hepatitis B			
Yes	372 (70%)	54%	0.55
No	160 (30%)	57%	
Predisposing factor: Perceived effectiveness			
a) Medicines are available to treat hepatitis B			
Yes	300 (57%)	50%	0.01
No	231 (44%)	61%	
Reinforcing factor			
a) Doctor(s) had recommended hepatitis B testing			
Yes	118 (22%)	87%	<0.0001
No	415 (78%)	46%	
b) Family member(s) had suggested hepatitis B testing			
Yes	89 (17%)	82%	<0.0001
No	443 (83%)	49%	
c) Friend(s) had suggested hepatitis B testing			
Yes	43 (8%)	88%	<0.0001
No	490 (92%)	52%	
d) Employer had requested hepatitis B testing			
Yes	35 (7%)	74%	0.01
No	497 (93%)	54%	
e) Family member(s) were chronically infected with HBV			
Yes	75 (14%)	80%	<0.0001
No	457 (86%)	51%	
Enabling factor			
a) Seen by a doctor in the last year			
Yes	494 (93%)	55%	0.21
No	36 (7%)	50%	
b) Received a complete physical exam during the last year			
Yes	263 (49%)	63%	0.0002
No	270 (51%)	47%	
c) Regular source of care (hospital/clinic/doctor's office)			
Yes	494 (94%)	55%	0.69
No	33 (6%)	52%	
d) Regular provider			
Yes	498 (96%)	55%	0.66
No	20 (4%)	60%	
e) Gender of doctor			
Male	365 (70%)	56%	0.63
Female	133 (26%)	52%	
None	20 (4%)	60%	
f) Chinese ethnicity of doctor			
Yes	467 (90%)	56%	0.29
No	31 (6%)	42%	
None	20 (4%)	60%	
g) Requires an interpreter when seeing a doctor			
Yes	18 (3%)	39%	0.16
No	515 (97%)	56%	
h) Ever received obstetric services in North America*			
Yes	150 (50%)	57%	0.41
No	150 (50%)	62%	

* Restricted to 300 women. Missing values: Predisposing factors Knowledge: a=1, d=1; Perceived susceptibility: a=1; Perceived severity: b=2, c=1, d=1, e=1; Perceived effectiveness: a=2; Reinforcing factors: b=1, d=1, e=1; Enabling factors: a=3, c=6, d=15, e=15, f=15, h=3; all others=0.

The project was approved by the Research Ethics Board at the University of British Columbia.

Data Analysis

Response options of 'yes', 'no' and 'not sure/don't know' were dichotomized into 'yes' versus 'other'. Bivariate comparisons of the characteristics of respondents who did and did not report previous HBV testing were made using the chi-square test to assess statistical significance (Rosner, 2000). All associations with $p<0.05$ were considered significant. We then used unconditional logistic regression models to summarize the independent effects of individual items on HBV testing. All variables with a p-value of <0.10 in the bivariate analysis were included in our multiple logistic regression analysis (Breslow and Day, 1980).

Results

Study group and sociodemographic factors

The final study group included 533 individuals, with an overall response rate among reachable and eligible households of 59%. Reasons for non-response are discussed more fully elsewhere (Hislop et al, in press). Three hundred and seventy-four respondents (70%) completed the survey in Cantonese, 102 (19%) in Mandarin, and 57 (11%) in English. Two hundred and ninety-three (55%) indicated that they had received a HBV blood test.

The sociodemographic characteristics and HBV testing

Table 3. Factors Associated with HBV Testing, Adjusted Model*

Factor	OR	95% CI	p-value
Sociodemographic factor			
Length of time in North America (< 20 years)			
	2.1	(1.3,3.4)	0.002
Predisposing factor: Perceived severity - People with hepatitis B can be infected for life			
	1.6	(1.0, 2.4)	0.04
Reinforcing factor- Doctors had recommended hepatitis B testing			
	4.4	(2.2, 8.6)	<0.0001
Enabling factor - Received a complete physical exam during the last year	1.9	(1.3, 3.0)	0.003

*Adjusted for the following sociodemographic factors (gender, age, education, English proficiency, birth country); predisposing factors (HBV can be spread during sexual intercourse, during childbirth, by sharing razors; HBV can cause cirrhosis, liver cancer; medicines are available to treat HBV); and reinforcing factors (family members had suggested testing, friends had suggested testing, employer had requested testing, family members were chronically infected).

levels for the respondents are shown in Table 1. The majority were aged 35 years or older, currently married, with at least 12 years of education, with less than 20 years of residence in North America, fluent in English, and born in China. In bivariate analysis, female gender, younger age (<50 years), higher education (≥12 years), shorter length of time residing in North America, English fluency, and birth country (Taiwan) were all significantly associated with HBV testing.

PRECEDE factors

The distribution of PRECEDE factors and HBV testing levels are shown in Table 2.

Predisposing factors

The majority of respondents knew how HBV could be spread, even by someone appearing healthy; that it can cause cirrhosis and liver cancer; that it can be fatal; and that medicines are available for its treatment. Only about one-third knew that it was more easily spread than AIDS and that it was more common in Chinese than whites. Also, less than one-half knew that HBV infection was for life. In bivariate analysis, knowledge of spread during childbirth and by sharing razors, that HBV infection was for life, that it can cause cirrhosis and liver cancer, and that medicines are available for treatment were all significantly associated with HBV testing.

Reinforcing factors

Few respondents reported having HBV testing recommended to them by their doctor, family members, friends or employers. Despite this finding, all reinforcing factors that were examined were significantly associated with HBV testing in bivariate analysis.

Enabling factors

Most respondents reported receiving regular medical care, having a Chinese doctor, and not needing an interpreter at these doctor visits. Also, one-half of women reported using obstetric services in North America. However, the only enabling factor significantly associated with HBV testing in bivariate analysis was having received a recent complete physical exam.

In multiple logistic regression analysis, one predisposing factor, reinforcing factor and enabling factor each had significant independent effects, as shown in Table 3. Since the reinforcing factor (physician recommended testing) was so highly significantly associated with HBV testing, we repeated the analysis excluding this factor and three additional reinforcing factors became significant: family member suggested testing (OR=2.7, 95%CI=1.3-5.6; p=0.006), friend suggested testing (OR= 3.1, 95%CI=1.0-9.3; p=0.04), and family member a chronic carrier (OR=2.2, 95%CI=1.1-4.3; p=0.02).

Discussion

Slightly over one-half of Chinese adults in this study reported being tested for HBV. Several sociodemographic characteristics were associated with higher testing levels, including younger age, higher education, greater fluency in English, and birth country in Asia. Similar findings, except for birth country, were reported in an earlier Vancouver-based study of Chinese women and Pap testing behaviour (Hislop et al, 2003). Interestingly, we found that recent immigrants had higher HBV testing levels than long-term residents. This may be due to HBV testing campaigns in Asia which are lacking in Canada. Taiwan, Hong Kong and Singapore have led the world in universal childhood HBV vaccination programs, beginning in Taiwan in 1984 (Chen et al, 1987; Farrell and Liaw, 2000). Notably, our data showed relative high testing rates among individuals born in Taiwan and Hong Kong.

Although a majority of our Chinese adults had relatively good knowledge about HBV transmission routes, lack of knowledge about risk of spread during childbirth and also by sharing razors were associated with lower levels of HBV testing. The strongest independent association with HBV testing was found for the reinforcing factor, having a physician recommend testing.

It is interesting that, although most respondents had seen a doctor in the preceding year, few indicated that their doctor had ever recommended HBV testing. Numerous studies of different populations have reported an association between physician recommendation and breast and cervical cancer screening (Bastani et al, 1991; Vernon et al, 1992; Maxwell et al, 1997; Taylor et al, 1999; Taylor et al, 2002b). We previously found a strong association between physician recommendation and Pap testing in Vancouver Chinese women (Hislop et al, 2003). Few respondents also reported that their family or friends had ever suggested HBV testing, despite significant associations between HBV testing and recommendations from family and friends. These findings suggest that interventions should also include care givers and significant others.

Our study has several strengths. We used population-based sampling methods and administered an in-person survey in the language of choice. We also used the PRECEDE model as a conceptual framework which allowed us to systematically classify factors identified in our qualitative work and this framework facilitates the application of our findings to intervention planning. The

survey findings suggest that predisposing and reinforcing factors may be more important than enabling factors for HBV testing in this population. Enabling factors may be more important in other areas where the availability of Chinese care givers may be less prevalent.

Our study has several limitations. Firstly, households were recruited from areas with a relatively high density of Chinese residents. Our findings may not be generalizable to other areas with fewer Chinese persons. Also, our respondents were recruited in one lower income geographic area which may not be representative of all Chinese in Vancouver. Secondly, we missed households using cell phones only, having no phone, and having unlisted phone numbers. Thirdly, respondents to the survey may have different characteristics and preventive behaviour patterns than those who were not reached or refused to participate. Fourthly, self-reports of HBV testing may be inaccurate due to error in recall, desirability bias, or confusion about the purpose of the blood test.

In closing, our findings suggest that health education about HBV transmission and its sequelae may stimulate patients to seek HBV testing. Intervention programs that utilize physician and social networks in the Chinese community may also increase HBV testing rates. Physicians who serve Chinese patients should be educated about the importance of HBV testing, even in long-term Chinese residents. Our research group is currently conducting two randomized controlled trials on HBV knowledge and testing levels among Chinese Canadian adults: the first involves a multi-faceted outreach worker intervention and the second involves an educational curriculum for English as a Second Language students.

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