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Hepatitis B Vaccination and Infection Prevalence among Men Who Have Sex with Men Who Travel Internationally

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Abstract

Among MSM traveling internationally, self-reported HBV vaccination prevalence was 77% and less prevalent among older men and those with HBV infection. HBV infection prevalence was 25% and was associated with older age and HIV infection. Testing for chronic infection, universal vaccination, and treatment for populations with multiple risks is needed.

Keywords

hepatitis B virus; vaccination; infection; men who have sex with men; international travel

The 2017–2020 National Viral Hepatitis Action Plan (NVHAP) calls for the elimination of new viral hepatitis infections, screening for persons at risk, and access to care and treatment for persons living with chronic infections.[1] NVHAP cites low public awareness, low perceived risk and limited data to monitor infections as critical barriers to stemming the spread of viral hepatitis.[1]

Hepatitis B virus (HBV), a bloodborne and sexually transmitted infection (STI), is a major etiology of liver disease.[1,2] In the US and other countries with low endemicity, the primary exposure routes are sexual contact and injection drug use.[2] CDC estimates 850,000 Americans are living with HBV, though other studies suggest the actual numbers may exceed 2 million.[3,4]

International travelers can be susceptible to infection, especially when visiting HBV-endemic regions. Travelers often are unaware of travel-related HBV risk factors, such as condomless sex, injection drug use and medical/dental care while abroad.[5,6] A study of U.S. travelers to HBV-endemic areas found 32% of travelers reported a travel-related risk;

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and 31% sought travel medical advice prior to departure, of whom fewer than one-third were vaccinated, thus placing them at potential risk for infection.[5]

An HBV vaccine was shown to be safe and effective in a randomized controlled trial that included men who have sex with men (MSM) known to be at high risk for infection.[7] HBV vaccination recommendations first issued in 1982 specified targeted vaccination of adults at risk for infection, including MSM, persons who inject drugs (PWID) and international travelers.[8] Despite these long-standing recommendations, in 2014, only an estimated 24.5% of adults in the US had been vaccinated, indicating missed opportunities for high-risk adult populations, particularly MSM.[9]

MSM continue to be disproportionately affected, accounting for 24% of new infections.[2] They are at elevated risk due to high prevalence of HBV among MSM populations and increased transmission risk associated with condomless anal intercourse.[2,10] International travel could expose MSM to even higher prevalence populations. We therefore assessed HBV vaccination and infection in a community-based sample of MSM who travel internationally.

MSM were recruited using an adapted respondent-driven sampling method between 2009 and 2011. A detailed description of recruitment procedures has been previously reported. [11] Eligible MSM were 18 years, San Francisco Bay Area residents who traveled internationally in the previous 12 months. Of the original 501 participants enrolled in the study, 478 with blood specimens available for HBV testing were included in this analysis. The study received approval from the Institutional Review Board at the University of California, San Francisco.

Participants completed an interviewer-administered, computer-assisted survey. Demographic characteristics collected included age, race, ethnicity, education and birth country. Participants were asked about the two most recent countries visited in the previous 12 months. HBV vaccination was self-reported. HBV infection was defined as a positive result by total anti-hepatitis B core (HBc) serological testing (ADVIA Centaur HBC Total assay, Siemens Healthcare Diagnostics Inc., New York). A positive HBc test result does not provide information on stage of infection, e.g., acute, chronic or cleared. Birth and visited countries were classified as HBV-endemic if the national prevalence of HBV surface antigen in that country was ≥8%.[12] HIV status was determined by rapid antibody serological testing.

Frequency distributions were calculated for categorical variables. Medians and inter-quartile ranges (IQR) were calculated for continuous variables. Prevalence ratios (PRs) were estimated for the outcomes of HBV vaccination and infection. Bivariate and multivariable Poisson regression models with robust errors calculated PRs, adjusted prevalence ratios (aPRs), and 95% confidence intervals (CIs). Variables associated at $p < 0.20$ in bivariate analyses were included in multivariable analyses.

Self-reported HBV vaccination prevalence was 77% overall and was highest among men ages 18–40 (86%), decreasing significantly with every 10-year increase in age (aPR=0.95; $p=0.04$), as presented in Table 1. HBV-infected men (positive for total HBc) were less likely

to report vaccination (aPR=0.60; $p<0.01$). Fifty-eight of the 117 men with HBV infection (50%) reported being vaccinated.

HBV infection prevalence was 25% overall and was higher among older men, increasing significantly with every 10-year increase in age (aPR=1.49; $p<0.01$), as shown in Table 2. HIV-positive men were more likely to be infected (aPR=2.43, $p<0.01$), whereas vaccinated men were less likely to be infected (aPR=0.46, $p<0.01$). Although race/ethnicity was not significantly associated with HBV infection ($p=0.09$), black men were at elevated risk (aPR=2.22; 95% CI: 1.20, 4.10) compared to white men.

Persons who travelled to an HBV-endemic country in the previous 12 months were slightly more likely to report vaccination (82% vs. 76%; PR=1.09; $p=0.08$) and less likely to be infected (21% vs. 26%; PR=0.82; $p=0.31$). Persons born in an HBV-endemic country were slightly more likely to report vaccination (86% vs. 77%; PR=1.12; $p=0.10$) and less likely to be infected (19% vs. 25%; PR=0.76 $p=0.41$).

MSM, particularly those who travel internationally, continue to be at high risk for HBV infection. Nearly one-quarter of the men in our study reported not being vaccinated. Self-reported vaccination prevalence was lowest among men over the age of 50. This finding may be due in part to the fact that national guidelines recommending universal HBV vaccination for infants and children were not updated until the 1990's, and therefore would not have affected older individuals.[13,14] One-third of HIV-positive men reported not being vaccinated for HBV, a worrisome finding as studies on the timing of HBV vaccination relative to HIV diagnosis and the persistent rate of HBV infection post-HIV diagnosis suggest completing the vaccine series prior to HIV infection may be the best strategy for preventing HIV-HBV co-morbidity.[15] CDC projects have demonstrated the feasibility of integrating HBV prevention services in a variety of settings, including STI clinics, HIV testing sites and correctional facilities, which may present an opportunity to reach unvaccinated older MSM.[16]

One-quarter of participants tested positive for total HBc. HBV infection prevalence was highest among men who were black, older or HIV-positive. By virtue of their age, older men had more time to acquire HBV infection. A somewhat unexpected finding was that being born in an HBV-endemic country was not associated with infection. Prior studies found foreign-born persons were 9.2 times more likely to have chronic HBV compared to US-born individuals.[17] The length of time that non-US born men lived in their birth countries prior to migration to the US may have affected our results, as persons immigrating at a younger age may have a similar infection risk as those born in the US. Alternatively, increased prevalence of HBV infection among older MSM may have reduced differences in country of origin over time.

Prevalence of HBV vaccination and infection in this study population was higher than previous data among MSM in other US cities. In Los Angeles County, 46% of MSM participating in the National HIV Behavioral Surveillance system were vaccinated and 19% had serologic evidence of current or past infection.[12] Other studies reported vaccination prevalence ranging from 9% to 42% and serological evidence of infection ranging from 11%

to 20%.[18,19] Our study population was comprised of MSM who travel internationally, which may account for the higher prevalence of HBV vaccination and infection observed. Our participants may have been at higher risk for HBV infection as a result of their international travel. As previously reported, 25% of our participants reported engaging in condomless anal intercourse while traveling internationally.[20] Study participants also may have been more aware of the potential risk for acquiring HBV as a result of their sexual activity or travel destinations, and thus sought vaccination.

The study did not assess participants' reasons for their HBV vaccination decisions. Among participants who reported being vaccinated, timing of the vaccination relative to international travel or HIV diagnosis was not collected. Our study also could not determine if infection occurred in childhood, as an adult in the US, or after international travel. Moreover, serological testing for this study assessed HBV infection in the absence of testing for immunity; therefore, acute and chronic HBV infection would not be detected.

HBV vaccination coverage is still not universal among MSM, even though they remain at high risk for infection. MSM were a priority population for vaccination programs in the first national vaccination recommendations released in 1982, and are still considered a priority population in the NVHAP for 2017–2020.[1] Older men, in particular, have not fully benefited from the availability of a safe and effective vaccine. This public health gap is particularly distressing considering that it was this generation of older MSM who participated in the HBV vaccination efficacy trials. We identified a high proportion of HBV-infected individuals who reported vaccination, some of whom may have been chronically-infected. In the absence of screening for active infection, vaccinated individuals may have a false sense of protection and may not be identified for treatment. This finding highlights the importance of screening for HBV infection with appropriate testing prior to vaccination, since vaccination does not confer benefit to chronically-infected individuals.

Our study highlights the critical need for vigorous testing for HBV infection, including chronic infection, universal vaccination, and treatment where needed for populations with multiple risks for infection. The Affordable Care Act has expanded access to health insurance for many Americans.[21–23] Increased coverage for the preventive services of HBV screening and vaccination will help achieve NVHAP's goal of universal hepatitis B vaccination for vulnerable adults.

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Bivariate and multivariable analyses of factors associated with self-reported hepatitis B virus (HBV) vaccination prevalence, men who have sex with men, San Francisco Bay Area, 2009–2011 (N=478 participants)

Table 1

	MSM N (%) ¹	HBV Vaccination Prevalence n (%) ²	Prevalence Ratio (95% CI)	p-value	Adjusted PR (95% CI)	p-value
Demographic Characteristics						
Age			0.88 (0.84, 0.93) ³	<0.01	0.95 (0.90, 1.00) ³	0.04
	18–30	120 (25)	-		-	
	31–40	126 (26)	-		-	
	41–50	128 (27)	-		-	
	> 50	104 (22)	-		-	
Race/Ethnicity				0.05		0.09
	White	309 (65)	1.00		1.00	
	Asian	73 (15)	1.14 (1.02, 1.28)		0.97 (0.86, 1.11)	
	Hispanic	64 (13)	1.11 (0.98, 1.27)		1.06 (0.93, 1.20)	
	Black	12 (3)	1.23 (1.03, 1.49)		1.29 (1.06, 1.57)	
	Mixed/Other	20 (4)	0.94 (0.70, 1.26)		0.91 (0.67, 1.22)	
Education				0.58		
	High school/GED/some college	77 (16)	1.00		-	
	College degree	228 (48)	1.07 (0.92, 1.24)		-	
	Graduate school	173 (36)	1.03 (0.88, 1.21)		-	
Country of birth				0.62		
	Born in US	377 (79)	1.00		-	
	Not born in US	101 (21)	1.03 (0.92, 1.15)		-	
Born in HBV endemic country				0.10		0.49
	Yes	42 (9)	1.12 (0.98, 1.28)		1.06 (0.90, 1.24)	
	No	436 (91)	1.00		1.00	
Travel History						
Travel to HBV endemic country in previous 12 months				0.08		0.24

	MSM N (%) ¹	HBV Vaccination Prevalence n (%) ²	Prevalence Ratio (95% CI)	p-value	Adjusted PR (95% CI)	p-value
HBV and HIV	Yes	131 (28)	1.09 (0.99, 1.21)		1.06 (0.96, 1.16)	
	No	343 (72)	1.00		1.00	
HBV and HIV						
HBV infection ⁴				<0.01		<0.01
HBV-positive	117 (24)	58 (50)	0.57 (0.48, 0.69)		0.60 (0.49, 0.73)	
HBV-negative	361 (76)	312 (86)	1.00		1.00	
HIV infection						
HIV-positive	124 (26)	83 (67)	0.83 (0.72, 0.94)		1.04 (0.91, 1.17)	0.10
HIV-negative	353 (74)	286 (81)	1.00		1.00	
Indeterminate	1 (0)	1 (100)	1.23 (1.17, 1.30)		1.15 (1.01, 1.30)	

¹Number and percent are out of the total participant population (N=478)

²Number and percent express self-reported HBV vaccination prevalence for sub-categories

³Prevalence ratio (PR) and adjusted PR per 10-year increase in age

⁴HBV infection defined as a positive total hepatitis B core (HBc) test result

Bivariate and multivariable analyses of factors associated with hepatitis B virus (HBV) infection prevalence, defined as a positive total hepatitis B core (HBc) test result, men who have sex with men, San Francisco Bay Area, 2009–2011 (N=478 participants)

Table 2

	MSM N (%) ¹	HBV Infection Prevalence n (%) ²	Prevalence Ratio (95% CI)	p-value	Adjusted PR (95% CI)	p-value
Demographic Characteristics						
Age			1.78 (1.58, 2.00) ³	<0.01	1.49 (1.31, 1.70) ³	<0.01
18–30	120 (25)	4 (3)	-		-	
31–40	126 (26)	15 (12)	-		-	
41–50	128 (27)	46 (36)	-		-	
> 50	104 (22)	52 (50)	-		-	
Race/Ethnicity				0.02		0.09
White	309 (65)	86 (28)	1.00		1.00	
Asian	73 (15)	6 (8)	0.30 (0.13, 0.65)		0.63 (0.28, 1.44)	
Hispanic	64 (13)	15 (23)	0.84 (0.52, 1.36)		1.03 (0.69, 1.54)	
Black	12 (3)	5 (42)	1.50 (0.75, 3.00)		2.22 (1.20, 4.10)	
Mixed/Other	20 (4)	5 (25)	0.90 (0.41, 1.96)		1.00 (0.53, 1.90)	
Education				0.91		
High school/GED/some college	77 (16)	20 (26)	1.00		-	
College degree	228 (48)	54 (24)	0.91 (0.59, 1.42)		-	
Graduate school	173 (36)	43 (25)	0.96 (0.61, 1.51)		-	
Country of birth				0.15		0.31
Born in US	377 (79)	98 (26)	1.00		1.00	
Not born in US	101 (21)	19 (19)	0.72 (0.47, 1.12)		1.24 (0.82, 1.89)	
Born in HBV endemic country				0.41		
Yes	42 (9)	8 (19)	0.76 (0.40, 1.45)		-	
No	436 (91)	109 (25)	1.00		-	
Travel History						
Travel to HBV endemic country in previous 12 months				0.31		

	MSM N (%) ¹	HBV Infection Prevalence n (%) ²	Prevalence Ratio (95% CI)	p-value	Adjusted PR (95% CI)	p-value
	Yes	131 (28)	0.82 (0.57, 1.20)		-	
	No	343 (72)	1.00		-	
HBV and HIV						
HBV vaccination history ⁴						
				<0.01		<0.01
Vaccinated	370 (77)	58 (16)	0.29 (0.21, 0.38)		0.46 (0.34, 0.62)	
	108 (23)	59 (55)	1.00		1.00	
Not vaccinated						
HIV infection				<0.01		<0.01
	124 (26)	67 (54)	3.8 (2.81, 5.17)		2.43 (1.77, 3.33)	
HIV-negative	353 (74)	50 (14)	1.00		1.00	
	1 (0)	0 (0)	-		-	
Indeterminate						

¹ Number and percent are out of the total participant population (N=478)

² Number and percent express HBV infection prevalence for sub-categories

³ Prevalence ratio (PR) and adjusted PR per 10-year increase in age

⁴ Self-reported HBV vaccination history