Title

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Journal

Open Forum Infectious Diseases, 9(5)

ISSN

2328-8957

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Publication Date

2022-05-01

DOI

10.1093/ofid/ofac175

Peer reviewed

Open Forum Infectious Diseases

BRIEF REPORT

Gaps in Hepatitis A and Hepatitis B Vaccination Among Hepatitis C Antibody–Positive Individuals Experiencing Homelessness

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Vaccination for both hepatitis A (HAV) and hepatitis B (HBV) is recommended in hepatitis C infection (HCV). Among HCV antibody–positive persons experiencing homelessness, we identified high rates of HAV (34%) and HBV vaccine (35%) eligibility, highlighting critical gaps in HCV preventative services. Following education, 54% and 72% underwent HAV and HBV vaccination, respectively.

Keywords. viral hepatitis; vulnerable populations; homeless shelter; vaccine hesitancy; COVID-19.

Hepatitis A (HAV) and hepatitis B (HBV) vaccines are recommended by the Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practice (ACIP) and the American Association for the Study of Liver Diseases (AASLD)/Infectious Disease Society of America (IDSA) in those with hepatitis C infection (HCV) [1–7]. The ACIP also recommends HAV vaccination in high-risk populations including persons experiencing homelessness (PEH), as well as HBV vaccination in all adults aged 19–59 [8]. Because PEH have a higher burden of vaccine-preventable disease, have a higher prevalence of HCV, and encounter heightened barriers to care, characterization of baseline HAV and HBV vaccination rates in PEH is necessary for delivery of comprehensive care [3, 6, 9–17].

In the era of the coronavirus disease 2019 (COVID-19) pandemic, resources have been committed to identifying vaccine implementation strategies and addressing vaccine hesitancy in efforts to reduce health disparities [20]. It is essential to be prepared to apply similar fundamental principles across additional vaccine-preventable and -modifiable public health threats such as viral hepatitis. Estimates of vaccination rates for HAV and HBV in persons experiencing homelessness remain insufficiently characterized [16–18, 21].

Here, we investigate the eligibility and baseline rate of vaccination for HAV and HBV in a diverse group of HCV antibody (HCV Ab)–positive PEH as part of a comprehensive shelter-based integrated HCV education and treatment program [19] with the aim of understanding gaps in preventative care for this vulnerable population.

METHODS

Study Population and Study Design

For this analysis, a prospective study was conducted by a multidisciplinary team at 4 large homeless shelters, 2 in San Francisco, California, and 2 in Minneapolis, Minnesota, from August 1, 2018, to January 30, 2021 [19]. Following informed consent, 766 (426 from CA and 340 from MN) adults age 18 years and older seeking shelter services who were either HCV treatment naïve or had not received HCV treatment within the prior 12 weeks were enrolled. HCV Ab–positive PEH who accessed low-threshold temporary shelters and safety net liver specialty care were also recruited. Shelter clients with significant medical or psychiatric conditions that prevented consenting or participation in the study were excluded.

Study Procedures

Clients who met study eligibility criteria were enrolled, completed a questionnaire, and underwent point-of-care HCV testing (OraQuick HCV Rapid Antibody Test, OraSure Technology, Bethlehem, PA, USA). Those who tested positive for HCV antibody underwent phlebotomy primarily onsite or alternatively through their provider for confirmatory HCV RNA testing and additional testing including hepatitis B serologies (hepatitis B surface antigen [HBsAg], total hepatitis B core antibody [HBcAb], hepatitis B surface antibody [HbsAb], and hepatitis A immunoglobulin G or total antibody [HAV IgG/total Ab]). Participants completed HCV education and pre- and posteducation questionnaires, as previously described [22].

Patient Consent

Institutional review board approvals were obtained from the University of California San Francisco and Hennepin Healthcare Human Subjects Research Committee, and all participants provided written consent.

Assessment of Clinical Variables

HAV and HBV serology results and vaccination status were captured through electronic medical record (EMR) documentation.

Received 6 January 2022; editorial decision 28 March 2022; accepted 4 April 2022; published online 7 April 2022.

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Open Forum Infectious Diseases®2022

https://doi.org/10.1093/ofid/ofac175

HAV vaccine eligibility was defined as HAV IgG/total Ab– serology. Chronic HBV infection was defined as HBsAg+. Prior exposure to HBV with evidence of natural immunity was defined as HBsAg–, total HBcAb+, and HBsAb+. HBV vaccine eligibility was defined as negative serologies for HBsAg, total HBcAb, and HBsAb. Prior evidence for receipt of HBV immunization by serology was defined as HBsAg–, total HBcAb–, and HBsAb+. Unknown HAV or HBV vaccine eligibility status was defined as either lack of available serologies, lack of documentation of prior vaccination, or presence of isolated total HBcAb positivity.

Statistical Analysis

Descriptive analyses of cohort characteristics were performed to obtain frequency (%) for categorical variables and median (interquartile range [IQR]) or mean (SD) for continuous variables. Patient characteristics were compared using the Mann-Whitney test for continuous variables and the χ^2 test or Fisher exact test, as appropriate, for categorical variables among those with or without receipt of vaccination. All analyses were performed in Stata 15 (Stata Corp LP, College Station, TX, USA).

RESULTS

Population

A total of 162 of 766 PEH tested positive for HCV Ab. Of these, 107 had detectable HCV RNA, and 54 had undetectable HCV RNA (HCV RNA results were unavailable for 1 patient). Participant characteristics are summarized in Table 1 by HCV RNA status. Participants were predominately male (75.8%), Black (41%), or non-Hispanic White (39.1%), with a median age of 55.8 years. A majority reported illicit drug use in the past year (84.3%), and approximately one-third reported heavy alcohol use. Most patients had a primary care provider (82.6%) and were publicly insured (89.3%).

Table 1. Participant Characteristics by HCV RNA Status

	HCV Antibody Positive (n = 162)[a]	HCV RNA Negative (n = 54)[a]	HCV RNA Positive (n = 107)[a]	*P* Value
Age, median (range) [IQR], y	55.8 (21.2–82.1) [49.4–62.7]	56.3 (31.7–75.4) [49.9–63]	55.7 (21.2–82.1) [48.8–62.3]	.7
Male sex, %	75.8	70.4	78.5	.3
Race, %	(n = 161)	(n = 53)		.3
Black/African American	41.0	45.3	39.2	
White, non-Hispanic	39.1	28.3	44.9	
Hispanic	9.3	11.3	8.4	
Native American/Alaska Native	3.1	3.8	1.9	
Asian/Pacific Islander	1.9	3.8	0.9	
Multiple races	5.6	7.5	4.7	
Education, %	(n = 161)	29.6	(n = 106)	.2
Less than high school	24.8	27.8	22.6	
High school	37.9	42.6	42.5	
More than high school	37.3		34.9	
Insurance type, %	(n = 150)	(n = 50)	(n = 99)	1.0
Public	89.3	90.0	88.9	
Private	4.0	4.0	4.0	
Uninsured	6.7	6.0	7.1	
Has a health care provider, %	(n = 145) 82.6	(n = 44) 72.7	(n = 101) 81.2	.3
History of prior HCV testing, %	(n = 161) 80.1	79.6	80.4	1.0
History of injection drug use ever, %	(n = 158) 66.5	(n = 52) 69.2	(n = 106) 65.1	.7
Illicit drug use within the past year, %	(n = 159) 84.3	(n = 53) 88.7	(n = 106) 82.1	.4
Alcohol use within the past year, %	(n = 159)	44.4	(n = 105)	.9
None/minimal	42.1	22.2	41.0	
Moderate	23.9	33.3	24.8	
Heavy/binge	34.0		34.3	
History of substance use therapy, %	(n = 156) 62.2	(n = 53) 64.2	(n = 103) 61.2	.7
Shelter location, No. (%)	(n = 161)	(n = 54)	(n = 107)	.04
San Francisco	103 (64.0)	41 (75.9)	62 (57.9)	
Minneapolis	58 (36.0)	13 (24.0)	45 (42.1)	

Abbreviations: HCV, hepatitis C virus; IQR, interquartile range.

[a]Unless otherwise specified.

Participant Attitudes Toward HAV and HBV Vaccination

Before HCV education, 77.4% of participants felt that it was a "good idea for people living with HCV to be vaccinated against HAV and HBV," and following education 91.3% agreed with this statement. There were no statistically significant differences in participant characteristics, HCV RNA status, or vaccination status with respect to the response to this question (data not shown).

HAV and HBV Serology and Vaccination Status

At baseline overall, combining known vaccination status by EMR and by serology, 55.6% (90/162) were vaccinated against HBV. With respect to HBV status, 1.4% (2/142) with available HBsAg serology had chronic HBV. Moreover, among 123 who had all 3 HBV serologies available (Table 2), 29% (36/123) had prior exposure to HBV with evidence of natural immunity, 25.2% (31/123) had previously been vaccinated, and 35% (43/123) were eligible for HBV vaccination. Compared with those without detectable HCV RNA, a higher proportion of those with detectable HCV RNA were HBV vaccine eligible (25.0% vs 39.1%, respectively).

With respect to HAV vaccination eligibility, when combining known vaccination status by EMR documentation and by serology, 59.9% (97/162) were immune to or vaccinated against HAV. Of participants with available HAV IgG/total Ab (n = 127), 33.9% were eligible for HAV vaccination (Table 2). A similar proportion of those with or without detectable HCV RNA were HAV vaccine eligible (33.7% vs 34.9%; $P = 1.0$). However, a higher proportion of HAV vaccine–eligible participants who were vaccinated for HAV had detectable HCV RNA (65% vs 28%; $P = .048$) (Table 2).

Overall, at baseline there were no statistically significant differences in sociodemographic or clinical parameters among those who did or did not receive vaccination (data not shown). Following enrollment in the study, 53.5% (23/43) HAV vaccine–eligible participants received HAV vaccination, and 72.0% (31/43) HBV vaccine–eligible participants received HBV vaccination. There were no distinguishing characteristics among those who did or did not undergo vaccination during the study, except that those who were vaccinated were younger compared with those who were not vaccinated (median age, 52.4 vs 56.7 years; $P = .047$).

DISCUSSION

In this study, we identified suboptimal vaccination rates for HAV and HBV in HCV Ab–positive PEH, despite a majority of participants endorsing positive attitudes toward receipt of vaccination. HCV education resulted in a high proportion of participants receiving HAV and HBV vaccines. We also identified that younger patients were more likely to be vaccinated. Regardless of whether this discrepancy in vaccine receipt between age groups is related to vaccine acceptability or targeted vaccination due to ongoing risk behavior, providing education to patients and providers on the importance of HAV and HBV vaccination among all age groups of PEH will be integral to enhancing vaccination uptake.

About one-third of our participants were eligible for HAV vaccination, similar to rates identified for PEH in a Detroit-based study [23]. In contrast, for HBV vaccination, about 35% of participants were eligible for HBV vaccination, which is higher than self-reported HBV vaccine eligibility in a prior London study of hard-to-reach HCV Ab+ patients [24].

Despite AASLD/IDSA guidelines recommending HAV and HBV vaccination for persons with HCV, as well as ACIP

Table 2. HAV and HBV Vaccination Eligibility and Vaccination Rate

	HCV Antibody Positive (n = 162)[a]	HCV RNA Negative (n = 54)[a]	HCV RNA Positive (n = 107)[a]	*P* Value
HAV vaccine eligible, No. (%)	(n = 127) 43 (33.9)	(n = 41) 14 (34.1)	(n = 86) 29 (33.7)	1.0
HAV vaccination after enrollment, No. (%) Yes No	(n = 43) 23 (53.5) 20 (46.5)	(n = 14) 4 (28.6) 10 (71.4)	(n = 29) 19 (65.5) 10 (34.5)	.048
HBV vaccine eligibility, No. (%) HBV vaccine eligible Prior vaccination for HBV Prior exposure to HBV with natural immunity Isolated total HBcAb positive	(n = 123) 43 (35.0) 31 (25.2) 36 (29.3) 13 (10.6)	(n = 36) 9 (25.0) 13 (36.1) 9 (25.0) 5 (13.9)	(n = 87) 34 (39.1) 18 (20.6) 27 (31.0) 8 (9.2)	.2
HBV vaccination after enrollment, No. (%) Yes No	(n = 43) 31 (72.0) 12 (28.0)	(n = 9) 6 (66.7) 3 (33.3)	(n = 34) 25 (73.5) 9 (26.5)	.7

Abbreviations: HAV, hepatitis A virus; HBcAb, total hepatitis B core antibody; HBV, hepatitis B virus; HCV, hepatitis C virus.

[a]Unless otherwise specified.

recommendations for HAV vaccination for PEH and HBV vaccination for all adults aged 19–59, rates of vaccination for PEH remain suboptimal [8, 16, 23, 24]. Analysis of effective HAV and HBV vaccine implementation strategies is essential given higher liver disease–related mortality in PEH [25]. As health care professionals promote COVID-19 vaccinations for PEH, we must also encourage strong vaccination advocacy for HAV and HBV. We call for action regarding the following: (1) Like the ACIP 2022 recommendations [8], the AASLD/IDSA HCV guidelines should specifically include recommendations for hepatitis vaccinations in PEH [5, 7, 16]. (2) We should examine the efficacy of the new 2-dose Heplisav-B vaccine for persons with HCV in the effort to reduce 3-vaccine series completion barriers [26, 27]. (3) We should continue to leverage existing infrastructures for HCV care through trusted networks (community health outreach workers, near-peer advocacy) and develop shelter-based vaccination efforts for HAV and HBV [19, 28–31].

Our study has limitations. Participants in our study may be more motivated to engage in HCV care and vaccination uptake than the general PEH population. In addition, despite inclusion of 2 geographically distinct regions, our findings may not be generalizable to other populations of PEH. Nevertheless, we captured baseline vaccination rates for HAV and HBV in HCV Ab+ PEH.

As vaccine implementation resources are scaled up during the COVID-19 pandemic, vaccination drives to fully vaccinate PEH provide an opportunity to address the gaps in HAV and HBV vaccination identified here.

Acknowledgments

The investigators would like to thank participating shelter staff, providers, and leadership, as well as GLIDE's HIV/Hep C and Harm Reduction Services program (San Francisco), the San Francisco Department of Public Health, Ms. Katie Burke, MPH, from the San Francisco Department of Public Health Population Health Division, and Minneapolis Healthcare for the Homeless.

Financial support. This work was supported by an investigator-initiated grant from Gilead Sciences Inc. (IN-US-342-4531 to M.K. and J.P.), National Institutes of Health (K24AA022523 to M.K.).

Potential conflicts of interest. Jesse Powell is a recipient of a research grant from Gilead Sciences Inc., and he has served on an advisory board for Gilead Sciences Inc. Mandana Khalili is a recipient of a research grant (to her institution) from Gilead Sciences Inc. and Intercept Pharmaceuticals, and she has served as consultant for Gilead Sciences Inc. The remaining authors have no financial disclosures. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

Author contributions. D.P. (diana.partida@ucsf.edu): interpreted data, participated in manuscript writing, reviewed and edited manuscript. J.P. (jesse.powell@hcmed.org): interpreted data, participated in manuscript writing, reviewed and edited manuscript. D.G. (danielg4@alumni.stanford.edu): performed data analysis, reviewed and edited manuscript. M.K. (mandana.khalili@ucsf.edu): contributed to study design, provided material support, reviewed statistical analyses, edited the manuscript, approved final submission.

Data statement. Data are not publicly available.

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