

Hepatitis B virus screening in Asian immigrants: Community-based campaign to increase screening and linkage to care: A cross-sectional study

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Abstract

Background and Aims: Despite established screening guidelines, many Asian immigrants remain unscreened. Furthermore, those with chronic hepatitis B (CHB) are not linked to care citing multiple barriers. The objective of this study was to determine the role of our community-based hepatitis B virus (HBV) campaign on HBV screening and the success of linkage to care (LTC) efforts.

Methods: Asian immigrants from the New Jersey and New York metropolitan areas were screened for HBV from 2009 to 2019. We started to collect LTC data starting in 2015, and those found to be positive were followed up. In 2017, because of low LTC rates, nurse navigators were hired to aid in the LTC process. Those excluded from the LTC process included those who were already linked to care, declined, and/or had moved or passed away.

Results: Total of 13,566 participants were screened from 2009 to 2019, of which, the results for 13,466 were available. Of these, 372 (2.7%) were found to have positive HBV status. Approximately 49.3% were female and 50.1% were male, and the rest were of unknown gender. A total of 1191 (10.0%) participants were found to be HBV negative but required vaccination. When we started to track LTC, we found 195 participants that were eligible for LTC between 2015 and 2017 after the exclusion criteria were applied. It was found that only 33.8% were successfully linked to care in that time period. After hiring nurse navigators, we saw LTC rates increase to 85.7% in 2018 and to 89.7% in 2019.

Conclusion: HBV community screening initiatives are imperative to increase screening rates in the Asian immigrant population. We were also able to demonstrate that nurse navigators can successfully help increase LTC rates. Our HBV community screening model can address issues with barriers to care including lack of access in comparable populations.

KEYWORDS

Asian immigrants, community-based, hepatitis B screening, linkage to care

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1 | INTRODUCTION

About 296 million people have chronic hepatitis B (CHB), according to the World Health Organization (WHO) report in 2019.¹ In the United States, it has been estimated that about 847,000 persons are infected with hepatitis B virus (HBV),² however this number is thought to have been underestimated as high-risk populations may not be properly accounted for.³ When accounted for, it is estimated that about 2.4 million individuals are infected with HBV.^{3,4}

It has been reported that Asian Americans and Pacific Islanders (AAPI) account for 58% of CHB cases,^{5,6} and that the highest prevalence is found among Asian immigrants.^{7,8} Specifically, Kowdley et al. found that AAPI comprises less than 6% of the population but represents the highest and most disproportionate burden for HBV-linked HCC (approximately 58%).⁹ In 2014, screening guidelines for HBV recognized that persons born in Asia are an at-risk population and therefore should be screened.¹⁰ Despite these recommendations, estimated screening rates have been shown to be below 30%–50%.¹¹ Consequently, fewer than 25% of Asian immigrants estimated to have CHB are diagnosed with CHB.¹²

According to the WHO, only about 10 million people diagnosed with CHB were on treatment by 2019,¹ indicating that there is a large discrepancy between those that are getting screened/diagnosed from those who have access to care and/or treatment. This raises the question of potential linkage to care (LTC) barriers that may exist. From 2009 to 2010, Hu et al. surveyed 28 minority communities across the United States and reported poor awareness and LTC among ethnic minorities.¹¹ In addition, the Chronic Hepatitis Cohort study done by Cohen and colleagues. found that of those diagnosed with CHB, only 40% were referred and linked to care. Some potential barriers to LTC were cited to be lack of access, poor health literacy, lack of insurance, and cultural and language barriers.^{10,13}

In our study, we sought to address the issues of inadequate screening and poor LTC through community-based outreach efforts in New Jersey and New York, states known to have prominent Asian immigrant populations. Through ongoing screening efforts from 2009 to 2019, our aim was to improve HBV screening among Asian immigrants. Following up on these screening efforts, starting in 2015, we were then able to assess the need for LTC in this population. Finally, we determined specific factors that helped to improve our LTC efforts.

2 | METHODS

2.1 | Participants

All participants were Asian immigrants identified through a large-scale, community-based HBV screening and Awareness campaign led by Asian Health Services (AHS) at Holy Name Medical Center in Teaneck, NJ between 2009 and 2019. The same sample has been the subject of other studies including those done by Hyun et al.^{14–17} All participants were of Asian heritage including Koreans, Vietnamese,

Filipinos, Indians, and Chinese. All were immigrants from their respective countries. Ages ranged from 21 to 108 with a mean age of 58.

2.2 | Study design

From 2009 to 2019, the AHS group set out to increase HBV screening and LTC efforts by bridging cultural gaps particular to the Asian community through disease surveillance and educational efforts. We focused our efforts on New Jersey, which is home to the largest Asian American population in the Northeast and the third largest in the nation with over 804,000 residents according to US Census Bureau. AHS particularly targeted Bergen County and Hudson County. According to the 2015 US Census Bureau estimates, Bergen County had over 926,300 residents representing over 10% of all New Jersey residents with AAPI comprising around 15.62% of this population while Hudson County had over 677,900 residents with AAPI comprising around 15.9% of this population.

The staff included in these screening endeavors consisted of board-certified community physicians with similar cultural backgrounds who were particularly skilled in communicating with populations who spoke the same language. Additional staff included nurses, volunteers, and medical students who were all specially trained to work with the targeted demographic. We made efforts to eliminate any potential barriers to care that were posed by language and culture. Finally, we were sensitive to engendering trust and positive interactions wherein patients are more likely to seek follow-up care and comply with healthcare advice.

2.3 | Screening and serological survey

We adapted current clinical guideline recommendations from the Centers for Disease Control and Prevention, the United States Preventative Task Force, and the American Association for the Study of Liver Diseases as the standard for screening community members for HBV. We collected blood samples from participants for laboratory analysis which included testing for hepatitis B surface antigen (HBsAg), anti-HBs, and total anti-hepatitis B core antigen (anti-HBc). Blood draws were either done by certified phlebotomists or nurses and all results were reviewed by physicians. We considered the anti-HBs level of less than 5 mIU to be negative and not immune to HBV. Those who were not immune to HBV, and were willing, were vaccinated. Those who were infected with HBV were advised to establish LTC. Participants who had tested positive for isolated anti-HBc were given the option to undergo a second test to rule out a false-positive test or to receive an HBV vaccine as previous studies have demonstrated that most patients with isolated anti-HBc responded to HBV vaccine by forming anti-HBs.^{18,19} We did not perform an HBV DNA test in our population sample. If a second test yielded a definitive HBV status, they were stratified to their respective sample. Otherwise, those with isolated anti-HBc were

excluded from our study sample and we did not perform HBV DNA testing in our population sample to determine if the participant had occult HBV infection. Simultaneously, participants were asked to complete a questionnaire that included questions regarding gender, date, and location of birth, ethnicity, preferred language, and preferred method of communication. The questionnaire also included questions regarding their knowledge about HBV and their own personal HBV status.

All participants were then followed up either by telephone, mail, or email. Those who did not respond initially were followed up several times through phone calls, mail, and email (up to a dozen times) before they were considered lost to follow up.

2.4 | LTC

From 2015 onwards, the campaign took its natural step in addressing the positive CHB prevalence rates in the Asian immigrant community. Between the years 2015 and 2019, we focused more of our efforts on improving LTC. For the purposes of our study, we defined LTC as the successful attendance of at least one appointment between a participant and a physician with the purpose of addressing concerns about the participant's CHB status and any plans for treatment. Up to 2017, although the follow-up was performed by our staff, it was ultimately up to the participant to organize appointments with an appropriate physician of their choosing. Surveys performed at this time demonstrated an LTC rate of 33.8%. In 2017, the AHS hired specially trained nurse navigators on HBV and CHB, cultural competency, insurance evaluation, and the marketplace insurance application process for the uninsured, scheduling medical appointments and guiding patients through health systems. Those who were not already in care and wished to initiate LTC were actively referred by these nurse navigators to specialists within the community. These nurse navigators were given a list of physicians specially trained to

treat CHB and then assigned a small number of participants to follow. Their goal was to investigate potential individual barriers to care and then find ways to address them. For example, did participants have difficulty finding transportation to these physician offices? Or did these patients not have the proper insurance to cover the costs of these visits and/or medications? Our nurse navigators worked with participants and physician offices to ensure that appointments were made and fulfilled. Our nurse navigators corresponded with participants on a weekly basis either by telephone, mail, or email. Communication was consistent until participants were successfully linked to care, or if they expressed that they no longer wished to be linked to care or were lost to follow-up despite multiple attempts at reaching them.

2.5 | Data analysis (Fisher's exact test, confidence intervals)

Exact binomial 95% CIs were calculated for the prevalence of HBsAg seropositivity. A two-tailed Fisher's exact test was used to identify any differences between frequencies. STATA was used for all analyses (version 16; STATACorp).

3 | RESULTS

3.1 | Serological data

Of the 13,566 participants screened between 2009 and 2019, the results for 13,466 participants were available. There were proportionately more female participants (60.2%) and between 51 and 70 years of age (53.2%) (Figure 1). Of these participants, 372 (2.7%) were infected with HBV (Table 1). Prevalence of HBsAg varied between age groups: 0.2% (age 21–30); 2.2% (age 31–40); 3.0% (age

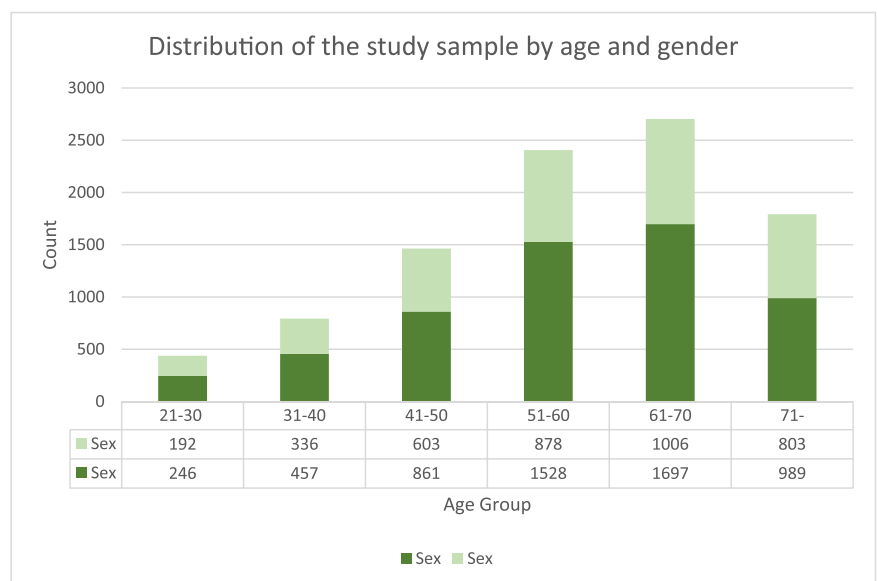


FIGURE 1 Distribution of the participants in the study by age and gender

TABLE 1 Demographic and linkage to care data of those infected (2009–2018)*

Demographic data	Participant number	Number of HBV infected	95% CI	Number of successful LTC	95% CI
Age group					
21–30	492	1 (0.2%)	0.04%–1.4%	0 (0%)	N/a
31–40	897	20 (2.2%)	1.4%–3.4%	6 (33.3%)	16.3%–56.3%
41–50	1727	52 (3.2%)	2.3%–3.9%	11 (33.7%)	21.9%–54.5%
51–60	2828	110 (3.9%)	3.2%–4.7%	15 (27.8%)	17.6%–40.9%
61–70	3190	85 (2.7%)	2.2%–3.3%	24 (55.8%)	41.1%–69.6%
71–	2379	63 (2.6%)	2.1%–3.4%	12 (85.7%)	60.1%–96.0%
%Unknown	339	13 (3.8%)	2.3%–6.4%	0 (0)	N/a
Gender					
Male	4700	172 (3.7%)	3.2%–4.2%	32 (41.0%)	30.8%–52.1%
Female	7073	169 (2.4%)	2.1%–2.8%	36 (40.4%)	30.9%–50.8%
Unknown	79	2 (2.5%)	0.7%–8.8%	0 (0%)	N/a

Abbreviations: CI, confidence interval; HBV, hepatitis B virus; LTC, linkage to care.

*In 2019, 1714 participants were screened, of whom 29 were found to be infected. No demographic data were available for these participants.

41–50); 3.9% (aged 51–60); 2.7% (age 61–70); 2.6% (age 71 and over). The highest prevalence rate of HBsAg found among the known age groups was in the 51–60 age group. Of the 372 seropositive participants, 169 identified themselves as females and 121 as males with two participants who did not disclose their gender. The prevalence rate of HBsAg was found to be 2.4% in females and 3.7% in males. Of those who were found to be seropositive for HBsAg, females made up 49.3% while males made up 50.1% (Table 1).

3.2 | Infection history

Of those who were found to be serologically positive, part of the follow-up survey included asking the participant if they knew of their HBV status, and if so, for how long. It was found that, out of 372 infected individuals, 63 (13.3%) were newly diagnosed, 143 (38.4%) were aware that they were infected with HBV in some form and the infection history of 166 (44.5%) could not be determined. Of the 143 individuals who were aware of their HBV status, 140 (97.9%) of them have immigrated to the United States within the last 20 years, 59 (13.9%) of them admitted taking medications and only 24 (16.7%) admitted regularly following up with either their primary care physician, hepatologist or gastroenterologist regarding their HBV status.

3.3 | Linkage to care data

From 2009 up to 2017, 324 total HBV-positive participants were found. Of these 324 participants, exclusions were then considered including whether the patient had provided incorrect contact information ($n = 120$),

TABLE 2 Successful LTC rates 2009–2019

	Number of HBV infected	Percentage
Successful LTC		
Up to 2017	56 (out of 195)	33.8
2018	12 (out of 14)	85.7
2019	26 (out of 29)	89.7

Abbreviations: HBV, hepatitis B virus; LTC, linkage to care.

if they declined to be linked to care ($n = 6$) and if they had moved, been incarcerated, or were deceased ($n = 3$). In this initial period, only 33.8% were found to have been successfully linked to care (Table 2). In 2018, a total of 19 HBV-positive participants were found. Of these 19, exclusions included if they declined to be linked to care ($n = 2$), were already in care ($n = 1$), had moved/deceased/incarcerated ($n = 1$) and if the contact information they provided was incorrect ($n = 1$). After these exclusions were applied, 14 individuals were found eligible to be linked to care. Twelve out of these 14 participants (85.7%) were able to be linked to care. In 2019, all participants found to be HBV positive ($n = 29$) were eligible to be linked to care. Of these, 26 (89.7%) were linked to care and the rest ($n = 3$) declined to be linked to care or could not be reached (Table 2).

4 | DISCUSSION

The purpose of our study was to describe community-based HBV screening campaigns in the Asian immigrant population and the potential role that nurse navigators may have in improving LTC rates in those found to be infected with HBV. We created a large-scale HBV screening community outreach program in New Jersey and New York targeted at

Asian immigrants, one of the most at-risk populations in the United States.^{10,20}

Of the participants we screened from 2009 to 2019, 2.7% were found to have CHB. We further categorized these participants based on age group and gender. The highest rate was found in the age groups 51–60 with an infection rate of 3.9%. The prevalence rate was 2.4% in females and 3.7% in males. Based on available data from comparable screening efforts, the total HBV prevalence rate, rates by age group, and rates by gender in our study were all found to be lower. For example, a community-based HBV screening campaign by Hann et al. evaluated 6130 Korean Americans in the eastern United States between 1988 and 1990 and found an HBsAg positive rate of 6.1%, 8% for males, and 4.4% for females.²¹ Another community-based study on 609 Korean Americans in Colorado between 2004 and 2007 revealed an HBV incidence rate of 4% with a risk of lifetime HBV infection in people older than 50 years that is 14 times higher than the risk for people younger than the age of 30.²² One more study on 3163 Asian American residents from California found that 8.9% of their screened population were infected with CHB with a 12.1% infection rate in males versus 6.4% in females. Those in the 40–49 age group were found to have the highest rate at 12.2%.¹² Finally, in a study out of Michigan looking at 1509 Asian Americans, 6.4% were found to be infected.²³ Of those infected, 44.3% were females and the age group over 69 was found to have the highest rate.²³

Newly screened Asian immigrants coming into the United States have been shown to have an estimated prevalence rate between 6.2% and 14.8%, which is disproportionately higher than the 0.3%–0.5% prevalence rate estimates in Americans.^{5,24,25} Although prevalence rates seem to be decreasing in the Asian immigrant population over recent years, it should be noted that these rates are still high when compared to US populations. Studies have shown that in the United States, the rate of CHB in non-Hispanic Whites was 0.1%, Hispanics was 0.1%, and African Americans were 0.6%.^{10,25} These rates were found to be lower than the CHB infection rates of 7% in Asians: 9% in foreign-born Asians, and 1.5% in US-born Asians.²⁵ Vaccine programs that were implemented later in the 20th century may be one reason for the disparity found in this population.^{26,27} For example, it wasn't until 1998 that South Korea launched its universal vaccination program which decreased the prevalence of HBsAg from 4.6% in 1998 to 2.9% in 2008.²⁶ Another example of this is the implementation of the HBV vaccination program for newborns in Thailand starting in 1988.²⁷ Children and adolescents born after this implementation have a carrier rate less than 1% compared to 5%–6% previously.²⁷ In addition to race/ethnicity, studies also suggest that HBV is related to other demographic and social characteristics, and social barriers such as a lack of literacy, education, or cultural fluency.⁹ Moreover, infection with HBV varies by the length of US residency for immigrants with HBV disproportionately affecting many first-generation (foreign-born) Asian immigrants. For example, in a New York City study cited earlier, 99% of the participants in the community screening program were foreign-born: 60% were from China, 30% were from Korea and 7% were from Malaysia.

In our efforts to increase LTC rates, we found many barriers to care. During follow-up, the following challenges were noted: cultural

and linguistic barriers, limited access to medical care and lack of health insurance for many immigrants and refugees, and programs' inability to access some of the communities at risk. LTC rates following our screening campaign demonstrated increasing success from 33.8% in 2017, 85.7% in 2018 and 89.7% in 2019. These increasing rates seem to reflect the success of adopted LTC efforts, most notably, the expertise of nurse navigators. When we started to focus more on LTC efforts starting in 2015–2017, we found that our LTC rates were low at 33.8%. In late 2017, after hiring nurse navigators to spearhead increasing LTC efforts, we saw LTC rates increase to 85.7% in 2018 and 89.7% in 2019. With our campaign, we were able to demonstrate that higher LTC rates are attainable despite the aforementioned barriers to care. Finally, our campaign is not an isolated example. HBV testing and LTC programs serving foreign-born populations in other metropolitan cities have all employed similar strategies, including the use of nurse navigators, to increase LTC rates.^{28,29}

This study has important limitations. First, our results may not be generalizable in various settings and geographic regions. As we only sampled Asian immigrants from the states of New Jersey and New York, this may not accurately represent all Asian immigrants living in the United States. Second, with our definition of LTC, the number of participants we counted as linked to care may be viewed as conflated, especially in a disease that requires life-long follow-up. Third, our sample may not be entirely random with certain selection biases. It is possible that participants who participated in the survey were those who would be more willing to engage in LTC overall. Additionally, participants who may have already known about their HBV status may have been more willing to participate in hopes of having their condition more easily addressed. Both influences may have artificially increased the prevalence of HBV in this population and increased the ratio of participants who knew about their status versus those that were newly diagnosed.

In conclusion, the goal of this study was to demonstrate the importance of continued HBV screening efforts in communities with a large population of immigrants who are at risk, and the importance of optimal LTC efforts in Asian immigrants who have tested positive for HBV. By focusing on populations found to be at increased risk for HBV, it is our hope that we can narrow the difference in HBV rates in the foreign-born immigrant population versus the US-born population.

AUTHOR CONTRIBUTIONS

Aziza Win contributed to the investigation, methodology, writing of the original draft, and editing and revising process. Scott King contributed to the investigation, formal analysis of the results, and the editing and revising process of the writing. Gregory Wu contributed to the investigation, methodology, writing of the original draft, and editing and revising process. Steve Kwon contributed with conceptualization, data curation, formal analysis of the results, investigation, methodology, project administration, supervision, validation, writing of the original draft, and editing and revising process. All authors have read and approved the final version of the manuscript.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Steve Kwon had full access to all of the data in this study and takes complete responsibility for the integrity of the data and the accuracy of the data analysis.

TRANSPARENCY STATEMENT

The lead author (Steve Kwon) affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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