

Screening for hepatitis B in the Bronx West African community with a blood pressure cuff: a cohort study



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Summary

Background Hepatitis B (HBV) and hypertension (HTN) are prevalent in West Africa (WA). Inadequate control is common, and evaluation and management are challenging among immigrants due to unfamiliarity with the United States (US) healthcare system. While HBV is stigmatised, HTN is recognised as an important condition. We describe how a HTN screening program can facilitate HBV screening in the Bronx WA community.

Methods Thirty-minute HTN educational programs were delivered in collaboration with faith-based organisations, and 5-min presentations were presented upon request at community gatherings. Arrangements were made for those interested in a clinic visit where a questionnaire was completed, blood pressure (BP) measured, a free BP cuff provided, HBV testing performed, and referrals made. For those without ongoing care, insurance was arranged, and linkage to care provided.

Findings Seven 30-min and five 5-min presentations were conducted. After the 30-min presentation, 204 of 445 attendees (45.8%) requested a visit, and 68 (33.3%) attended the visit. After the 5-min presentation, 80 requested a visit and 51 (63.8%) attended the visit. A BP >140/90 mmHg was present in 122 individuals (48.4%), including 43 (17.1%) without a history of HTN and 39 (15.5%) with BP >160/90 mmHg. All except two who reported previous testing agreed to HBV testing. 19 (7.5%) were hepatitis B surface antigen positive. Transition into ongoing care was provided for 60 (33.9%) with HTN who were not integrated into the US healthcare system.

Interpretation HTN screening with a free BP cuff promotes HBV screening and US healthcare integration.

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Introduction

Chronic hepatitis B (CHB) and hypertension (HTN) are leading causes of morbidity and mortality in West Africa (WA). CHB is endemic in all WA countries with estimated prevalences in 2022 ranging from 2.3% to 12.3%.¹ Infection with hepatitis B (HBV) is the main cause of cirrhosis and hepatocellular carcinoma and the greatest cause of cancer-related death in WA men.^{2,3} HTN, once an uncommon problem in WA, has risen to become a major public health concern due to increasing urbanisation and resultant epidemiological shift.⁴ Its prevalence ranges from 28.9% to 48% in WA,

and it is a main determinant of cardiovascular disease and fifth leading cause of death in Western Sub-Saharan Africa.^{5,6}

Both CHB and HTN represent significant unmet medical needs in WA. Screening for HBV is low, and it is estimated that less than 1% of CHB cases have been diagnosed.^{7–9} Similarly, HTN awareness and control are inadequate. A meta-analysis concerning its prevalence in Benin, Ghana, and Nigeria reported that awareness of HTN status was less than 30%. In addition, rates of blood pressure (BP) control were less than 15.4% in Sub-Saharan Africa.¹⁰

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Research in context**Evidence before this study**

A search was conducted in the PubMed database between 2014 and 2023 for studies related to hypertension (HTN) and hepatitis B (HBV) prevalence, understanding, and attitudes in West Africa and among West African immigrants as well as studies of immigrant use of healthcare resources. HTN and HBV are significant contributors to morbidity and mortality in West Africa, but attitudes towards the two conditions differ greatly. There is no stigma surrounding HTN. In contrast, HBV is a highly stigmatized diagnosis about which there is only limited knowledge. There are significant gaps in the incorporation of immigrant communities into the US healthcare system.

Added value of this study

This study links the information that is currently available for HTN and HBV prevalence and attitudes in West African immigrants with a strategy to increase HBV screening and facilitate integration into the U.S. healthcare system.

Implications of all the available evidence

The important implication of our study is vital role of incorporating a community's perspective in an outreach program. Both HTN and HBV are prevalent in the West African immigrant community, but are viewed very differently by the community. The motivation for HTN screening can be effectively utilized to screen for a stigmatized condition such as HBV as well as integrate a medically disadvantaged community into the US healthcare system. Our program can serve as a model for any medical outreach program.

Although barriers to care for HBV and HTN have been attributed to inadequate health infrastructure and poverty, limited knowledge is considered an important factor.^{4,11–14} In an interview-based study from Senegal, only one third of lay populations had heard the term “hepatitis B” or even knew of an illness category which encompassed the infection. In addition, knowledge of HBV among healthcare workers in the area was also limited.¹⁴ While knowledge of HTN is greater than that of HBV, it is still limited. In questionnaire-based studies, only 61.5% of subjects knew that HTN could be asymptomatic, 55.6% that it could cause complications, and 13.2% knew of the importance of monitoring BP.^{15,16}

Attitudes towards CHB and HTN differ markedly in WA. CHB is highly stigmatized and poorly understood. In an interview-based study in rural Senegal, individuals who were able to recognise the signs and symptoms of liver disease attributed them to occult forces.¹⁴ Avoidance and ostracization of those with CHB are common due to misinformation about transmission, belief that it inevitably causes death and affects those who have been cursed or punished for wrongdoing, and associations with promiscuity.^{17–19} In contrast, HTN is attributed to weight gain, poor diet, inactivity, and stress.^{12,16,20} Participants of an interview-based study from Ghana reported an absence of social stigma involving HTN. Social support was even believed to be important for those under treatment.¹²

The WA population of the Bronx has grown dramatically in recent years, with 46,300 people of WA origin immigrating to the Bronx between 2015 and 2019.²¹ HBV screening rates are low among African immigrant communities.^{22,23} As immigrants acculturate, they also acquire the risk factors of their new communities, with longer residences correlating with increased rates of HTN.^{24,25} In a survey of WA immigrants in

Baltimore, there was a statistically significant positive correlation between length of stay in the United States and prevalence of HTN.²⁶ Immigrants overall are less likely to access and utilise healthcare resources than the native-born population, a discrepancy attributable to many factors including lack of familiarity with the health system, legal status, and lower rates of health insurance.²⁷

Treatment of HBV in select patients can decrease the risk for hepatocellular carcinoma, decompensation, and the need for liver transplantation as well as lead to the improvement of extrahepatic manifestations, and treatment of HTN is associated with decreased cardiovascular morbidity and mortality.^{28,29} As a result, screening for HBV and HTN and integration in the US health care systems in the Bronx WA community represent important unmet public health needs.

The Montefiore Starfish Program (SP) is an educational outreach program whose main aim is to screen for HBV in the Bronx West African community. It started as a questionnaire designed to assess barriers to screening. To facilitate its completion, an educational program was developed with the plan to administer the questionnaire prior to events organized in collaboration with local faith-based organizations. Based on the enthusiasm generated from the presentations, funds for HBV testing were recruited. After receipt of a New York City Council grant designed to promote compliance of HBV patients with virologic monitoring, hepatocellular carcinoma surveillance, and treatment, a WA navigator was hired, and an outreach program was initiated.³⁰ In screening Bronx WA for HBV, four gaps in care were identified. The first two involved vaccination of the non-immune and compliance with an evaluation of the chronically infected. These two issues were addressed by the expansion of the program to include vaccination and an immediate comprehensive serologic evaluation.³¹

The other two areas included an extremely high prevalence of HTN, including poorly controlled and previously undiagnosed, and the importance of rapid transition of an individual into ongoing care. To address these issues, the Program expanded its mission to include a comprehensive program with HTN as a focus. In this report we discuss the impact of a culturally sensitive HTN education and screening program that also incorporated both HBV screening and integration into the US healthcare system.

Methods

HTN educational programs

Two educational presentations on hypertension were prepared. The first consisted of a 30-min presentation that reviewed HTN and its importance for the Bronx WA community. The topic was introduced with clinical vignettes (hypertensive urgency, cerebrovascular accidents) that featured patients of WA descent. It then explained the concepts of BP and HTN, the importance of monitoring BP, complications of HTN, treatment, and the high prevalence of HTN in the WA community. Educational events at local religious organisations were arranged as previously described.³⁰ The number of individuals attending the presentation was recorded. After the presentation, a question-and-answer session was held, and point-of-care HTN screening was performed. The number of individuals who were hypertensive (defined as a BP >140/90 mmHg) was recorded.

The second presentation consisted of an informal 5-min presentation that mentioned the high prevalence and frequent poor control of HTN in the WA community, its asymptomatic nature, and its long-term implications. The brief 5-min presentation was given spontaneously when requested after religious services and at various community events.

Contact information after both presentations was obtained for individuals interested in returning to Montefiore Medical Center for a clinic visit to receive a free BP cuff. The availability of HBV screening at the time was also announced. Numbers of individuals requesting clinic visits after each presentation were recorded.

Clinic visit for blood pressure cuff and HBV screening

Medical record numbers were created, and individual appointments were scheduled for those requesting a clinic visit. Data were collected on the numbers of individuals from each educational event, who registered and returned for a clinic visit, and who did not register but subsequently called to request a clinic visit.

Clinic visit data were collected starting from the first presentation until six months after the conclusion of the final presentation. At the time of the clinic visit, consent was obtained to complete a questionnaire. Adequacy of

its completion was ensured by the outreach coordinator. Information collected included demographics (age and sex as reported by the patient and confirmed with identifying information or documentation), country of birth, duration in the US for those born in Africa, history of HTN and diabetes mellitus (DM), and integration into the US healthcare system. Individuals were also given the opportunity to refer family and friends, and the number of referrals who subsequently returned for a visit was recorded. BP was measured, and a BP cuff and instructions on its use were provided. Data were collected on the number of individuals with a history of HTN, with an elevated BP without a previous diagnosis of HTN, and with poorly controlled BP in need of urgent intervention.

All participants were offered free serologic screening for HBV at the clinic visit and provided brochures about the importance of HBV screening for the West African community.³⁰ The percentages of individuals who agreed to HBV testing and who were HBsAg positive were recorded. The progression from the educational programs to the clinic visit are summarised in [Fig. 1](#).

Linkage to care

Individuals with uncontrolled HTN (>140/90 mmHg) who had a primary care provider (PCP) were instructed to contact their PCP to arrange follow-up care. Patients with HTN without insurance and a PCP were enrolled in a Medicaid program if eligible and referred to a collaborating WA PCP (KB) for transition to long-term care. Individuals with severe HTN (>160/90 mmHg) were either referred to the Emergency Department or the collaborating PCP for a same day appointment as clinically appropriate. Patients who could not be seen on the same day and who needed urgent intervention were given a 30-day supply of amlodipine. Those with significantly elevated BP were contacted by telephone on the following days to ensure that the BP was properly controlled.

HBsAg positive individuals received an in-person discussion with the supervising physician concerning the possible sources and natural history of HBV and the requirements for a complete evaluation, and they were offered a free comprehensive serologic evaluation at the time of testing.³²

Statistical analysis

Presentation data, demographic information, and clinical/screening data were calculated as numbers with percentages or means and standard deviations. Categorical data were analysed using Chi-Squared tests. Strength of association between duration in the US for those born in Africa and the presence of an elevated blood pressure or a history of hypertension was assessed using Binary Logistic regression and controlled for age, sex, and history of DM. Statistical tests and regression analyses were performed using IBM® SPSS® Statistics version 29.0.0.0.

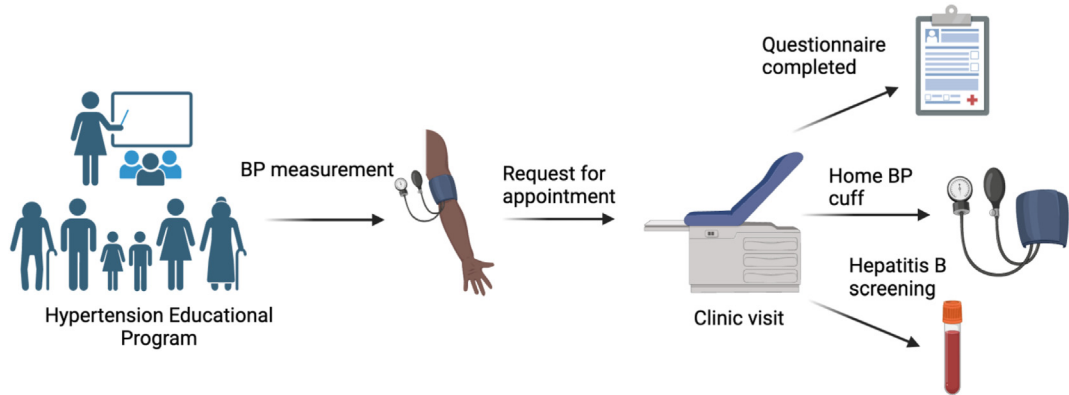


Fig. 1: Hypertension and hepatitis B screening program overview.

Institutional review board

BP screening and serologic testing was performed as a free clinical service at Montefiore Medical Center. The questionnaire was approved by the Albert Einstein Institutional Review Board, and verbal informed consent was obtained prior to its completion.

Role of the funding source

Funding sources had no role in study design; collection, analysis, or interpretation of data; writing of the report; or the decision to submit the paper for publication.

Results

HTN educational programs

Seven 30-min educational presentation events were held (4 churches, 3 mosques) between March 2022 and December 2022. A total of 445 individuals attended the presentations (64 ± 30 per presentation). 144 individuals (144/445, 32.4%) obtained a BP measurement after the presentation, and 85 (85/144, 59.0%) had an elevated level (>140/90 mmHg). 204 individuals (204/445, 45.8%) registered for a clinic visit. Five 5-min presentations were held between February 2022 and February 2023. 80 individuals registered for a clinic visit.

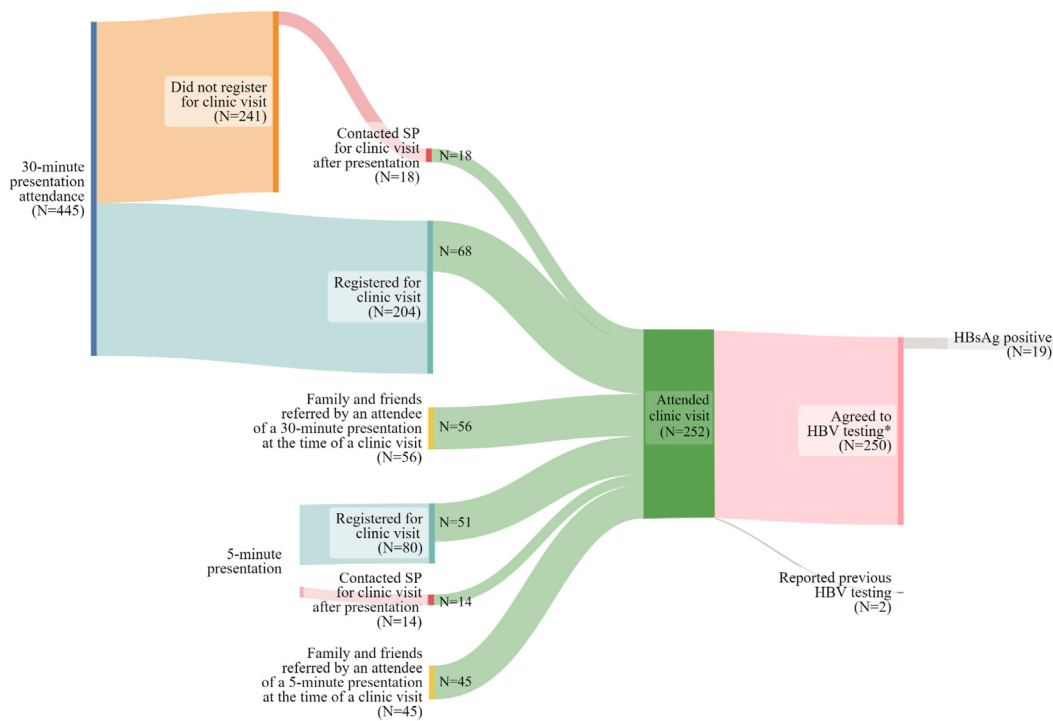
Clinic visit for blood pressure cuff and HBV screening

68 individuals (68/204, 33.3%) who registered after attending a 30-min presentation showed for a visit, and an additional 18 individuals (18/445, 4.0%) who did not register contacted the program to schedule a visit (Fig. 2). 51 individuals (51/80, 63.8%) who registered after attending a 5-min presentation showed for a visit, and an additional 14 who did not register subsequently contacted the SP to schedule a visit. A significantly greater proportion of those who registered after attending a 5-min presentation (51/80, 63.8%) showed for a clinic visit compared to those who registered after

attending a 30-min presentation (68/204, 33.3%) (difference = 30.5%, $p < 0.0001$). An additional 101 individuals who were referred by someone attending an event were evaluated, 56 from one who attended a 30-min presentation and 45 from one who attended a 5-min presentation.

All 252 individuals who attended a clinic visit completed the questionnaire (Table 1). The clinic visit HTN screening results and outcomes are summarised in Table 2. 134 (134/252, 53.2%) individuals had a previous diagnosis of HTN. Among the individuals with a history of HTN, 98 (98/134, 73.1%) had US health insurance and a PCP. 80 (80/134, 59.7%) reported taking antihypertensive medication as prescribed. 79 (79/134, 59.0%) individuals had an elevated BP at the time of the visit. Among the individuals who did not have a previous diagnosis of HTN, 43 (43/118, 36.4%) had an elevated BP and 75 (75/118, 63.6%) had a normal BP at the time of the visit. 39 (39/252, 15.5%) individuals had severe HTN that required urgent intervention, including ten (10/252, 4.0%) who did not have a previous diagnosis of HTN. Individuals born in Ghana had a significantly higher prevalence of previously diagnosed HTN or an elevated BP at the clinic visit (126/163, 77.3%) compared to those born in other WA countries (50/88, 56.8%) ($p < 0.0001$). Age (OR = 1.080, 95% CI: 1.047–1.114, $p < 0.0001$) and a history of DM (OR = 3.170, 95% CI: 1.241–8.093, $p = 0.016$), but not sex (OR = 0.839, 95% CI: 0.434–1.622, $p = 0.60$) or number of years in the US (OR = 0.980, 95% CI: 0.947–1.014, $p = 0.24$) were associated with the presence of an elevated blood pressure or a history of hypertension. Age, sex, and history of DM were selected as confounders as they are common patient factors that affect the prevalence of HTN.

All participants underwent screening for HBV (nine had been previously tested in the SP after a hepatitis B educational program) except for two who reported previous testing elsewhere. Nineteen individuals (19/250, 7.6%) were HBsAg positive.



*Nine had previously undergone HBV testing at the SP

Fig. 2: Flowchart of presentation attendance, appointment request and clinic visit attendance.

Linkage to care

Arrangements for follow-up care were arranged for all participants with HTN. 160 patients (160/252, 63.5%) had both insurance and a PCP visit within the past year. 92 (92/252, 36.5%) patients did not have insurance and a PCP. Of these patients, insurance arrangements were made for all. Among those with severe HTN that required intervention, four (4/252, 1.6%) were referred

to the Emergency Department and 19 (19/252, 7.5%) to the collaborating PCP for a same day evaluation. Seven (7/252, 2.8%) were started on amlodipine until transition to care could be arranged. Nine (9/252, 3.6%) contacted their personal PCP.

Discussion

Important findings in our study include a strong motivation to address HTN in the WA community and the ability to effectively employ screening for the condition to facilitate screening for HBV and integration of this disadvantaged immigrant community into the US healthcare system. There was significant enthusiasm for HTN screening. 45.8% (204/445) of those attending the 30-min presentation requested a clinic screening visit, and 33.3% (68/204) of those requesting a visit travelled to the hospital for the visit. In addition, 63.8% (51/80) of those attending a brief 5-min explanation requested an on-site visit. All readily agreed to undergo HBV testing except for two (2/252, 0.01%) who reported previous testing. Ten (10/252, 4.0%) individuals without a previous diagnosis of HTN had a severely elevated BP at the visit. Sixty (60/252, 23.8%) of the individuals with an elevated BP or history of HTN were not integrated into the US healthcare system prior to screening, and arrangements for transition to long-term care were made for all.

Number of individuals	252
Age, years, mean (SD)	54.8 (13.0)
Sex	
Female ^a	90 (35.7%)
Male ^a	162 (64.3%)
Country of birth	
Ghana ^a	163 (64.7%)
Nigeria ^a	7 (2.8%)
Other West African country ^a	81 (32.1%)
US ^a	1 (0.4%)
History of hypertension^a	134 (53.2%)
History of diabetes mellitus^a	56 (22.2%)
Insurance^a	190 (75.4%)
PCP visit within previous year^a	190 (75.4%)

^aCategorical variables reflect numbers with percentages.

Table 1: Results of the clinic visit questionnaire.

Number of individuals	252
Number of individuals with a history of hypertension^a	134 (53.2%)
Normal blood pressure at time of visit ^a	55 (21.8%)
Elevated blood pressure at time of visit ^a	79 (31.3%)
Number of individuals without a history of hypertension^a	118 (46.8%)
Normal blood pressure at time of visit ^a	75 (29.8%)
Elevated blood pressure at time of visit ^a	43 (17.1%)
Number of individuals with a history of hypertension or an elevated blood pressure without insurance or PCP visit within the previous year^a	60 (23.8%)
Number of individuals with an elevated blood pressure requiring urgent intervention^a	39 (15.5%)
Referred to the ED ^a	4 (1.6%)
Referred for same day evaluation with local WA PCP ^a	19 (7.5%)
Prescribed temporary supply of amlodipine ^a	7 (2.8%)
Contacted PCP for urgent evaluation ^a	9 (3.6%)

^aCategorical variables reflect numbers with percentages.

Table 2: Frequency of hypertension and elevated blood pressure.

HTN constitutes a major public health problem in WA where its prevalence ranges from 28.9 to 48% and less than 10% of those affected have controlled BP.^{4,5} Limited understanding of the condition is a significant barrier for its diagnosis and treatment. In cross-sectional studies from Benin and Ghana, its prevalence was 32.9% and 29.4%. In these surveys, only 41.8% and 34% were previously aware of their condition, and only 46.3% and 28% of those who knew of their diagnosis were receiving antihypertensive treatment. Among treated subjects, only one-third and 6.2% had controlled HTN.^{33,34}

Our findings reveal a similar high prevalence in the Bronx WA community. At the time of the HTN educational events, 59.0% (85/144) of those screened were hypertensive. Among those who returned for a clinic visit to receive a BP cuff, 177 (177/252, 70.2%) had an elevated BP or history of HTN, including 17.1% (43/252) who had an elevated BP without a history of HTN, 31.3% (79/252) with uncontrolled HTN, and 15.5% (39/252) requiring urgent intervention (>160/90 mmHg).

Attitudes towards HTN and HBV differ greatly in the WA community. HTN is an unstigmatised diagnosis and readily acknowledged by the community as an important medical concern, and social support is perceived to be important for those being treated for the condition.¹² A community-based cross-sectional and descriptive study of 440 known hypertensive community residents in Ibadan, Nigeria reported that social support was strongly associated with treatment compliance.³⁵ The attitude towards HBV, in contrast, is frequently one of social stigma and shame that has been attributed to misconceptions about transmission and a belief that HBV infection was related to moral wrongdoing, among other factors.¹⁷⁻¹⁹ In a survey of attitudes towards HBV,

21.1% of participants reported that they would avoid someone with hepatitis B and 22.7% would keep it a secret if a family member were diagnosed.³⁶

The enthusiasm shown by the community towards HTN was remarkable. In addition to a relatively high show rate for those who registered at the time of a presentation, an additional 32 individuals attending presentations but did not register for a clinic visit subsequently contacted the program for a visit, many for a same day appointment. Individuals without HTN also demonstrated marked interest in hypertension screening and a free BP cuff; 29.8% (75/252) of those who returned for a visit did not have a history of HTN or an elevated BP. Finally, an additional 101 subjects were referred for screening by those who attended the events.

Previously reported community health campaigns in Africa used HTN and malaria screening to integrate screening for HIV/AIDS, a similarly stigmatized condition.³⁷⁻³⁹ These programs were able to capture a high volume of participants with high rates of HIV/AIDS screening. However, the campaigns were temporary and labour intensive, primarily due to both the education and screening components being brought to the community centres. Our program, in contrast, is able to readily attract participants to the hospital for an on-site visit where HBV screening and linkage to care can easily be arranged with only a sole patient navigator and supervising physician. Furthermore, an additional two individuals are reached for every five participants who attended a clinic visit. All of these factors lead to the program's potential for longevity and widespread reach.

An unexpected finding was the significantly greater show rate for those who attended a 5-min presentation compared to those who attended a 30-min presentation (difference = 30.5%, $p < 0.0001$). A possible explanation could be the decision of those who were hypertensive to contact their PCP for follow-up. Conversely, those with a normal BP would be less interested in a clinic visit for confirmation and to obtain a BP cuff. Regardless of the reason for the decreased show rate after the 30-min presentation, it potentially represents a missed opportunity for screenings for other conditions and should be confirmed.

The limitations of the study include the inability to definitively establish a diagnosis of HTN based on a one-time assessment, a potential selection bias for those with a known diagnosis of HTN, and testing for only HBV and not HIV. The number of individuals attending the 5-min presentations was not available due to the spontaneous nature of the events. However, the number of individuals at the 5-min presentations were subjectively comparable to the 30-min presentations. Point-of-care BP screening is also more cost-effective than requiring a clinic visit. Another limitation includes the recruitment of participants primarily from religious organizations.

In this report, we also do not directly compare screening rates of those who were only offered free HBV screening. In a previous report, we described the effectiveness of a free HBV screening program.³⁰ Although successful, the degree of enthusiasm was not as great. No patients spontaneously called in for an appointment, and 17.5% had to be rescheduled two or three times. In addition, referrals of family members or friends for testing were rare.

These limitations, however, do not detract from our goal to demonstrate that HTN screening can be employed for both HBV screening and integration of individuals belonging to an immigrant community into the US healthcare system. By conducting this screening directly at a medical centre, it is possible to arrange for the incorporation of the individual into the US healthcare system and ensure an appropriate transition to long-term care. Testing for HIV was not included to not discourage the patient from receiving HBV testing. Hepatitis B is associated with significant stigma in the WA community that is due, in part, to its association with HIV infection. The aim of this project was to encourage HBV testing through screening for a non-controversial medical condition. After establishing a trusting relationship, HIV screening was encouraged for those who tested HBsAg positive. Once the effectiveness of using HTN to screen for HBV was established, the program later evolved to incorporate screening for diabetes mellitus with measurement of haemoglobin A1c. In a separate report, we discuss the importance of trust in the evaluation of HBsAg positive individuals and their linkage to long-term care.³²

HTN and HBV are significant medical issues but are perceived very differently by the WA community. Treatment for both conditions is hindered by lack of information and unfamiliarity with Western medical care. Our findings demonstrate the usefulness of establishing a partnership with the community based on cultural sensitivity and incorporation of the community's perceived needs. With such an approach even screening for a stigmatized condition can be easily performed.

Contributors

JN, MS, JAB, DG, MP, MF, and SHS conceptualized the study. JN, MS, JAB, MF, and SHS developed the methodology. FO, EUE, KB performed investigation. JN, FO, DG, and MP performed data curation. JN performed the formal analysis. JN, MS, and SHS wrote the original draft of the manuscript. FO, EUE, KB, DG, MP, and MF reviewed and edited the manuscript. FO, EUE, KB, and SHS performed project administration. SHS supervised the project. JN, FO, DG, MP, and SHS have accessed and verified the data. All co-authors were responsible for the decision to submit the manuscript.

Data sharing statement

Questionnaire responses and additional information are available upon request by email to Dr. Samuel Sigal. All data is deidentified.

Declaration of interests

SHS reports research support from Gilead Sciences, Mallinckrodt, Intercept, and Eli Lilly. All other authors declare no competing interests.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.lana.2024.100780>.

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