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ORIGINAL PAPER

Sub-optimal Testing and Awareness of HCV and HBV Among High Risk Individuals at an Underserved Safety-Net Hospital

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Abstract Sub-optimal screening for chronic hepatitis C virus (HCV) and chronic hepatitis B virus (HBV) among high risk groups delays diagnosis and treatment. We aimed to evaluate overall rates of HCV and HBV screening and patient knowledge of their testing result. Adults age ≥18 years undergoing elective outpatient endoscopy at a large, urban safety-net hospital from July 2015 to July 2016 were prospectively evaluated to determine rates of HCV and HBV testing, the results of those completed tests, and patient knowledge of test results among high risk individuals (as determined by U.S. Preventative Services Task Force). Among 1125 patients (52.3% male, 70.4% foreign-born), 66.5% were high risk for chronic HCV; only 30.9% received prior testing. 14.7% had positive chronic HCV infection. Patients born in the 1945–1965 cohort were more likely to have received prior HCV testing compared to those born outside of this cohort (32.7 vs. 16.9%, $p=0.01$). Among patients who received HCV screening, 29.3% were aware of test results. Overall, 61.6% were high risk for chronic HBV; only 25.1% received prior testing. 4.1% were positive for chronic HBV. Compared to Caucasians, Asians (19.0 vs. 44.4%, $p<0.001$) and Hispanics (20.0 vs. 44.4%, $p<0.001$) were less likely to have previous HBV testing. Among patients who received prior HBV screening, 18.4% were aware of test results. Less than one-third of high risk patients received HCV and HBV screening among an ethnically diverse safety-net population. Equally low rates of patient knowledge of testing results were observed.

Keywords Viral hepatitis · Birth cohort · Screening · HBV · HCV

Abbreviations
HBV Hepatitis B virus
HCV Hepatitis C virus

Introduction

Programs for early detection and treatment of chronic hepatitis C virus (HCV) and chronic hepatitis B virus (HBV) rely on the success of effective screening programs. However, effective screening programs hinge on the ability of providers to accurately identify high risk patients that need to be tested and linking those with chronic viral hepatitis infection into care for further evaluation and treatment. Despite well established guidelines identifying high risk patients in need of HCV and HBV screening, testing and linkage to care remains low, particularly among ethnic minorities and those of low socioeconomic status. These populations that are at greatest risk for chronic HCV and chronic HBV [1–13].

While targeted education can improve provider awareness and implementation of appropriate HCV and HBV screening, patient awareness of their own test results is also an important factor that may affect linkage to care. Knowledge of test results may reflect better engagement and awareness of risk factors for and complications of chronic HCV and chronic HBV and thereby improve the success of

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linkage to care among those with positive screening tests. Improving HCV and HBV screening and patient awareness of these infections are particularly important for urban safety-net hospital settings, which predominantly care for underserved populations. These populations include a large proportion of ethnic minorities and those with high risk behaviors and multiple risk factors for chronic HCV and chronic HBV. Our current study aimed to evaluate rates of HCV and HBV screening and awareness among patients at high risk for chronic HCV and chronic HBV among a diverse, underserved safety-net hospital population.

Methods

We prospectively evaluated all consecutive adults undergoing elective outpatient endoscopy from July 2015 to June 2016 at a large, urban safety-net hospital. All patients were assessed to identify those at high risk for and thus eligible for HCV and HBV screening based on U.S. Preventative Services Task Force guidelines. Receipt of prior testing among eligible patients was evaluated through review of the electronic medical records, including the result of those completed tests, Rates of prior testing were stratified by sex, race/ethnicity, country of birth (U.S. born vs. foreign born), year of birth, history of intravenous drug use, and HIV status. We further assessed whether patients were aware of receiving prior HCV or HBV testing and stratified this awareness by whether they were positive for chronic HCV or chronic HBV, respectively. Patient demographics and clinical data were presented for the entire cohort as well as stratified by those at high risk for chronic HCV or chronic HBV infection. Categorical variables were presented as proportion and frequencies, and continuous variables were presented as mean and standard deviation. Comparison between groups for categorical variables utilized Chi square testing. This study was approved by the Institutional Review Board at Alameda Health System and informed consent was obtained from the study participants.

Results

Among 1125 patients evaluated, 52.3% were male, 70.4% were foreign-born, and 41.7% were of Hispanic ethnicity. 66.5% (n = 748) were high risk for chronic HCV infection, among which 50.1% were male, 89.8% were born in the 1945–1965 birth cohort, 10.3% had HIV co-infection, and 86.7% were of non-white race/ethnicity. 61.6% (n = 693) were high risk for chronic HBV infection, among which 48.6% were male, 89.6% were foreign-born, 11.6% had HIV co-infection, and 94.8% were of non-white race/ethnicity (Table 1).

Among patients at high risk and thus eligible for HCV screening, only 30.9% received prior testing for chronic HCV, of which 14.7% had confirmed chronic HCV infection (Fig. 1). When stratified by birth cohort, high risk patients born in the 1945–1965 birth cohort were more likely to have received prior HCV testing compared to those born outside of this birth cohort (32.7 vs. 16.9%, $p = 0.01$). Compared to Caucasians, Asians (20.7 vs. 38.9%, $p < 0.001$) and Hispanics (21.9 vs. 38.9%, $p < 0.001$) were significantly less likely to have received prior HCV testing. No significant differences in prior HCV testing were observed when stratified by sex, history of intravenous drug use, history of incarceration, or HIV status. Among patients who received prior HCV screening, only 29.3% were aware of prior testing. Knowledge of prior HCV testing was significantly higher among patients who were HCV positive vs. HCV negative (76.9 vs. 23.6%, $p < 0.001$).

Among patients at high risk and thus eligible for HBV screening, only 25.1% received prior testing for chronic HBV, among which 4.1% were positive for confirmed chronic HBV infection (Fig. 2). Compared to Caucasian patients, Asians (19.0 vs. 44.4%, $p < 0.001$) and Hispanics (20.0 vs. 44.4%, $p < 0.001$) were significantly less likely to have received previous HBV testing. Foreign born patients were also significantly less likely to have received prior HBV testing compared to U.S. born patients (22.0 vs. 39.1%, $p < 0.01$). No significant differences in rates of prior HBV screening were observed when stratified by sex, history of intravenous drug use, and HIV status. Among patients who received prior HBV screening, only 18.4% were aware of prior testing. Knowledge of prior HBV testing was significantly higher among patients who were HBV positive vs. HBV negative (75.0 vs. 16.2%, $p < 0.001$).

Discussion

Sub-optimal screening for chronic HCV infection, especially among high risk groups is a missed opportunity for early detection, linkage to care, and delivery of highly effective antiviral therapy. Efforts to improve provider education and awareness of high risk groups to implement birth-cohort based and risk factor-based HCV screening, particularly at the primary care and emergency room settings has the potential to narrow the gap between those who are unaware of their chronic HCV infection status [1, 3–8, 10, 12]. Lack of patient awareness of the importance of HCV screening and chronic HCV infection has also been reported, with one study demonstrating only 32% of intravenous drug users with chronic HCV infection aware of their HCV status [5]. While our current study demonstrated sub-optimal testing for chronic HCV infection among high risk groups, the observation that <30% of patients who

Table 1 Characteristics of the study cohort

	Total cohort		HCV screening cohort		HBV screening cohort	
	%	Frequency (N)	%	Frequency (N)	%	Frequency (N)
Overall	100.0	1125	66.5	748	61.6	693
Female	52.3	588	49.9	373	51.4	356
Male	47.7	537	50.1	375	48.6	337
Language preference						
English	52.2	591	45.6	341	35.4	245
Non-English	47.5	534	54.4	407	64.7	448
Foreign born	70.4	631	66.9	407	89.6	604
Age	52.4	12.3	56.9	8.4	51.9	12.5
Risk factors						
History of IV drug use	4.3	36	6.3	36	5.5	36
History of incarceration	12.5	117	18.5	116	17.3	117
HIV infection	6.5	19	10.3	19	11.6	19
Blood transfusion prior to 1992	4.9	42	7.3	42		
1945–1965 birth cohort	59.7	672	89.8	672		
Race/ethnicity						
White	12.4	124	13.3	89	4.2	28
African American	23.4	234	27.1	182	10.2	68
Asian	16.2	162	19.1	128	20.5	137
Hispanic	41.7	418	35.9	241	56.7	378
African	1.6	16	0.8	5	1.8	12
Middle Eastern	2.0	20	1.2	8	2.9	19
Other	2.8	28	2.7	18	3.8	25

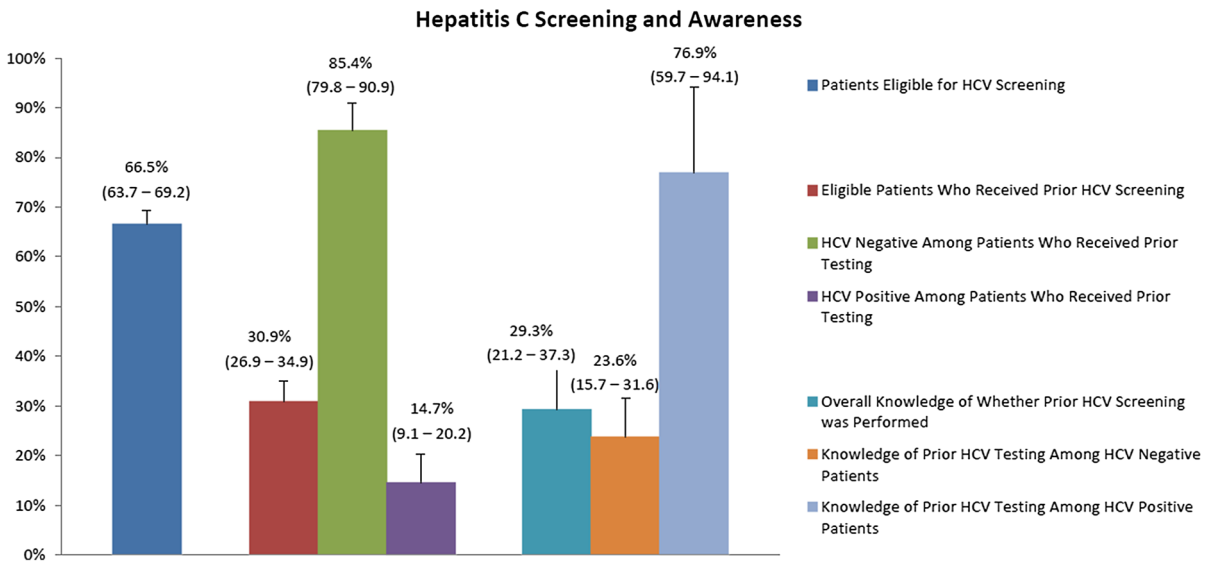

Fig. 1 Hepatitis C virus screening and patient awareness of testing results

received previous testing were aware of their test results raised major concerns, as this lack of awareness reflected lack of engagement into medical care, and created additional barriers in linkage to care among a population that already faced significant barriers in access to medical care. The need for greater awareness and improved screening is particularly important for urban safety-net hospital populations given the high prevalence of unrecognized HCV

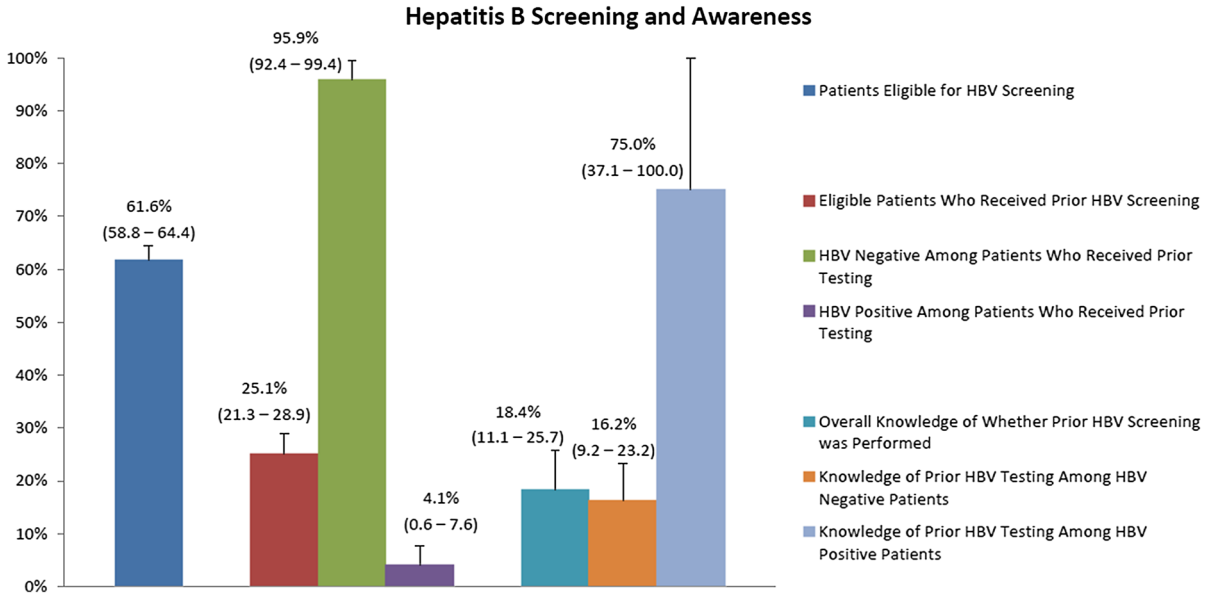

Fig. 2 Hepatitis B virus screening and patient awareness of testing results

infection. Turner, et al. evaluated 4582 hospitalized patients born 1945–1965 among an urban safety-net hospital and demonstrated a 4% prevalence of chronic HCV infection, nearly twice the national average [12]. Furthermore, nearly one-third of these newly diagnosed patients had evidence of advanced fibrosis or cirrhosis. The importance of implementing widespread screening among these high risk cohorts will improve early detection and treatment, thereby halting disease progression to cirrhosis and cirrhosis-related complications.

While there has been much focus on HCV screening and linkage to care given the recent advancements in HCV therapy, screening and linkage to care for chronic HBV patients is equally important. HBV infection affects over 240 million individuals worldwide and is a leading cause of hepatocellular carcinoma [14]. The majority of HBV infection occurs in Asia-Pacific and African populations, and thus effective screening programs are particularly important among safety-net hospitals, which serve a large proportion of ethnic minorities [14]. As with HCV, efforts at HBV screening among high risk groups have been disappointing, and this missed opportunity has led to delays in timely initiation of antiviral therapy [2, 9, 11, 13, 15]. Hu et al. utilized 2009–2010 data from the Racial and Ethnic Approaches to Community Health registry and demonstrated that only 39.2% of 53,896 ethnic minority individuals reported having HBV testing [2]. Our current study demonstrated a 25% HBV testing rate for high risk individuals. Similarly concerning, only 18% of patients who received prior testing were aware of their results. As with our HCV observations, the HBV observations were particularly concerning given our underserved safety-net population. Firstly, the demographics of our population were predominantly ethnic minorities with a large proportion of Asian and African immigrants, two populations that are at particularly high risk for chronic HBV infection. Secondly, the majority of our patients lived at or below the national poverty level, are non-English speaking, and already faced significant barriers in timely access to medical care (e.g. lack of engagement with medical care, difficulty with public transportation to make it to appointments, inadequate clinic time for providers to address all medical issues). Missed opportunities for early identification of HBV further contributed to disparate medical care and delays in time access to treatment to prevent disease progression. Greater awareness of both HCV and HBV are needed at both the provider level and the patient level—to effectively implement systematic screening programs, to develop systematic processes to coordinate linkage to medical care, and to provide timely access to much needed antiviral therapies to prevent disease progression, particularly among our underserved safety-net populations.

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Compliance with Ethical Standards

Conflict of interest Robert Wong served as a consultant and is a member of the advisory board and speaker's bureau for Gilead Sciences. Robert Wong received research grants from Gilead Sciences. The other authors have declare that they have no conflict of interest.

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