

## Senior Center-Based Hepatitis C Screening in Baltimore

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Despite significant advancements in hepatitis C virus (HCV) treatments, the majority of individuals infected with HCV remain undiagnosed. We report on senior citizen center-based HCV testing in Baltimore, which revealed a 9.4% prevalence of infection. Our data suggest that community-based HCV testing and linkage to care in appropriate settings is feasible and high yield.

**Keywords.** hepatitis C; linkage to care; senior citizen centers; testing.

In the United States, an estimated 3.2 million individuals are chronically infected with hepatitis C virus (HCV) [1]. However, 50%–80% of those infected are unaware of their status and cannot benefit from recent improvements in HCV treatment [2]. Hepatitis C virus infection is associated with an increased risk of liver failure, liver cancer, and death, which can be avoided by early diagnosis and treatment. Because over 75% of HCV infections are in individuals born between 1945 and 1965, the Centers for Disease Control and Prevention (CDC) and the United States Preventive Services Task Force have recommended that individuals born in these years (“the birth cohort”) be tested at least once for HCV, independent of any identified risk factors [3, 4].

Compared with the national HCV prevalence of 3.25% in the birth cohort, 11.1% amongst baby boomers at the University of Alabama Emergency Department, 6.7% among hospitalized baby boomers in Texas, and 8.4% amongst US veterans [1, 5–7], Baltimore has a high prevalence of HCV infection with rates of 18% in persons attending emergency departments, 10% among persons attending sexually transmitted diseases (STD) clinics, and 60%–90% among injection drug users [8–10].

Older age is associated with accelerated progression of liver disease [11]. This suggests a need for more aggressive screening and treatment of HCV in older individuals. However, the feasibility and yield of HCV testing amongst older individuals in nonmedical settings remains unknown. Thus, the objectives of this current analysis were to assess knowledge and prevalence of HCV in a high-risk setting, which includes persons born before 1945.

### METHODS

Six of 13 senior citizen recreation centers in Baltimore City were randomly selected by the Baltimore City Health Department (BCHD) Office of Aging as sites for HCV testing events. Two weeks prior to the events, promotional event fliers including information on hepatitis C rates in “baby boomers” were distributed to sites.

To assess HCV status, event staff offered free HCV rapid antibody and follow-up HCV RNA testing during 1–8 hours shifts from May 1, 2014 to May 8, 2014. Participants also completed a questionnaire assessing demographic information, HCV risk, testing history, knowledge, and perceived barriers to treatment. Individuals who tested positive for anti-HCV received posttest counseling including information on the importance of confirmatory HCV RNA testing and contact details for the BCHD STD Clinic where they could receive their HCV RNA results and be linked to care. This study was determined to be exempt by the Johns Hopkins University School of Medicine Institutional Review Board.

### Testing

Anti-HCV testing was performed using the OraQuick Rapid HCV Antibody Test (Orasure Technologies, Inc., Bethlehem, PA) on blood collected by finger prick. Follow-up HCV RNA testing was performed on blood collected from anti-HCV-positive persons via venipuncture and processed at a commercial laboratory.

### Statistical Analyses

Descriptive statistics were used to characterize the study population with respect to demographics and risk behaviors. Proportions were compared using  $\chi^2$  tests. All analyses were performed using Stata version 13 (StataCorp, College Station, TX).

### RESULTS

One hundred forty-nine seniors were screened at 6 different senior centers distributed throughout Baltimore City. The median age of individuals screened was 67 (interquartile range, 62–72) years. Sixty-two (42%) were born before 1945, 112 (75%) were African American, 35 (23%) were white, and 3 (2%) were Hispanic. The majority were female (71%). Most (85%) had

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previously heard of hepatitis C, and 11 (7%) considered themselves at risk for infection. The majority of individuals tested were aware that HCV is curable (63%) and can lead to liver failure (90%) or liver cancer (81%). Most (130, 87%) stated they would want treatment if found to be infected.

Of 149 individuals tested, 14 (9.4%) tested positive for anti-HCV. Of these 14, 12 (86%) tested positive for HCV RNA. As such, 8.1% of the 149 seniors tested were chronically infected with HCV. Among 87 individuals born between 1945 and 1965 (the CDC “birth cohort”), 11.5% tested positive for HCV antibody. Among 62 individuals born before 1945, 4 (6.5%) tested positive for HCV antibody. Among 22 participants who reported prior HCV testing, 6 had a positive HCV serology (all born between 1945 and 1965). Most (5) knew their positive status from prior testing, and 2 of them had received HCV treatment, but 1 had previously tested negative. Of the 14 individuals who tested positive for anti-HCV, 9 (64%) were newly diagnosed. As such, 5 (50%) of 10 and all 4 (100%) of HCV diagnoses among individuals born between 1945 and 1965 and before 1945, respectively, were new diagnoses. Of the 2 individuals who reported previous treatment, 1 was HCV RNA positive whereas the other was HCV RNA negative.

Prevalence of HCV infection was higher in men (21%) than in women (5%) and was comparable between blacks and whites (10% and 9%, respectively). Of individuals reporting a history of injection drug use (IDU), 78% tested positive for anti-HCV. However, all 4 individuals born before 1945 who tested positive for HCV denied a history of IDU. All persons who tested positive for anti-HCV were insured through public insurance (Medicare/Medicaid), with the exception of 1 individual who was uninsured.

In bivariate analysis, male sex, history of IDU, Hispanic ethnicity, and human immunodeficiency virus (HIV) infection (Table 1) were all statistically significantly associated with HCV infection among all seniors tested ( $P < .05$ ). Multivariable analysis was not performed due to the small number of cases of HCV.

All individuals received HCV antibody results, education on HCV infection, and counseling on alcohol reduction at the time of testing. Of 12 individuals chronically infected with HCV, 6 (50%) visited the BCHD STD clinics for HCV RNA results, HIV testing, and immunization against hepatitis B as indicated by CDC guidelines. Four of the 6 individuals who did not visit the STD clinic contacted the clinic by phone and requested that their laboratory results be forwarded to their primary care physician (PCP), whereas 2 (16%) individuals could not be contacted. Of the 6 individuals who visited the STD clinic for HCV RNA results, 5 requested assistance with linkage to care, and 3 of them were linked to an HCV treating specialist. The 2 individuals who were not linked subsequently declined HCV linkage due to competing life priorities. The 5 who refused assistance with linkage to care believed they could access HCV care through their PCP. Only 2 of 9 Medicare patients had Medicare Part D (required to cover drug costs). Seven of 10 patients who were chronically infected cited cost as the primary barrier to HCV care.

## DISCUSSION

In Baltimore City, we found a high prevalence of HCV (9.4%) among community-based individuals attending senior centers. Although trends in HCV prevalence by risk category are consistent with national trends, we found a high prevalence of HCV (6.5%) among individuals born before 1945. This prevalence is higher than previously reported estimates ranging between 1%

**Table 1. Distribution of Individuals Tested and Prevalence of HCV by Risk Characteristic**

Characteristic	All Seniors (N = 149)			Born 1945–1965 (N = 87)		Born Before 1945 (N = 62)	
	Tested N (%)	Anti-HCV Positive N (%)	P Value	Tested N (%)	Anti-HCV Positive N (%)	Tested N (%)	Anti-HCV Positive N (%)
Sex			.002				
Male	43 (29)	9 (21)		28 (32)	8 (29)	15 (24)	1 (7)
Female	106 (71)	5 (5)		59 (68)	2 (3)	47 (76)	3 (6)
Race			.826				
African American	112 (75)	11 (10)		62 (71)	7 (11)	50 (80)	4 (8)
White	35 (23)	3 (9)		25 (29)	3 (12)	10 (16)	0
Ethnicity			.001				
Hispanic	3 (2)	2 (67)		1 (1)	1 (100)	2 (3)	1 (50)
History of IDU	9 (6)	7 (78)	<.001	8 (9)	7 (88)	1 (2)	0
HIV infected	3 (2)	2 (67)	.001	2 (2)	2 (100)	1 (2)	0
Insurance status			.161				
Medicare	91 (61)	11 (12)		42 (48)	7 (17)	49 (79)	4 (8)
Medicaid	8 (5)	2 (25)		7 (8)	2 (29)	1 (2)	0
Uninsured	5 (3)	1 (20)		4 (5)	1 (25)	1 (2)	0
Consider self at risk for HCV	11 (7)	5 (36)	<.001	6 (7)	3 (50)	5 (8)	2 (40)
Ever tested for HCV	22 (15)	6 (27)	.003	14 (17)	6 (43)	8 (13)	0

Abbreviations: HCV, hepatitis C virus; HIV, human immunodeficiency virus; IDU, injection drug use.

and 2% in individuals born before 1945 reported in the National Health and Nutrition Examination Survey and amongst US veterans [1, 5]. To the best of our knowledge, this is the first study to assess prevalence of HCV infection amongst community-dwelling seniors. These older individuals born prior to 1945, all denied a prior history of IDU and lacked prior knowledge of HCV infection despite being actively engaged in primary care.

Older age is consistently associated with an increased rate of progression of liver disease and has been strongly linked to liver fibrosis even after adjustment for HCV infection duration [11]. Rapid improvements in HCV treatment including the availability of all oral direct-acting agents against HCV with short durations of treatment and minimal side effects make cure of hepatitis C a possibility for most patients. The US Action Plan for the Prevention, Care, and Treatment of Viral Hepatitis calls for improvements in the HCV continuum of care with the goal of curing individuals to reduce the long-term complications of HCV and decrease HCV transmission [12]. Our data demonstrate the high yield and feasibility of venue-based testing at strategically selected community sites.

Hepatitis C virus prevalence in our population was an order of magnitude higher than national estimates. This can be in part explained by high rates of IDU in Baltimore City (prevalence of injection drug use of 336/10 000 population aged 15–64) [13]. High rates of hepatitis C in those born before 1945 may also partly be explained by introduction of heroin use into Baltimore in the 1950s, early in the US heroin epidemic [14].

Our study is limited by the small sample size, which affected the precision of our estimates. In addition, we were unable to assess bias in our convenience sample due to lack of information about individuals who refused participation.

Although it was reassuring that majority of the newly identified individuals infected with HCV were publicly insured, most lacked medication coverage (Medicare Part D) and cited the cost of medication as the major barrier to potential HCV treatment. Additional efforts will be needed to successfully engage infected individuals in treatment.

## CONCLUSIONS

In conclusion, HCV testing in senior centers in Baltimore identified high proportions of previously undiagnosed HCV

infection. These results suggest that in some cities, the birth cohort may need to be expanded and that senior centers could serve as important venues for detection of unrecognized infection.

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