

Hepatitis C Virus Screening In Federally Qualified Health Centers in Rural Appalachia

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Abstract

Purpose of study: This is a descriptive study to ascertain the Hepatitis C Virus (HCV) prevalence and usefulness of screening in medical outreach settings (MO) compared to indigent healthcare clinics (IHC) in northeast Tennessee.

Methods used: Between April 2017 – February 2019, routine, opt-out HCV testing was performed in 4 IHC and 3 MO sites in the Tri-Cities, TN region. During screening, demographic information was collected and the de-identified data were analyzed.

Summary of results: Among 212 clients screened 26 (12.26%) were HCV antibody positive. Of all clients screened 107 (50.47%) were young adults, born after 1965 compared to 99 (46.7%) participants born between 1945-1965. The percentage of HCV antibody cases were 16 (61.54%) and 8(30.77%) for young adults and baby boomers respectively. The percentage of males and females screened were 46.7% and 53.3% respectively, with equal proportion of HCV antibody cases (50%; P=0.7186). Non-Hispanic whites and African Americans made up 90.57% and 9.43% respectively of all clients screened; 96.15% (P=0.2980) of the positive cases were ascribed to non-Hispanic whites. Screening occurred in seven testing locations, 3 MO events and 4 IHCs. A total of 25 (96.15%; P=0.0056) HCV-antibody positive cases were found in the IHCs compared to 1(3.85%) found in a MO event.

Conclusion: This analysis shows the higher yield of targeted screening at IHCs. Targeted HCV screening is critical in the era of opioid epidemic especially since direct-acting antiviral agents (DAAs) who offer a Sustained Virologic Response (SVR) rate of more than 90% are available.

Keywords: Hepatitis C virus infection; Hepatitis C virus screening; Opioid epidemic; Baby boomers; Race; Health insurance; Northeast Tennessee; Federally qualified health centers; Medical outreach settings

Abbreviations: HCV: Hepatitis C Virus; CON: College Of Nursing; ETSU: East Tennessee State University; FQHC: Federally Qualified Health Center; JCCHC: Johnson City Community Health Center; JCDDC: Johnson City Downtown Day Center; PMC: Providence Medical Center; DAAs: Direct Acting Antiviral Agents; PWID: People Who Inject Drugs; IDU: Injection Drug Use; EMR: Electronic Medical Record; SVR: Sustained Virologic Response; MO: Medical Outreach Settings; IHC: Indigent Healthcare Clinics; HBV: Hepatitis B Virus; HIV: Human Immunodeficiency Virus; CDC: Center for Disease Control; USPSTF: United States Preventative Task Force; RAM: Remote Area Medical; EMR: Electronic Medical Record; BBC: Baby Boomer Birth Cohort

Introduction

Hepatitis C virus (HCV), previously known as non-A/ non-B hepatitis until 1988 when it was discovered, is a major public health burden and one of the leading causes of morbidity and mortality globally [1,2]. HCV is the most common blood borne infection, with a higher age-adjusted mortality rate than Hepatitis B Virus (HBV) or Human Immunodeficiency Virus (HIV) [3]. Recent estimates show that more than 185 million people are infected with HCV worldwide [2]. Mortality rates from HCV are expected to increase over the next 20 years. Without treatment, approximately 1.1 million people are expected to die from HCV by 2060 [4]. Currently, in the United States, HCV prevalence is estimated at 3.5 million with about 18,153 deaths recorded in 2016. People born between 1945-1965 (baby boomers) make up 75% of chronic hepatitis C infection [1,3]. In 2016, the estimated cases of acute HCV reported in 42 states was 41,200 compared to 33,900 cases documented in 2015. The reported cases of acute HCV in 2016 is 2.3 per 100,000 in Tennessee, which is more than twice the national goal set by Healthy People 2020. Additionally, Tennessee has a HCV prevalence of 10,632 cases. The estimated HCV prevalence in northeast Tennessee since January 2018 is about 2,058 cases (unpublished data, 2018). Injection drug use (IDU), unprotected sex, mother to child transmission, health worker-associated transmission, lack of awareness of the disease, and limited accessibility to screening facilities are some of the cited factors and barriers attributed to the increasing burden of HCV in the US [5-7]. In 2016, among all age groups, persons aged 20-29 years contributed to the highest rate (2.7 cases per 100,000 population) of acute hepatitis C [1,3].

This age group has been significantly associated with the current opioid epidemic due to IDU. People who inject

drugs (PWID) make up the majority of acute HCV infected cases. The 21% one-year increase in HCV infection rate since 2015 and the 350% rise since the beginning of the decade can be attributed to sharing of injection equipment such as syringes and injection water. HCV is capable of living in bottled water and syringes for 21 and 63 days respectively. About 45%-85% of the total infected populations do not know their HCV status [5-8]. The reasons vary from not knowing where to get tested to lack of funds; therefore, those infected are not receiving the care required to prevent potential HCV-associated complications like liver cirrhosis, liver cancer, and death. As part of the effort to lower the prevalence of HCV in the US, improve diagnosis of HCV and linkage to care for infected individuals, the Center for Disease Control (CDC) and the United States Preventative Task Force (USPSTF) expanded the routine HCV testing to include a one-time screening for HCV infection among baby boomers and asymptomatic high-risk individuals-PWID in particular.

Those considered to have a high-risk of getting HCV are PWID, men who have sex with men (MSM), health care workers, infants born to infected mothers, prisoners, people who receive chronic blood transfusion and hemodialysis (Thalassemia, hemophilia, Sickle cell and Chronic diseases patients) and people living with HIV, HBV and Tuberculosis [9-11]. HCV screening is necessary for the provision of epidemiological data to support surveillance and interventional strategies such as syringe exchange programs, providing evidence-based guidelines for preventive interventions, the delivery of safe blood transfusion and monitoring treatment response. Most screening is done in IHC, however, majority of the target high-risk population such as PWID, HIV patients, homeless and incarcerated people, especially those in underserved and rural communities often have inadequate access to healthcare services. Consequently, testing rate in these communities is low [12-14]. The importance of screening and linkage-to-care is pivotal especially with the introduction of the pangenotypic direct acting antiviral agents (DAAs), which offer a sustained virologic response (SVR) of about 96% after 8-12 weeks of treatment. A sustained virologic response is defined as aviremia after 6 months of completed therapy. Compared to HIV which incorporates its viral genome into the host DNA thereby resulting in a stable genetic material for replication, HCV can be cured because it is not integrated into the host nucleus. Several studies and recommendations have shown that the availability of free community-based screening centers significantly improves the accessibility to screening opportunities for high-risk individuals [3,15-16]. However, limited

information is available on the comparative effectiveness of IHC compared to MO. This descriptive study compares the observed outcome of routine HCV screening test done in the MO and IHC in Northeast Tennessee. This study was completed to ascertain the prevalence of HCV in rural Appalachia. It was supervised by the College of Nursing (CON) at East Tennessee State University (ETSU). The study was a grant funded research with the sole purpose of implementing routine HCV testing with subsequent referral to federally qualified health center (FQHC). The ETSU CON worked in collaboration with Johnson City Community Health Center (JCCHC), Johnson City Downtown Day Center (JCDDC) and Providence Medical Center (PMC). JCCHC and JCDDC are focused on the delivery of primary care and specialized health services to underserved patients in the upper northeast Tennessee region, with an aim to reduce health disparities. These centers integrated a reflex confirmatory HCV ribonucleic acid (RNA) test for positive HCV antibody cases, which elicited an automatic request for a confirmatory quantitative or qualitative HCV test following a positive HCV antibody test.

Methodology

Conceptual framework

Evidenced based guidelines for HCV screening and linkage-to-care was set up and potential referral centers were informed about the HCV treatment services offered at the 4 MO settings. Nurses, pharmacists, laboratory technicians and administrators were trained on HCV etiology, pathology, epidemiologic trends, risk factors, testing goals, and treatment with DAAs. Collaboration with Gilead Pharmaceuticals for provision of DAAs was made. HCV testing and treatment was integrated into routine services offered at the FQHC in order to reduce interruption of other services. The public were made aware of HCV testing and linkage-to-care offered at the FQHC through fliers and medical outreaches such as UMOJA festivals and Remote Area Medical (RAM). Clients who utilized these FQHC during the study period of April 2017-February 2019 were offered pretest counselling, HCV antibody testing and post-test counselling.

All participants' information was kept confidential and verbal consent was obtained. Following a given verbal consent, information on demographic characteristics and risk behaviors were acquired. Subsequently, an HCV antibody test was performed using the Ora Quick rapid HCV kits (Ora Sure Technologies). All positive test results automatically had an HCV-RNA quantitative or qualitative test to detect current HCV infection. Discount pricing with

commercial laboratories was negotiated in order to facilitate HCV-RNA testing for the uninsured clients. Supportive labs for HIV, Hepatitis B Core total antibody, complete metabolic panel, platelet count, aspartate aminotransferase and alanine aminotransferase levels were also requested. Monthly reports of the number of clients screened at the FQHC were generated using the Electronic Medical Record (EMR) and subsequently relayed to the clinic director, nurses and HCV-care specialist. The HCV-care specialist in collaboration with nurses, pharmacists and a research assistant coordinated all clients with HCV antibody positive results through the linkage- to-care process. This entailed the provision of HCV test results to clients, accessing the willingness to commence treatment and applying for DAAs from Gilead pharmaceuticals through the Patient Assistance Program. Afterwards, clients who were eligible to receive DAAs were contacted by the pharmacy representative when the medications arrived. Epclusa was the drug of choice because it is pangenotypic with minimal side effects such as headaches and abdominal discomfort. This was provided monthly for a period of 3 months. Following successful completion of treatment, a confirmatory test was performed six (6) months after treatment commencement or three (3) months after completion. A SVR is attained following a negative result. Clients who tested positive for both HCV and HBV were reviewed monthly for a possible resurgence of HBV.

Data sources

This study utilized primary de-identified data from clients screened in four (4) IHC and three (3) MO sites in the Tri-Cities, Tennessee region between April 2017 - February 2019, which included surveys on demographic characteristics. The screening tool was adapted from the EMR at the FQHCs. The study population consisted of clients who routinely visited these centers for primary care, the majority of which were homeless and uninsured. Participants (n=212), were adults, who engaged in routine, opt-out HCV antibody testing at both the IHC and MO settings.

Statistical analysis

Descriptive statistics were used to measure weighted frequencies and percentages of the demographic variables such as age, gender, and race. The Statistical Analysis System version 9.3 was used to measure the demographic variables and perform discrete Chi-Square test of independence between gender, race, testing location and HCV antibody prevalence. Demographic variable percentages were reported, including corresponding Chi-square P-values.

Results

Among 212 clients screened, 69.36% were in IHC while 30.64% were screened in MO settings. Screening showed

HCV antibody prevalence of 12.2%. Table 1 shows the prevalence of screening among clients tested in 4 IHC and 3 MO events, which were 19.37% and 1.75% respectively.

	# (%) N=212	HCV-antibody positive (%)	HCV-antibody negative (%)
BIRTH COHORT			
<1945	6 (2.83)	2(7.69)	4 (2.15)
1945-1965	99 (46.7)	8 (30.77)	91 (48.92)
>1965	107(50.47)	16(61.54)	91 (48.92)
GENDER			
Male	99(46.7)	13 (50)	86 (46.24)
Female	113 (53.3)	13 (50)	100 (53.76)
RACE			
Non-Hispanic White	192(90.57)	25(96.15)	167 (89.78)
African American	20(9.43)	1(3.85)	19 (10.22)
SCREENING LOCATIONS			
Indigent Healthcare Clinics	154(72.64)	25(96.15)	129 (69.36)
Medical Outreach Settings	58 (27.37)	1(3.85)	57 (30.64)
TOTAL		26 (12.26)	186 (87.74)

Table 1: Weighted Frequency of Sociodemographic Factors and Hcv Screening Locations among Adults

Birth cohort

Among all clients screened, 99 (46.7%) had their birth-year between 1945- 1965(baby boomers). A total of 113 (53.3%) had their birth-year outside 1945-1965, with 6 (2.83%) before 1945 and 107 (50.47%) after 1965. Young adults, born after 1965, formed a majority of the HCV antibody positive patients 16 (61.54%; $P=0.0905$). Those born before 1945 formed the least number of positive and negative cases, 2(7.69%) and 4 (2.15%) respectively. HCV antibody negative results were similar between baby boomers and young adults (Table 1).

Gender

The percentage of males and females screened were 46.7% and 53.3% respectively, with equal proportion of HCV antibody cases (50%; $P=0.7186$).

About 53.76% of females and 46.24% of males tested negative (Table 1).

Race

Non-Hispanic whites and African Americans made up 90.57% and 9.43% respectively of all clients screened and 96.15% ($P=0.2980$) of the positive cases were ascribed to non-Hispanic whites. About 10.22% of African Americans and 89.78% of non-Hispanic whites tested negative (Table 1).

Screening locations

Screening occurred in seven testing locations, 3 MO events and 4 IHCs. A total of 25 (96.15%; $P=0.0056$) HCV-antibody positive cases were found in the IHCs compared to 1(3.85%) found in a MO event (Table1). Among the positive cases found in IHC, 10 (38.5%) and 8(30.8%) were found in JCDDC and PMC respectively (Figure 1).

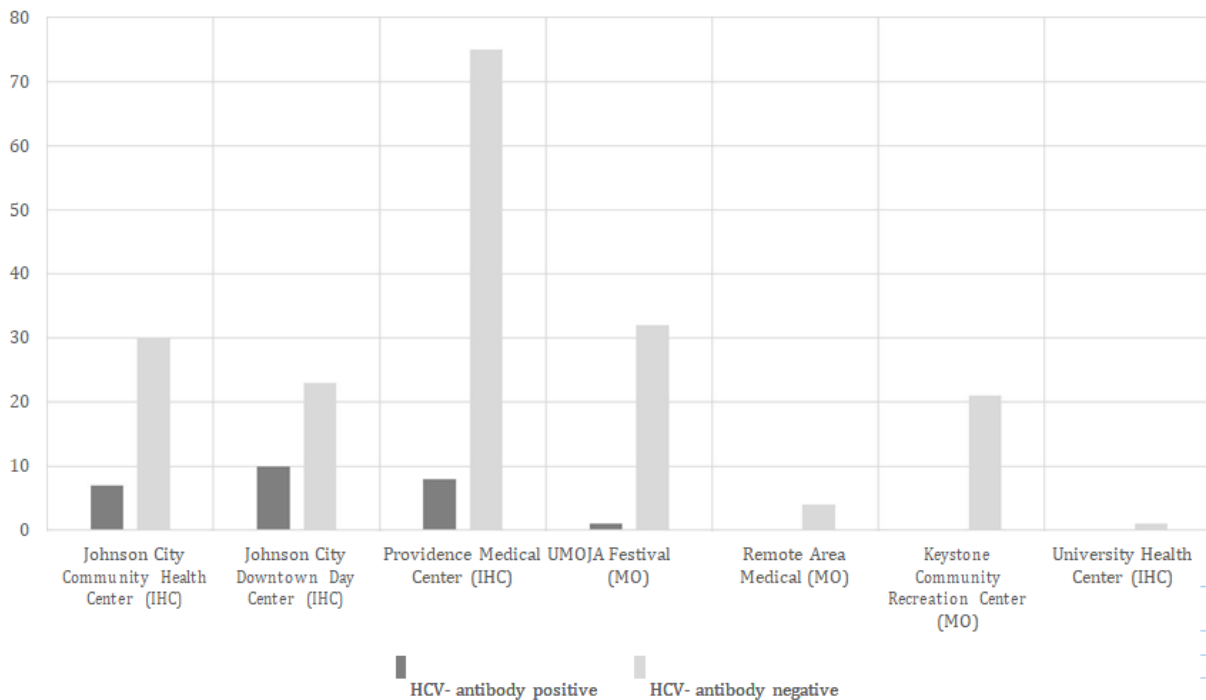


Figure 1: Frequency of Hcv Screening Test Result Locations.

Discussion

The aim of this study was to ascertain the prevalence of HCV and to further assess whether it was more useful to do HCV screening in MO settings compared to IHC in northeast Tennessee. The HCV seropositivity rate was found to be 12.2%. Out of the 212 people screened for HCV, 26 were HCV positive. The prevalence of screening among clients tested in 4 IHC and 3 MO events were 19.37% and 1.75% respectively. The majority of HCV antibody positive cases were born after 1965, signifying a shift from the baby boomer cohort to a younger age group. This correlates with the recent trends in HCV surveillance owing to the current opioid epidemic. Since 2013, the opioid epidemic, propagated by the sharing of injection equipment such as syringes and injection water, has contributed significantly to the alarming rate of HCV infection [1,15].

This is responsible for the change in birth cohort commonly associated with HCV infection, from baby boomers to young adults, aged between 20-40 years. The baby boomer birth cohort (BBC) accounted for 99(46.7%) of the study population and 8 (30.77%) of those who were positive for HCV. The U.S. Department of Health and Human Services (HHS) action plan for the prevention,

care and treatment of viral hepatitis created major changes in the management of HCV. The HHS action plan recommended greater access to hepatitis care and treatment in primary care facilities. This together with the USPSTF and CDC recommendation for the incorporation of a one-time screening program of the BBC and asymptomatic high-risk individuals accounts for the high HCV screening rate observed in these populations [7,17]. Although HCV screening was done in 4 IHC and 3 MO events in the Tri-cities region, most of the HCV antibody positive cases 25(96.15%) were found to occur in the IHCs ($P=0.0056$).

This can be explained by a variety of factors. Firstly, a substantial number of individuals who reported to the IHCs for primary care services were uninsured people who had previously engaged in IDU. Recent studies show that the majority of IDUs are aged between 20-40 years [1,18]. IDUs are more likely to feel stigmatized, uncomfortable and sensitive to testing in medical outreaches amid their peers in comparison to IHCs. Also, PWID tend to seek health services in places they perceive to be a comfortable and safe environment- sites where providers are used to PWID, are respectful towards them and understand addiction.²⁰ These are more likely to be IHCs with an established system of care and specialist

health staff than MO settings. A study on the barriers and facilitators of HCV screening found that regular contact and a good relationship with a primary care provider was associated with increased HCV testing in PWID.5 Also, PWID were more likely to get tested for HCV when instituted as part of a routine care rather than community outreach screenings [15].

Secondly, the CDC guideline for ongoing HCV screening for high risk populations plays a significant role in the higher yield of HCV positive antibody test in IHCs [19]. This has led to many IHCs supporting routine care practices. In this study, the IHC catered to a lot of homeless and uninsured people, a larger proportion of which were IDUs. Studies have shown that people who are homeless and incarcerated have a higher prevalence of HCV [20]. Furthermore, the 4 IHC locations used also tend to receive a substantial number of referrals from other facilities that did not offer routine HCV screening due to lack of HCV rapid test kits, lack of healthcare personnel or the absence of an HCV care specialist. The source of these referrals includes public health clinics, psychiatric hospitals, sexually transmitted diseases clinics, substance abuse treatment programs, and syringe exchange providers. All these places mostly referred high risk individuals that required HCV screening. Therefore, implementation of the recommended HCV screening in these IHCs within this target population is likely to be of high yield.

Finally, the BBC is enrolled in the Medicare program, which offers HCV screening at no cost [21]. Therefore, they probably have easier access to healthcare services, which are likely to be provided in IHC such as primary care centers. Hence, they may be requested to have HCV screening as recommended by CDC contributing to the higher yield in IHCs. Evidence from other studies have shown that targeted testing of BBC in primary care settings is 2.6 to 8 times as likely to identify those with old or new HCV infection compared to usual care [17,22]. A major disadvantage of MO settings with regards to attracting high risk individuals, involves maintaining communication channels that reach the target population. A study on the perception of PWID to HCV screening showed that, they are not always aware of voluntary testing sites such as MO [20]. In contrast, this study engaged in a community sensitization campaign targeted towards areas with high risk populations to inform them of the availability of HCV screening at the IHCs before screening was initiated. This together with a direct recruiter approach might also explain the higher yield at the IHCs compared to the MO. A direct recruiter approach

has been shown to be effectiveness in promoting HCV screening in some studies [17].

Of the 26 who screened as positive, only 16 (61.5%) returned for confirmation and treatment. This supports the national statistics for treatment of Hepatitis C after screening. Barriers to treatment are subjectively speculated [23,24]. The following may have contributed to the lack of follow-up and treatment: (1) fear; (2) cost; (3) transportation to clinic for treatment; (4) stigma; and (5) lack of knowledge of the nature of HCV disease process. There are limitations to this study. Overall, more of the screening was done in IHCs. Medical outreaches are sparse and not very common, so this limited the amount of screening done at MO. Also, this study was done in the Tri-cities region of northeast Tennessee, so the characteristic features of IHCs where screening was done, might not necessarily be the same with other parts of the U.S. Therefore, the results of this study might not be very generalizable.

Conclusion

This study identified a low prevalence of HCV in northeast Tennessee, with a higher prevalence of HCV among young adults, females, non-Hispanic whites and IHC. Only the higher prevalence found among IHC compared to MO settings was statistically significant ($P=0.0056$). These findings might have been affected by the higher rate of screening at IHCs compared to MO settings. In this era of opioid epidemic contributing significantly to the rates of HCV infection and the availability of DAAs that over a SVR rate of more 90%, the benefits of targeted screening cannot be over emphasized.

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