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HIV and Hepatitis C Linkage-to-Care Initiative for New Orleans Residents Experiencing Homelessness During the COVID-19 Pandemic

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Short Summary

A study evaluating a linkage-to-care initiative for those experiencing homelessness in New Orleans, LA during the COVD-19 Pandemic found effective strategies in connecting HIV and HCV patients with follow-up care.

Abstract

Background People experiencing homelessness are disproportionately infected with human immunodeficiency virus (HIV) and hepatitis C virus (HCV). In response to COVID-19, cities nationwide temporarily housed people experiencing homelessness in unused hotels. One such initiative in New Orleans also enacted a screening, counseling, and linkage-to-care model for HIV and HCV treatment for this temporarily housed population between May and July 2020.

Methods A non-concurrent cohort study was performed assessing follow up in the treatment of HIV and HCV for this population. Outcome data was collected on seropositive patients' electronic medical record to assess patient progression through the treatment cascade.

Results Of 102 unhoused residents, 25 (24.5%) tested HCV seropositive. Of the HCV positive 21/25 (84%) were connected to the associated clinic for follow up care and 10 (40%) obtained HCV treatment medication. Furthermore, all three patients who tested seropositive for HIV either started or re-initiated anti-viral treatment. The greatest barrier to providing medication for the HCV seropositive patients, once care was initiated, was loss-to-follow-up.

Conclusion Targeting homeless persons living in temporary residences for HCV and HIV screening can be effective at promoting access to care for those infected due to this population's high HCV seropositivity especially significant if the patient has a history of intravenous drug use or is over the age of 40. However, continued outreach strategies are needed to assist patients in retention of care.

Keywords

HIV, Hepatitis C (HCV), Urban homelessness, COVID-19

Introduction

In 2019, an estimated 4.1 million people in the United States were seropositive for hepatitis C virus (HCV) with 2.4 million chronically infected [1]. Additionally, it is estimated that 75% of Americans with a chronic HCV infection are unaware of their diagnosis [2]. In 2021, an estimated 1.2 million Americans are living with a human immunodeficiency virus (HIV) infection, 14% of which are unaware of their status [3]. Both HCV and HIV pose a significant national health threat due to the large number of those undiagnosed and the serious sequelae of infection.

Burden of HCV and HIV in Louisiana homeless population

This burden of HCV and HIV is especially profound in Louisiana. Among the 4.7 million people living in Louisiana, it is estimated that 60,000 and 20,907 are infected with HCV and HIV, respectively [4, 5]. During the 2013-2016 time frame, Louisiana was ranked fourth highest in the United States with an estimated Hepatitis C prevalence of 1,420 infected per 100,000 persons [6]. The city of New Orleans has the highest overall prevalence of HCV in Louisiana and it is estimated that 52% of people who inject drugs in New Orleans are HCV seropositive [7]. This can be further substantiated by analyzing the overlap between the opioid and HIV/HCV epidemics with the homeless at the epicenter of both. While difficult to measure the true rate of homelessness, the city estimates that 302 per 100,000 persons are homeless in New Orleans [8]. Overall, the homeless community is three and fourteen times more likely to be HIV and HCV seropositive, respectively compared to housed persons [9-11], thus HIV/HCV services are greatly needed for this vulnerable population.

Difficulty in reaching the homeless population and barriers connecting to care

Unhoused persons can experience several barriers to testing and follow-up care, including lack of knowledge and misconceptions about HCV infection, mistrust of health care providers, co-morbidity of substance use or psychiatric condition, lack of systemic advocacy from shelter staff, and access to transportation [12-14]. It can be difficult for those experiencing homelessness, who test positive for HCV, to navigate through the treatment cascade. While those with HCV have a low treatment rate, unhoused persons may have an even lower rate given the stressors placed on the homeless [15]. Additionally, those with commercial insurance have higher odds of HCV treatment initiation (OR 2.11, 95% 1.46-3.05) than those uninsured [16]. Residents experiencing homelessness are associated with lower quality of HIV care, including initiating and adhering to treatment [11, 17]. A recent study found that overall barriers due to housing (stability, structure, quality of housing) are associated with lower access and adherence to anti-retroviral therapy and higher rates of HIV high-risk behaviors [18]. Interventions that improve access to HIV/HCV care for the unhoused should be a priority.

Homelessness during COVID-19

Globally, the COVID-19 pandemic brought significant health care, economic, and social burdens. In the United States, individuals are at an increased risk of losing their housing due to increased unemployment rates and a struggling economy [19]. Despite the Centers for Disease Control and Prevention order halting residential eviction on September 4, 2020 through June 30, 2021, an analysis of US census data by the Aspen Institute estimated that 30-40 million Americans are at risk of eviction due to the COVID-19 pandemic [20, 21]. The COVID-19 Eviction Defense project estimates that 36% of Louisiana renters are at risk of eviction [22]. To

assist the homeless population during the COVID-19 pandemic, the state of Louisiana constructed four temporary housing shelters in hotels across metropolitan New Orleans and the adjacent suburb, New Orleans East. The purpose of these temporary housing shelters was to mitigate the spread of COVID-19 among vulnerable populations and provide alternative housing to those not accepted into local homeless shelters due to COVID-19 restrictions (reduced maximum occupancy).

The objective of this study was to analyze the effectiveness of a pilot program conducting rapid HIV and HCV testing among homeless persons residing in COVID-19 temporary housing, along with connecting seropositives to follow-up care at a comprehensive community clinic in New Orleans, LA. The unique format of utilizing hotels allowed for recruitment and testing at the patients' place of residence, aiding access to this notoriously difficult-to-reach population and improving retention in the treatment cascade.

Materials and Methods

Program

A screening, counseling, and linkage to care initiative took place from May 6, 2020 to July 14, 2020 at four temporary housing locations in Orleans Parish, Louisiana. Then, a non-concurrent cohort study was performed assessing follow-up in the HIV and HCV treatment cascades for this population.

Opt-in screening was offered to all residents using the OraQuick® HCV Rapid Antibody test and/or the Determine HIV Ag/Ab assay. Positives from the Determine HIV Ag/Ab assay

were confirmed with the rapid INSTI HIV-1/HIV-2 antibody test. All three of these tests were administered by Louisiana Office of Public Health trained and certified testers in a private room at the hotel to ensure confidentiality. These testers also delivered in-depth counseling on both HIV and HCV infections (contraction, long-term health effects, and treatment options) to all patients at the time of testing. All patients were given the same comprehensive education on Pre-Exposure Prophylaxis (PrEP) medications available to help prevent the spread of HIV in those not yet exposed. Patients who tested for HCV and/or HIV were given their results within 20 minutes (at the completion of the antibody test) and if seropositive, referred to CrescentCare clinic for follow up treatment with a primary care provider (PCP).

CrescentCare clinic is a federally qualified healthcare center (FQHC) that provides a broad range of comprehensive health and wellness care to those residing in the greater New Orleans area. Linkage to a primary care provider at CrescentCare was organized following determination of seropositivity. For HIV this determination comes immediately, same day, after two reactive rapid HIV tests; a testing algorithm that can be used as proof of diagnosis in the state of Louisiana. For HCV, the confirmation comes after initial rapid antibody test via viral ribonucleic acid (RNA) polymerase chain reaction (PCR) test, followed by assessment of disease progression, and treatment with enrollment assistance if necessary. The FQHC provided free organized transportation to all health care related visits and the Louisiana Department of Housing provided an in-house case worker at the temporary housing sites to assist in the patient's movement through the treatment cascade. This in-house case worker assisted in linking positive patients with CrescentCare to ensure adequate communication among the clinic and patient. Their role included organizing the private telehealth appointments between the clinic's

health care provider(s) and patient by utilizing the patient's smart phone, if available, or case worker's computer.

The study included persons 18 years of age and over at any of the four temporary housing hotels who opted-in to receive an HIV and/or HCV test. This program tested at all four of the temporary housing hotels made available by the state to the homeless in New Orleans, LA. These temporary housing hotels were open to anyone that needed shelter during this time, no data was collected on the participants' length of housing difficulties. Participants resided at these hotels until being placed into long-term housing or voluntarily leaving. While being housed, residents had access to case managers to assist in their healthcare needs and additional assistance in finding employment as well as permanent housing. This study excluded non-homeless employees of the temporary housing site who received testing and those who completed treatment prior to the study.

Treatment Cascade

Outcomes for the study were assessed based on the progression in the HCV Care treatment cascade. The cascade includes the following stages: 1. Receiving the HCV antibody test at one of the four temporary housing shelters, 2. Successfully reaching the participant via phone call and scheduling a primary care provider (PCP) appointment, 3. Attending the PCP appointment via online video services at the hotel (telehealth), 4. Completing pre-treatment labs (HCV viral load), 5. Obtaining HCV medications, and 6. Confirmed sustained virologic response at 12 weeks following completion of therapy (SVR12). The RNA labs and medication pickup occurred on the same day and prior to establishment of chronic infection. If RNA levels were

undetectable (the patient did not have chronic infection) then the patient was notified to stop treatment as their body cleared the infection.

Similarly, patients testing HIV seropositive were assessed on their progression through the HIV treatment cascade, including: 1. Initial reactive HIV antibody test(s) via the rapid/rapid testing algorithm at the temporary housing shelter, 2. Attending initial PCP appointment at CrescentCare, and 3. Initiation of treatment, or if the patient had fallen off therapy, re-initiation of treatment.

Data Collection and Analysis

During the testing window, demographics and behavioral habits (Table 1) were collected on Louisiana Office of Public Health Testing STD/HIV testing forms and stored securely at CrescentCare. The following variables were collected at the time of testing: age, assigned sex at birth (male or female), lifetime heterosexual exclusivity, lifetime history of intravenous (IV) drug use, and lifetime history of sharing injecting equipment. Bivariate analysis was performed to identify risk factors for HCV seropositivity (Table 2). For analysis, age was categorized into two levels (18-39 years or 40 years of age and older) and those in the baby boomer generation (born 1946-1964) (Table 2). The classification by age was found as those who are 40 years of age or older have a higher HCV antibody-positive rate and are thus recommended to have regular HCV screenings due to this cohort's potential of participating in at risk behaviors (blood transfusion, tattoos, and unclean injections prior to the discovery of HCV) [23].

Additional information regarding follow-up care was asked to all those that tested

seropositive for HCV (Table 3), these variables included: HCV infection history (if the patient stated a previous HCV seropositive test or not), method of communication with CrescentCare clinic (patient's personal cell phone or hotel's case manager's phone), transportation to PCP appointment (provided by Medicaid, public transport via bus/streetcar, or rideshare service provided by CrescentCare), and patient's current insurance status. Additionally, testers asked all patients who were tested for HCV or HIV if they are currently taking or are aware of PrEP (Table 3). Outcome data was collected on seropositive patients' electronic medical record to assess the patient's progression along the treatment of care cascade (Table 4). Outcome data was collected from May 6, 2020 through January 2021 and seropositive patients were followed for at least four months after their initial antibody test. This data continued to be collected after hotels were closed in summer 2020 as the clinic continued to follow seropositive patients.

Statistical analysis was conducted using SPSS version 27 software. Categorical variables were assessed using χ^2 analysis. Significance was determined by p-value < 0.05. The association between HCV positivity and risk behaviors was measured using odds ratios. The Tulane University Institutional Review Board (IRB) approved the study procedures. Upon IRB approval, the electronic data was provided by CrescentCare in a deidentified manner and kept confidential. Consent was not required by the IRB for this type of non-concurrent cohort study. This study uses historical data of an ongoing program at the clinic that we later evaluated.

Results

Demographic Data

During the study period, 108 patients were tested for HIV and/or HCV and six patients

were excluded because they were a non-homeless employee of the temporary housing site who received testing or completed treatment prior to the study. In total, 102 patients were included (Table 1). Participants were predominantly male (61.8%) and between the ages of 18 and 50 (55.9%) at the time of testing. Additionally, the majority were African American (56.9%) and heterosexual (68.6%). Furthermore, 24.5% reported a previous history of IV drug use, of whom 32% reported a history of sharing injecting equipment.

Antibody Testing

All participants stayed to receive their results. In total, 25/102 (24.5%) tested seropositive for HCV and 3/98 (3.1%) tested seropositive for HIV (Table 1). One participant was found to be HCV-HIV coinfected.

HCV Risk Factors

HCV seropositivity was significantly associated with a reported history of IV drug use, history of sharing injecting equipment, and those older than 40 (Table 2). Those reporting a history of IV drug use had an HCV seropositivity rate of 60% and were significantly more likely to be HCV seropositive than participants without a reported history of IV drug use (OR 10.05, 95% CI 3.55-28.44). Similarly, 75% of those who reported a history of sharing injecting equipment were HCV seropositive and significantly more likely to be HCV seropositive than those who have not shared injecting equipment (OR 11.84, 95% CI 2.21-63.39). Age less than 40 years old was found to be significantly protective of HCV seropositivity (6.9% vs 32.4%). (OR 0.16, 95% CI 0.03-0.71). Similarly, of those in the baby boomer generation (born 1946-1964), 42.4% were HCV seropositive and were more likely to be HCV seropositive than those not in

this generation (OR 3.75, 95% CI 1.48-9.66). There was no significant association between HCV infection and assigned sex (p = 0.092) or being exclusively heterosexual (p =0.760).

HCV Treatment Cascade

Over half (60%) of the patients testing HCV seropositive were unaware of their HCV infection prior to testing. The HCV treatment cascade (Table 4, Figure 1) depicts the treatment of care for the 25 patients with a seropositive HCV test result that had not completed treatment prior to this study; 100% were communicated their antibody positive result, 21/25 (84%) were linked with follow-up care from CrescentCare clinic, 15/25 (60%) attended a telehealth appointment with a provider, 13/25 (52%) utilized transportation to have confirmatory start of care labs, 10/25 (40%) picked up their medication to start treatment, and 2/24 (8.3%) were cured throughout this process, defined by SVR12. The denominator was held at 25 for steps 1-5 to show the progression along the treatment cascade for all patients, this was adjusted to 24 for step 6 as those not chronically infected would not continue medication to achieve SVR12. The clinic did not establish chronicity for treatment to begin, thus the treatment cascade is evaluated for all HCV seropositive patients (n=25). Only those found to be chronically infected 12/13 (92.3%) with HCV were eligible to proceed on medication, 1/13 (7.7%) was not chronically infected (Table 4). However, this leads to a conservative estimate of SVR12, 2/24 (8.3%) since 12 of the 24 patients included in the denominator of step 6 were not evaluated for chronicity due to not completing step 4 (pre-treatment labs) (Table 4).

Of the 25 that tested seropositive for HCV without history of prior cure, 7/25 (28%) relied on the in-house temporary housing case manager to connect with the clinic for treatment

and of those, 6/7 (85.7%) of patients did not make it passed the initial contact by the CrescentCare treatment manager (step 2) in the treatment cascade (Table 3). Additionally, pre-treatment labs (step 4) were the first step where transportation was necessary to continue along the treatment cascade. Of those that completed step four, 5/13 (38%) relied on a rideshare provided by the clinic to do so. Lastly, 20/25 (80%) of HCV seropositive patients in this study had active insurance confirmed and only 1/10 (10%) of those on treatment did not have insurance on file with the clinic.

Of the HCV seropositive patients, 0/25 (0%) were currently on PrEP and 7/25 (28%) of patients had never heard of the prophylaxis medication.

HIV Treatment Cascade

Of the three that tested seropositive for HIV, one patient (33.3%) had never been on HIV treatment prior to this program and one patient tested seropositive for both HIV and HCV. All three (100%) of the HIV seropositive patients received their test result, had their initial PCP appointment at CrescentCare, viral load assessed, and either started treatment or had assistance with re-starting their treatment regimen. All HIV seropositive patients were contacted by CrescentCare clinic the same day as the initial antibody test at the temporary housing site and all were given adherence counseling.

Discussion

This initiative identified a high seropositivity of 24.5% for HCV antibodies in the 102 patients experiencing homelessness that were tested while living in free housing during the

COVID-19 pandemic. Due to the accessibility of testers and clinic personnel to the homeless residents in this structure of care, 21/25 (84.0%) of these seropositive patients were connected to follow up care from a local clinic. In order to reduce HCV transmission, it is imperative to frequently test at-risk populations, such as current or previous IV drug users and those 40 years of age and older. Providing routine testing specifically in the homeless population of an urban city can allow for early HCV diagnosis and prevention of chronic HCV infection. Due to the high seropositivity in this homeless population, it is imperative to also consider the effect this has on urban public health and spread amongst our communities. The temporary housing shelters created a unique opportunity to screen for HIV and HCV among a notoriously difficult to reach population that does not seek regular health care screenings.

This transient population typically has difficulty moving through the HCV treatment cascade and completing treatment [14]. As evident by the 10/25 (40%) of patients with a reported history of HCV seropositivity prior to this project (Table 3), these patients often cited lack of previous treatment completion due to loss-to-follow-up by medical providers and not fully understanding the disease and treatment available. A variety of barriers exist for people experiencing homelessness, including accessing testing, returning for test results, communicating with health care providers, and transportation to clinic for care and pharmacy for medications [13]. Our model aimed to eliminate some of these barriers by offering testing at the patient's current place of residence and providing results within 20 minutes of test initiation, allowing for day-of notification of results to 100% of patients screened for HCV and HIV. Telehealth services allowed for easy and convenient linkage to care, thus eliminating transportation as a barrier to accessing a primary care provider. In instances where in-person contact with the clinic was

required, free means of transportation via a rideshare service was made available, thereby improving the patient's ability to access pre-treatment labs and procure necessary medications. Furthermore, an in-house case manager employed by the state resided at each hotel to assist patients with insurance enrollment and coordinating care with the clinic.

Additionally, due to the safe therapeutic index of the HCV treatment medications, CrescentCare clinic enacted a similar approach to the treatment of HCV as HIV. In this case, patients came in for pre-treatment labs to confirm their HCV RNA seropositivity and were able to pick up HCV treatment medication the same day. If the patient's labs came back depicting no chronic infection (n=1), they were communicated to discontinue medication. Those that did not pick up their medication the same day as the labs (n=3) did so due to patient choice or lost to follow-up. This method eliminated the barrier of additional communication and transportation needed for medication distribution.

Notably, this study had a relatively small sample size (n=102) from a single city; thus, findings may not be generalized to other areas of the country. An additional challenge was our ability to contact the patients that tested seropositive and connect them to follow up care. Of the HCV seropositive patients, 7/25 (28%) did not have their own cell phone, in such that the clinic relied on the hotel's in-house case manager to coordinate healthcare appointments. These homeless residents did not have their own transportation and the start of care lab site was inaccessible by way of most public transport. Furthermore, in order for the rideshare system to be effective, the patient needed to have a cell phone to accept the ride and communicate with the driver for pickup. In all, the greatest barrier to follow up care and treatment initiation for these

patients was the difficulty for the clinic to establish consistent, direct patient contact. This is evident by the large drop-off in adherence between HCV medication pickup and confirming SVR12 (Table 4) where patients became lost to follow-up largely due to the closing of the temporary housing hotels causing greater difficulty in confirming treatment completion.

Future projects should continue to assist patients with obtaining a cellular device or reliable method of communication. Additionally, bringing health care providers to the patient for pre-treatment labs and providing a medication delivery service can be used to circumvent the transportation barrier seen in this project. Even though this population can be notoriously difficult to reach, subsequent studies should consider expanding to more temporary housing shelters in order to increase sample size. Additionally, having both enrollment and the testing service at the same location can allow for ease of patient recruitment and follow up for additional care if needed. Future approaches must aim to combat these barriers to reliably contact the urban homeless population and provide them with tools to successfully navigate the treatment cascade.

Moving Forward

It is well understood that those of high-risk behaviors (current or previous IV drug use) have increased risk for blood-born infectious diseases, such as HCV and HIV. This study's increased prevalence of infection compared to the general population underscores the importance of providing critical intervention and treatment of care services to this high-risk population. In addition to increasing funding for these groups to aid in mending the barrier of communication, further screening for HCV seropositivity must be expanded in all emergency departments to assist in early detection and treatment initiation. Additionally, if the patient was born in the Baby

Boomer generation (1946-1964), they have a higher likelihood of having HCV antibodies when compared to those who were not (42.4% vs 16.4%). Researching these high-risk populations provides the key to designing and implementing effective screening and follow-up care interventions in order to control the prevalence of HCV and HIV in the United States.

With the hardship of adjusting to the COVID-19 pandemic, state officials have taken valiant strides to help mitigate the spread of the virus, specifically in susceptible patients such as the urban homeless population. With the housing initiatives in New Orleans brought on by the pandemic, it allowed health care personnel to identify a notoriously hard to access population by localizing them all in one place – free housing hotels. This unconventional delivery of care would have been nearly unattainable without this housing configuration. Having this population centralized in one location assisted the health care team with both delivering the tests and results thereafter as well as connecting patients to follow up care. The high HCV seropositivity percent found in this population further substantiates the alarming prevalence of the virus in this difficult to access cohort and underscores the prioritization of future initiatives to assist this group in determining their serostatus and accessing treatment.

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Disclosure and Conflict of Interest

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Figure 1. Treatment cascade for HCV positive patients (n=25)

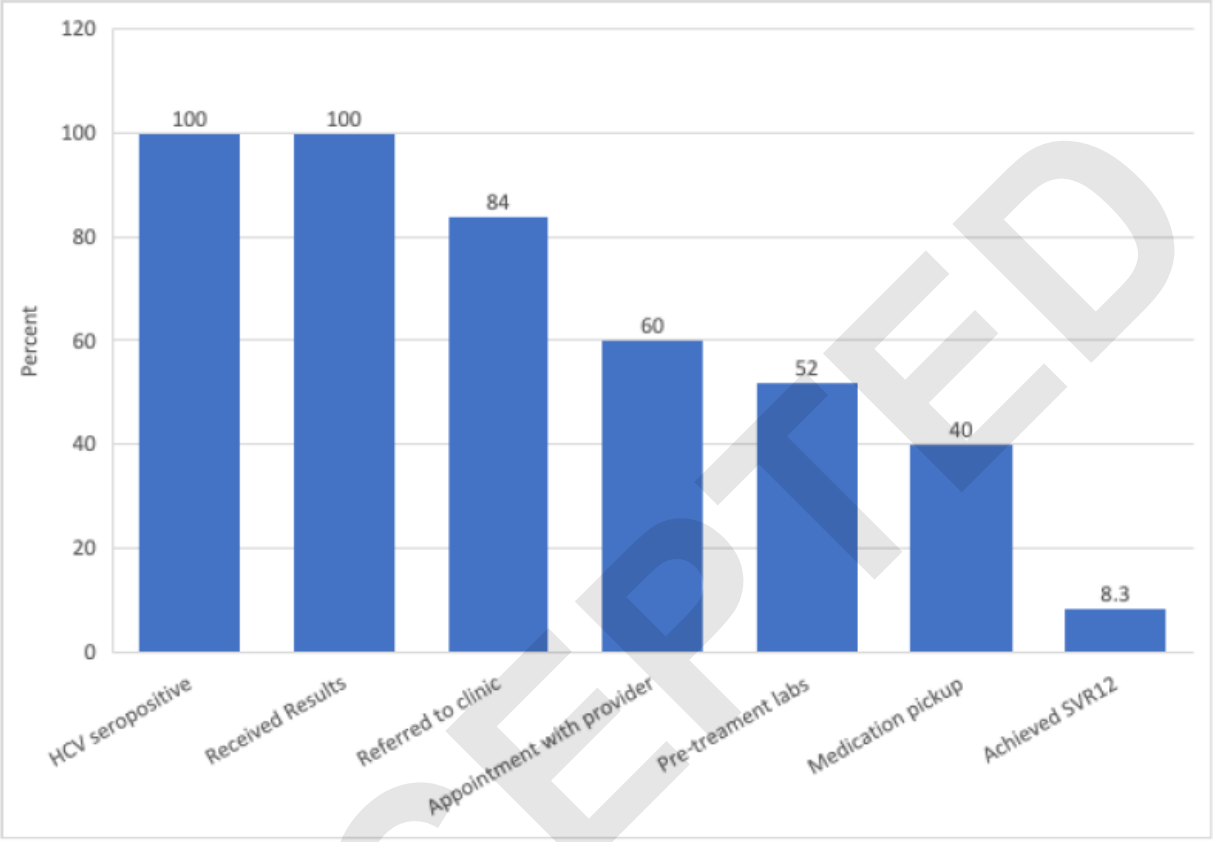

Table 1. Descriptive Statistics for Client Demographic and Social Variables (n = 102)

Variable	**Patients Tested** median (interquartile range)
Age, years	46.5 (20)
Variable	n (%)
Male	63 (61.8)
White	28 (27.5)
African American	58 (56.9)
Born in baby boom generation	33 (32.4)
Heterosexual	70 (68.6)
Reported history of IV drug use	25 (24.5)
Reported history of sharing injecting equipment	8 (7.8)
Hepatitis C seropositive	25 (24.5)
HIV seropositive[1]	3 (3.1)

[1]HIV test was not completed by every patient (n=98)

Table 2. Demographics and Social Variables of HCV Positives among clients tested

Characteristic	N (n = 102)	HCV seropositive (%) (n=25)	HCV seronegative (%) (n=77)	P Value	Odds Ratio (95% CI)
Age[1]					
18-39	29	2 (8)	27 (36)	0.008	0.16 (0.03, 0.71)
≥ 40	71	23 (92)	48 (64)		
Baby Boomer					
Born 1946-1964	33	14 (56)	19 (25.3)	0.005	3.75 (1.48, 9.66)
Not a Baby Boomer	67	11 (44)	56 (74.7)		
Assigned Sex					
Male	63	19 (76)	44 (57.1)	0.092	2.38 (0.85, 6.61)
Female	39	6 (24)	33 (42.9)		
Race[1]					
White	28	9 (36)	19 (25)	0.286	1.69 (0.64, 4.44)
Non-white	73	16 (64)	57 (75)		
Heterosexual					
Lifetime heterosexual	70	18 (72)	52 (67.5)	0.760	1.21 (0.35, 4.16)
Not heterosexual	18	4 (16)	14 (18.2)		
No answer	14	3 (12)	11 (14.3)		
Reported history of IV drug use					
Yes	25	15 (60)	10 (13)	< 0.001	10.05 (3.55, 28.44)
No	77	10 (40)	67 (87)		
Reported history of sharing injecting equipment					
Yes	8	6 (24)	2 (2.6)	< 0.001	11.84 (2.21, 63.39)
No	94	19 (76)	75 (97.4)		

[1]Variables age and race were not answered by every patient

Table 3. Follow-Up Care for HCV Positive Patients (N=25)

Characteristic	N (%)
HCV Infection History	
New HCV seropositive	15 (60)
History of HCV infection	10 (40)
Communication with clinic	
Personal Cell Phone	18 (72)
Relied on hotel's case manager	7 (28)
Transportation	
Medicaid transportation	4 (16)
Bus/streetcar	2 (8)
Rideshare service (ex: Lyft)	7 (28)
Patients who did not reach step in treatment cascade	12 (28)
Insurance	
Active insurance	20 (80)
Inactive insurance	2 (8)
Unsure	3 (12)
PrEP	
Not currently on PrEP	24 (96)
Patients that never heard of PrEP	7 (28)
Patient did not answer	1 (4)

Table 4. Treatment Cascade for HCV Positive Patients (N=25)

Step in Cascade	Treatment of Care Step	Number of patients completing step (N, %)
1	Initial OraQuick HCV rapid Ab test and delivery of results	25 (100)
2	Initial contact by CrescentCare clinic	21 (84)
3	First telehealth appointment with CrescentCare provider	15 (60)
4	Pre-treatment labs (RNA Confirmatory Test)	13 (52)
5	HCV medication pickup	10 (40)
6[1]	Sustained Virologic Response at 12 weeks (SVR12)	2 (8.3)

[1] Step 6 is evaluated out of 24 patients as n=1 was not chronically infected