Efforts at the Frontlines: Implementing a Hepatitis C Testing and Linkage-to-Care Program at the Local Public Health Level

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ABSTRACT

Objectives. The national Viral Hepatitis Action Plan recommends strengthening partnerships among health departments, community-based organizations, and health-care providers for hepatitis services. We implemented a hepatitis C virus (HCV) testing and linkage-to-care program through a local health department using similar strategies reported for HIV care.

Methods. The Durham County Department of Public Health received federal funding to conduct HCV testing and linkage to care in Durham, North Carolina. HCV antibody testing with reflex RNA was offered through a sexually transmitted disease clinic, a county jail, community testing sites (including a residential substance abuse recovery program), and a homeless clinic. People with evidence of HCV infection were linked to care through an HCV bridge counselor who provided education, incentives, and transportation, and scheduled appointments with HCV specialists at nearby academic centers and on-site clinics.

Results. From December 2012 through February 2014, we conducted 2,004 HCV tests, of which 326 (16.3%) were HCV antibody positive and 241 (12.0%) had detectable HCV RNA. Among the 241 people with HCV infection, 178 (73.9%) were men, and 133 (55.2%) were born between 1945 and 1965. Of 241 people with chronic HCV infection, 150 (62.2%) reported ever injecting drugs, eight (2.5%) were coinfected with HIV, and 123 (51.0%) were linked to care.

Conclusion. At the local public health level, HCV testing and linkage to care can be facilitated with additional funding and by leveraging existing programs and provider networks to deliver a coordinated system of care.

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Advances have been made in the treatment of hepatitis C virus (HCV) infection with the introduction of direct-acting antiviral therapies in the United States. However, only 38% of the estimated 3 million people living with HCV infection in this country have been linked to care, 11% have been treated, and 6% have achieved cure based on data prior to the new era of interferon-free treatment.[1] In 2011, the U.S. Department of Health and Human Services released the Viral Hepatitis Action Plan to combat viral hepatitis.[2] One of its key strategies was to launch and strengthen partnerships among local health departments, community-based organizations, and health-care providers for HCV services, especially for intravenous drug users (IDUs). Fortunately, many public health departments are already positioned within established community networks that can be leveraged to raise awareness, increase education, and facilitate HCV testing and linkage to care for vulnerable populations.

North Carolina has one of the fastest-growing populations in the southeastern United States and has faced challenges with the provision of health care for the uninsured, including screening and treatment for HCV. Prior to 2012, HCV screening was not routinely offered through North Carolina health departments. A handful of programs were providing HCV antibody (anti-HCV) testing but not confirmatory HCV ribonucleic acid (RNA) assays because of cost. Only acute HCV infections are reportable in North Carolina, and no surveillance for chronic HCV infection exists. From 2008 to 2012, North Carolina reported an average of 46 acute HCV infections per year;[3] however, this number was likely an underestimation of the total burden. Extrapolation of the numbers of acute HCV infection suggests that the number of chronic HCV infections in North Carolina is much higher than estimated.[4]

In December 2012, the Durham County Department of Public Health initiated a program for HCV testing and linkage to care funded by federal Prevention and Public Health Funds. Durham County is the sixth-largest county in North Carolina and has experienced high rates of human immunodeficiency virus (HIV) infection and syphilis potentially associated with social determinants of health, including poverty and access to health care.[5] Kolman et al. previously identified barriers to testing and treatment for HIV infection, sexually transmitted diseases (STDs), and viral hepatitis in Durham as cost, lack of transportation, and stigma associated with a diagnosis.[6] To address these barriers, we implemented strategies to integrate HCV testing into existing HIV testing programs for at-risk populations and to facilitate HCV linkage to care with health-care providers in the community. We describe our activities and lessons learned from the implementation process and summarize our outcomes data from the project's first year.

METHODS

Upon notification of a Prevention and Public Health Fund grant from the Centers for Disease Control and Prevention (CDC), project staff members at the Durham County Department of Public Health convened several meetings with key community partners and health-care providers who had an interest in expanding HCV testing and care. Based on CDC recommendations for HCV testing,[7] we primarily targeted HCV testing efforts toward current and past IDUs, HIV-infected individuals, and people born between 1945 and 1965, or baby boomers (for one-time testing). We also considered other risk factors for HCV infection, including incarceration, long-term sexual exposure to an HCV-infected person, history of multiple sexual partners or STDs, or men who have sex with men.

To maximize access to the at-risk groups, we coordinated HCV testing through the local health department in the STD clinic, the county jail, community testing sites (including a residential substance abuse recovery program), and a clinic providing health care for the homeless. We drafted policies and procedures for internal programs (i.e., STD clinic, county jail, and community testing program), and we developed a memorandum of understanding with external organizations (i.e., the substance abuse recovery program, homeless clinic, and academic hospitals) prior to implementation of activities that included HCV referrals, on-site clinics, and sharing of confidential patient information for disease reporting and linkage services.

HCV testing process

Clinicians and health educators offered HCV testing along with HIV and STD screening in the STD clinic and at the community testing sites already providing these services. Testing was typically conducted on-site at the testing locations or in a mobile van during some of the community testing events. The county jail offered universal opt-out testing for HCV among inmates, while other locations offered targeted HCV testing based on predetermined risk factors. Risk-factor information was collected using a standard collection form from each testing site. Schoenbachler et al. describe additional information regarding the HCV testing process at the Durham County jail.[8]

We conducted anti-HCV testing with reflex HCV RNA testing for positive results through a memorandum of understanding with the University of North Carolina

Hospital laboratory. Two blood specimens collected from individuals at the testing sites were processed and transported to the University of North Carolina by the next business day. The anti-HCV test was based on a chemiluminescent microparticle immunoassay (Abbott ARCHITECT® Anti-HCV, Abbott Laboratories, Abbott Park, Illinois), and the quantitative HCV RNA was conducted using polymerase chain reaction (Abbott RealTi*m*e HCV Assay, Abbott Laboratories). We also offered rapid anti-HCV testing (OraQuick® HCV Test, OraSure Technologies, Bethlehem, Pennsylvania) to some individuals in the community, especially when we deemed it important to have immediate results for the population being tested (e.g., those at bus stops or housing complexes). If the rapid test was positive, we attempted to confirm all positive rapid HCV tests with quantitative HCV RNA assays by collecting additional blood specimens on the same day.

HCV pretest and posttest counseling

Health educators and project staff members provided HCV-specific information and prevention messages according to CDC guidelines[7] using written materials in English or Spanish during individual or group counseling sessions at each site. People tested at the STD or homeless clinic were asked to return in two weeks for results. People with evidence of HCV infection tested at the county jail were given their results as soon as possible, while residents at the substance abuse recovery program were given monthly test results to minimize interruptions with work requirements during the two-year program. Individuals who tested positive for anti-HCV, with or without detectable HCV RNA, were counseled and referred for hepatitis A/B vaccination at the health department. Trained staff members used CDC guidelines to provide posttest counseling for people with chronic HCV infection, including the need for preventing further harm to their liver, reducing risks of transmitting HCV to others, and medical evaluation for chronic liver disease and treatment.[7]

HCV linkage to care

Consistent with definitions from the HIV care continuum,[9] we defined HCV linkage to care as the process of assisting people diagnosed with chronic HCV infection with their initial visits with an HCV medical provider. Similar to strategies for people with newly diagnosed HIV infection,[10–12] we used an HCV bridge counselor or patient navigator to assist with posttest counseling and active linkage to care for people with chronic HCV infection. The bridge counselor had a health education background and received additional training from HIV disease intervention specialists who had experience working with the community. Upon confirmation of the diagnosis, the bridge counselor either met with or called individuals to facilitate linkage to care. Attempts to contact people identified with HCV infection involved at least two telephone calls and letters; bridge counselors also conducted home visits to locate individuals in the community as needed. During the bridging session, the counselor reviewed medical and drug history with each client, and provided HCV education, alcohol- and drug-reduction counseling, and HCV control measures as per North Carolina communicable disease laws.[13]

The counselor initially provided options for linkage to care at either a liver specialist located at Duke University (Durham) or to infectious disease physicians at the University of North Carolina (Chapel Hill), who could provide HCV care to patients regardless of insurance status. In the latter half of the project period, these specialists began providing on-site assessments for people with chronic HCV infection at the residential substance abuse recovery program and the health department to reduce individual barriers to care. The HCV bridge counselor assisted with scheduling appointments and sent reminders after the bridging sessions. Gift cards ($10) or bus passes were also provided to people with chronic HCV infection as incentives to attend their first appointments. People diagnosed with chronic HCV infection while in jail were contacted and linked to care after release; when possible, detainees not released were referred for further care to the North Carolina Department of Corrections.

HCV data entry and analysis

We entered data from the standardized collection forms into EvaluationWeb®, an Internet-based data collection system[14] that CDC provided to grantees. We downloaded demographic, HCV risk-factor, HCV test-result, and linkage-to-care data from this database for people tested from December 10, 2012, to February 20, 2014. We calculated the prevalence of chronic HCV infection, based on a positive anti-HCV test and detectable HCV RNA level, overall and for each testing site. We also examined the distribution of demographic characteristics and HCV risk factors for people with and without a positive anti-HCV test and for people with chronic HCV infection. We focused on age, sex, race/ethnicity, country of birth, and health insurance status. We evaluated injection drug use history (i.e., ever and within the past 12 months), HIV infection status, and birth year as the primary HCV risk factors of interest. All analyses were performed using SAS® version 9.2.[15]

Health department staff members also entered individual-level data regarding people identified with

chronic HCV infection into the North Carolina Electronic Disease Surveillance System.[16] However, the state did not monitor these cases for surveillance purposes because only acute HCV infections are reportable in North Carolina.

RESULTS

We conducted 2,004 anti-HCV tests from all testing sites, of which 326 (16.3%) were positive and underwent reflex RNA testing and 241 (12.0%) had detectable HCV RNA levels. The prevalence of chronic HCV infection among people tested was 10.0% (47/471) at the STD clinic, 9.3% (66/708) at the county jail, 14.7% (109/741) at community testing sites, and 22.6% (19/84) at the homeless clinic (Table 1). Among all 2,004 people tested, the median age was 37 years (interquartile range [IQR] = 27–50), and 609 (30.4%) people tested were born between 1945 and 1965. Most participants were male (n=1,456, 72.7%), black (n=1,255, 62.6%), and uninsured (n=1,349, 67.3%) (Table 2).

Among the 241 people identified with chronic HCV infection, the median age was 49 years (IQR=35–55), 178 (73.9%) were male, 123 (51.0%) self-identified as black, 107 (44.4%) self-identified as white, and three (1.2%) self-identified as Hispanic. The percentage of people with chronic HCV infection in the birth cohort was 55% (133/241), and six of 241 (2.5%) HCV-infected people had self-reported HIV coinfection. Most of the 241 individuals diagnosed with chronic HCV infection reported a history of having ever injected drugs (n=150, 62.2%), of whom 65 (43.3%) reported that they had injected drugs in the past 12 months.

Of the 241 people identified with chronic HCV infection through all testing sites, 197 (81.7%) received their HCV results and posttest counseling and 44 (18.3%) could not be contacted despite telephone calls, letters, or a home visit by the HCV bridge counselor. Of the 197 people who received posttest counseling, 134 (68.0%) were referred to care, of whom 123 (91.8%) attended their first appointment with an HCV care provider. Of 197 people identified with chronic HCV infection, 54 (27.4%) were not referred to care because of incarceration, relocation, or work requirements for the substance abuse recovery program, and nine (4.6%) reported that they were already in care (Figure). More than half (123 of 241, 51.0%) people identified with chronic HCV infection from our testing sites attended an initial appointment for HCV care during the project period.

DISCUSSION

HCV testing and linkage to care can be facilitated at the local public health level, where these services can be integrated with HIV/STD programs and coordinated through existing networks with other providers. By implementing screening for anti-HCV with reflex RNA testing in a public STD clinic, county jail, community testing sites, and a homeless clinic, we identified a 12.0% overall prevalence of chronic HCV infection. Targeted testing at a homeless clinic based on risk factors identified the highest percentage of chronic HCV infection (22.6%, 19/84) among people tested.

Table 1. Prevalence of hepatitis C virus infection among at-risk individuals,[a] by testing site and test results, Durham County, North Carolina, December 2012 through February 2014

Testing facility	*Number tested for HCV infection*	*Number testing anti-HCV positive/ HCV RNA positive (percent)[b]*	*Number testing anti-HCV positive/ HCV RNA negative (percent)[b]*	*Number testing anti-HCV negative (percent)[b]*	*Number with indeterminate anti-HCV result (percent)[b]*
Total	2,004	241 (12.0)	85 (4.2)	1,676 (83.6)	2 (<0.1)
STD clinic	471	47 (10.0)	17 (3.6)	405 (86.0)	2 (0.4)
County jail	708	66 (9.3)	23 (3.3)	619 (87.4)	0 (0.0)
Community testing site	741	109 (14.7)	41 (5.5)	591 (79.8)	0 (0.0)
Homeless health-care clinic	84	19 (22.6)	4 (4.8)	61 (72.6)	0 (0.0)

[a]At-risk individuals included current and past injection drug users, individuals with human immunodeficiency virus infection, and people born between 1945 and 1965 (i.e., baby boomers) (for one-time testing). Other risk factors included incarceration, long-term sexual exposure to an HCV-infected person, history of multiple sexual partners or STDs, and men who have sex with men.

[b]Percentages are row percentages.

HCV = hepatitis C virus

anti-HCV = hepatitis C virus antibody

RNA = ribonucleic acid

STD = sexually transmitted disease

Table 2. Characteristics of and risk factors for at-risk individuals tested for hepatitis C virus at testing sites in Durham County, North Carolina, December 2012 through February 2014[a]

Characteristic	*Number tested for HCV (percent)[c]*	*Number testing anti-HCV positive[b] (percent)[c]*	*Number testing anti-HCV negative (percent)[c]*
Total tested	2,004 (100.0)	326 (16.3)	1,678 (83.7)
Median age, in years (IQR)	37 (27–50)	48 (33–53)	35 (26–48)
Categorical age, in years			
<30	665 (33.2)	52 (16.0)	613 (36.5)
30–49	824 (41.1)	127 (39.0)	697 (41.5)
50–69	515 (25.7)	147 (45.1)	368 (21.9)
Birth cohort (1945–1965)			
Yes	609 (30.4)	165 (50.6)	444 (26.5)
No	1,395 (69.6)	161 (49.4)	1,234 (73.5)
Sex			
Male	1,456 (72.7)	234 (71.8)	1,222 (72.8)
Female	541 (27.0)	92 (28.2)	449 (26.8)
Transgender	5 (0.2)	0 (0.0)	5 (0.3)
Not reported	2 (0.1)	0 (0.0)	2 (0.1)
Race/ethnicity			
Black	1,255 (62.6)	161 (49.4)	1,094 (65.2)
White	542 (27.0)	147 (45.1)	395 (23.5)
Hispanic	97 (4.8)	7 (2.2)	90 (5.4)
Other[d]	55 (2.7)	3 (0.9)	52 (3.1)
Not reported	55 (2.7)	8 (2.5)	47 (2.8)
Country of birth			
U.S.-born	1,821 (90.9)	305 (93.6)	1,516 (90.4)
Foreign-born	86 (4.3)	4 (1.2)	82 (4.9)
Not reported	97 (4.8)	17 (5.2)	80 (4.8)
Health insurance status			
Yes	464 (23.2)	57 (17.5)	407 (24.3)
No	1,349 (67.3)	233 (71.5)	1,116 (66.5)
Not reported	191 (9.5)	36 (11.0)	155 (9.2)
Type of health insurance (among those with insurance)			
Public	242 (52.2)	36 (63.2)	206 (50.6)
Private	141 (30.4)	13 (22.8)	128 (31.5)
Other	1 (0.2)	0 (0.0)	1 (0.3)
Not reported	80 (17.2)	8 (14.0)	72 (17.7)
Ever injected drugs			
Yes	371 (18.5)	197 (60.4)	174 (10.4)
No	1,445 (72.1)	97 (29.8)	1,348 (80.3)
Not reported	188 (9.4)	32 (9.8)	156 (9.3)
Injected drugs within the past 12 months (among those who ever injected)			
Yes	178 (48.0)	90 (45.7)	88 (50.6)
No	193 (52.0)	107 (54.3)	86 (49.4)
HIV status			
HIV infection	37 (1.8)	8 (2.5)	29 (1.7)
No HIV infection	1,452 (72.5)	250 (76.7)	1,202 (71.6)
Not reported	515 (25.7)	68 (20.9)	447 (26.6)

[a]At-risk individuals included current and past injection drug users, individuals with HIV, and people born between 1945 and 1965 (i.e., baby boomers) (for one-time testing). Other risk factors included incarceration, long-term sexual exposure to an HCV-infected person, history of multiple sexual partners or sexually transmitted diseases (STDs), and men who have sex with men. Testing sites included an STD clinic, county jail, homeless health-care clinic, and community testing sites.

[b]The anti-HCV-positive group included people who were anti-HCV positive/ribonucleic acid (RNA) positive or antibody positive/RNA negative.

[c]Percentages may not total to 100 because of rounding.

[d]Other race includes multiracial, Asian, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander.

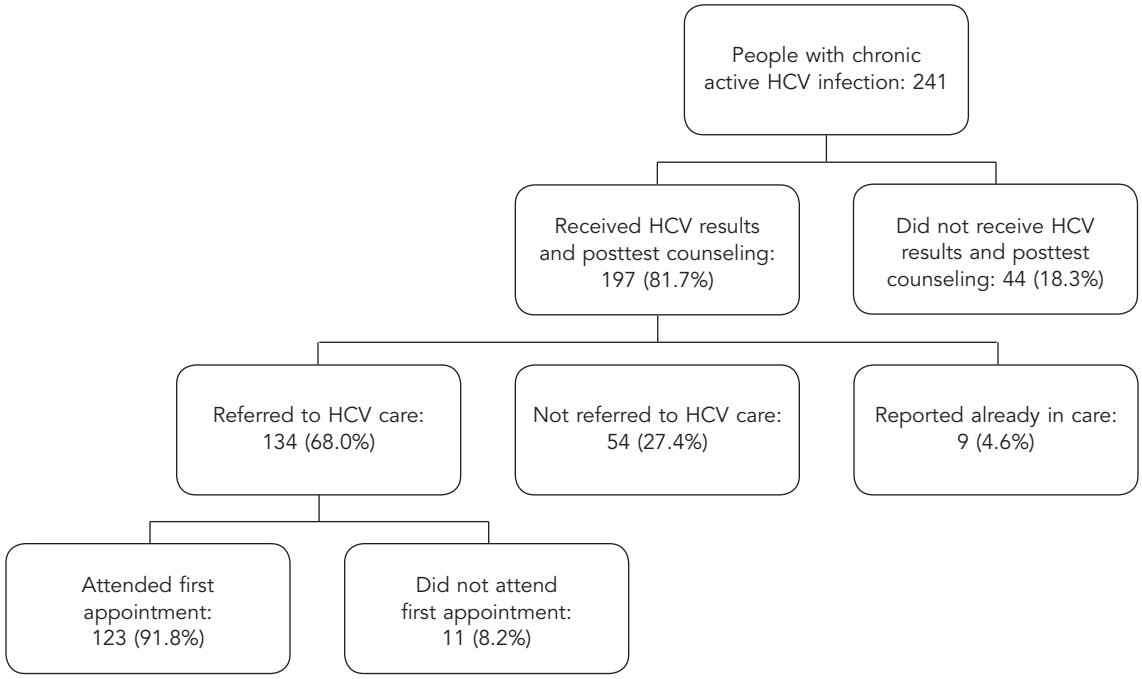
HCV = hepatitis C virus

anti-HCV = hepatitis C virus antibody

IQR = interquartile range

HIV = human immunodeficiency virus

Figure. At-risk detainees identified with chronic active hepatitis C virus infection and the proportion linked to care at testing sites in Durham County, North Carolina, December 2012 through February 2014[a]



[a]At-risk detainees included current and past injection drug users, people with human immunodeficiency virus infection, and people born between 1945 and 1965 (i.e., baby boomers) (for one-time testing). Other risk factors included incarceration, long-term sexual exposure to an HCV-infected person, history of multiple sexual partners or sexually transmitted diseases (STDs), and men who have sex with men. Testing sites included an STD clinic, county jail, homeless health-care clinic, and community testing sites.

[b]Reasons for not being referred for HCV care included incarceration (n=21), relocation (n=1), work requirements of the residential drug treatment recovery program (n=2), and no specified reason (n=30).

HCV = hepatitis C virus

However, linkage to HCV care was challenging for a predominantly uninsured population, and necessitated the assistance of a patient navigator and development of on-site HCV clinics to reduce barriers for people with chronic HCV infection.

Since 1998, CDC has recommended HCV screening based on risk factors such as intravenous drug use, HIV infection, and other medical conditions.[17] Unfortunately, barriers remain for IDUs, who typically have limited access to HCV care outside of drug treatment facilities.[18] As such, targeted HCV screening in STD clinics and other public health venues is a reasonable strategy for reaching IDUs and other at-risk individuals. An earlier study by Hennessy et al. reported integrated HCV testing among patients attending a New York City STD clinic. Although only 3% of patients reported intravenous drug use in the study, the authors noted that hepatitis services attracted at-risk IDUs to the clinic, which increased the use of additional HIV/STD services by this population.[19] Jewett et al. recently demonstrated the feasibility of integrating HCV point-of-care testing to patients with at least one risk factor in a Denver, Colorado, STD clinic.[20] In clinics providing health care for the homeless, Strehlow et al. identified a 31% prevalence of anti-HCV positivity among homeless adults with a history of intravenous drug use or prior incarceration.[21]

Similar to the HIV care cascade,[22,23] an HCV cascade of care with decreasing proportions of infected people knowing their status, being engaged in care, and achieving virological response exists.[24,25] We were able to increase the proportion of people in the initial steps of the cascade by using strategies such as patient navigation and HCV clinics colocated at the testing sites. A randomized trial conducted by Masson et al. involving HCV care coordination, on-site screening, and motivational enhanced education at methadone clinics found that their intervention increased adherence to hepatitis A/B vaccinations and HCV evaluations. In their study, case managers coordinated

HCV evaluation appointments with primary care and hepatology clinics located near methadone clinics in San Francisco, California, and New York City.[26]

In our program, we initiated on-site HCV clinics at the substance abuse recovery program and the health department after several patients missed or failed to attend their appointments at the academic hospitals. The HCV providers at these on-site clinics conducted HCV-focused histories, examinations, and general assessments for liver decompensation, and provided counseling on HCV treatment, potential side effects, and outcomes.[27] Our health-care providers comprised liver and infectious disease specialists who volunteered their time to provide initial HCV assessments; additionally, they had the ability to refer patients needing complex evaluations or treatment to their own specialty clinics at the academic centers. Other successful integrated models of HCV care delivery have been reported, including partnering of primary care clinics with HCV specialists, telemedicine, and distance-learning programs in which specialty care can be extended to increase access to HCV care.[28,29] These models are attractive in that HCV-infected patients can potentially be linked to a primary medical home, where they can be followed until they require direct-acting antiviral therapies or other HCV treatment regimens that can be comanaged with HCV specialists.

We learned several lessons during the linkage-to-care process that may benefit other jurisdictions seeking to implement a similar program. First, engaging and connecting with a network of health-care providers who can offer HCV care was critical to support testing activities. Second, scheduling medical appointments within a month of the bridging session followed by frequent reminders led to a greater likelihood that patients would attend their first appointment. We found that the completeness of contact information obtained during HCV testing was crucial to minimizing loss to follow-up for posttest counseling and linkage to care. Lastly, we alleviated the transportation barrier for our population by providing on-site HCV clinics with health-care providers.

Limitations

Our project was subject to several limitations. First, we lacked data regarding subsequent steps in the HCV care cascade (e.g., retention in care, completion of therapy, and sustained virological response). Second, the project goals were predominantly focused on increasing the number of individuals who were aware of their HCV status and linked to care. A small proportion of people whom we tested reported being aware of their anti-HCV status or that they were already in care, but we lacked the resources to verify the information. Third, we deployed HCV specialists to provide care at on-site clinics, which may be difficult to implement in other jurisdictions. Lastly, we provided HCV screening and linkage-to-care activities at one local North Carolina health department; as such, our results may not be generalizable to other U.S. public health departments.

CONCLUSION

In 2010, the Institute of Medicine indicated that the lack of knowledge and awareness about viral hepatitis and insufficient understanding about the extent of this public health problem impeded efforts to prevent and control HCV.[30] Ward et al. also stated that lack of public and provider awareness has led to inadequate public health and health-care resource allocation for HCV.[31] Additionally, challenges for individuals with chronic HCV infection, including no health insurance, lack of transportation, and access to HCV care, prevail. At the local public health level, we demonstrated that HCV testing and linkage to care can be facilitated with the support of federal funds and by leveraging existing HIV/STD programs and provider networks to deliver a coordinated system of care.

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All aspects of this project were considered part of a public health program and determined to be exempt from institutional review board approval.

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