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Research paper

# Healthcare contact and treatment uptake following hepatitis C virus screening and counseling among rural Appalachian people who use drugs

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ABSTRACT

*Background:* Hepatitis C virus (HCV) remains a major contributor to morbidity and mortality worldwide. Since 2009, Kentucky has led the United States in cases of acute HCV, driven largely by injection drug use in rural areas. Improved treatment regimens hold promise of mitigating the impact and transmission of HCV, but numerous barriers obstruct people who inject drugs (PWID) from receiving care, particularly in medically underserved settings.

*Methods:* 503 rural people who use drugs were recruited using respondent-driven sampling and received HCV screening and post-test counseling. Presence of HCV antibodies was assessed using enzyme immunoassay of dried blood samples. Sociodemographic and behavioral data were collected using computer-based questionnaires. Predictors of contacting a healthcare provider for follow-up following HCV-positive serotest and counseling were determined using discrete-time survival analysis.

*Results:* 150 (59%) of 254 participants reported contacting a healthcare provider within 18 months of positive serotest and counseling; the highest probability occurred within six months of serotesting. 35 participants (14%) reported they were seeking treatment, and 21 (8%) reported receiving treatment. In multivariate time-dependent modeling, health insurance, internet access, prior substance use treatment, meeting DSM-IV criteria for generalized anxiety disorder, and recent marijuana use increased the odds of making contact for follow-up. Participants meeting criteria for major depressive disorder and reporting prior methadone use, whether legal or illegal, were less likely to contact a provider.

*Conclusion:* While only 8% received treatment after HCV-positive screening, contacting a healthcare provider was frequent in this sample of rural PWID, suggesting that the major barriers to care are likely further downstream. These findings offer insight into the determinants of engaging the cascade of medical treatment for HCV and ultimately, treatment-as-prevention. Further study and increased resources to support integrated interventions with effectiveness in other settings are recommended to mitigate the impact of HCV in this resource-deprived setting.

## Introduction

Hepatitis C virus (HCV) remains a major public health problem worldwide, causing over 500,000 deaths per year (Lim et al., 2012) and greater mortality in the United States than that attributed to HIV (Ly et al., 2012). The virus is hyper-endemic worldwide among people who inject drugs (PWID), with 73% median seroprevalence among individuals who have ever injected and transmission typically occurring via sharing of needles, syringes, and drug-preparation equipment (Nelson et al., 2011). Unfortunately, medical evaluation to assess for disease progression and treatment eligibility occurs sporadically among seropositive individuals in the general population (Spradling et al., 2014) and even less frequently among PWID (Wiessing et al., 2014). However, remarkable advances in pharmacotherapy now offer greater than 90% efficacy for most genotypes, tremendously decreased adverse effect profiles, and shortened interferon- and ribavirin-free regimens (Li & De Clercq, 2017;

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Rehermann, 2016). PWID in community clinics and opioid substitution programs have achieved rates of sustained virologic response (SVR) equivalent to non-injectors even with older regimens including interferon and ribavirin (Grebely et al., 2016, 2015). For these reasons, identifying factors associated with seeking and receiving HCV-related medical care after seropositive test and post-test risk-reduction counseling (T&C) is critical in underserved and often stigmatized populations such as PWID (Grebely et al., 2008).

In prior research, PWID-specific barriers to HCV-related medical care have included lack of status awareness and HCV-related knowledge, homelessness and unstable lifestyle, lack of social support, psychiatric comorbidity, HIV co-infection, fear of diagnosis and medical procedures, concerns regarding drug toxicity and low efficacy, and lack of transportation (Mravcik et al., 2013). Stoove et al. (2005) reported that patients with no history of IDU were greater than threefold more likely to be referred to an HCV specialist than PWID, and current injectors were significantly less likely to initiate treatment, underlining substantial impact of IDU status on HCV-related care (Stoove, Gifford, & Dore, 2005). Similarly, despite 81% being interested in receiving treatment, just 27% of PWID in three U.S. cities received medical evaluation HCV-positive serotesting (Strathdee et al., 2005). In another study of urban PWID, just 14% and 6% reported receiving medical evaluation for HCV and initiating treatment, respectively; barriers to treatment included perceptions of severe adverse effects, low efficacy, and deprioritization due to lack of symptoms (Mehta et al., 2008). Grebely et al. (2009) found only 15 of 1360 seropositive Canadian PWID had initiated treatment, among whom only four completed treatment and three achieved sustained virologic response. Strikingly, HCV seroconversion occurred at 25 times the rate of HCV treatment (Grebely et al., 2009). However, when referral to medical care was coupled with seropositive T&C, medical evaluation occurred in 76% of PWID, and guideline-based clinical criteria became the major determinant of treatment initiation (Grebely et al., 2010). Finally, of particular relevance to rural PWID, shorter travel distance to clinics (Monnet et al., 2008) and increasing community size (Astell-Burt, Flowerdew, Boyle, & Dillon, 2011) have been positively associated with HCV-related medical care.

Identifying predictors of both seeking and engaging in HCV-related medical care after T&C is central to enhancing public health interventions among PWID, especially with regard to the utility of HCV "treatment as prevention" (Grebely & Dore, 2014; Martin et al., 2013). Such efforts are particularly relevant in medically underserved rural areas such as the Central Appalachian region of the United States, where harm reduction, substance use disorder (SUD), and integrated treatment programs recommended to address widespread HCV among PWID (Birkhead et al., 2007; Grebely et al., 2010) are largely unavailable (Appalachian Regional Commission, 2008; Des Jarlais et al., 2015; Stensland and Sutton, 2002). Although a March 2015 Kentucky law permitted syringe exchange programs (SEPs) and expanded access to naloxone and other harm reduction services, as of February 2017 only 8 of 54 Appalachian Kentucky counties had established operational SEPs (Department for Public Health, 2015). PWID also encounter barriers to accessing syringes in local pharmacies, as Kentucky law requires that persons engaged in sales of syringes collect detailed information about individuals purchasing syringes, including information on the planned use of such syringes (Kentucky Legislative Research Commission, 2005). By contrast, such programs are often more accessible to PWID in major urban areas and/or in countries with comprehensive HCV public health programs, where the majority of prior research on HCV-related healthcare engagement among PWID has occurred.

As yet there is no clear consensus regarding factors likely to increase seeking and engagement in HCV-related care, and previously reported characteristics may be highly population- and context-specific. Moreover, little is known regarding rural PWID, who may differ significantly from their urban and suburban counterparts (Havens et al., 2013) and are thought to be in large part driving resurgent HCV incidence observed in the United States in recent years (Zibbell et al., 2015). In the United States, Kentucky has reported the highest incidence of acute HCV since 2009 (Centers for Disease Control and Prevention, 2016). For these reasons, this study identifies predictors of contacting a healthcare provider for recommended follow-up and describes the uptake of treatment following HCV-seropositive T&C in a medically underserved population of people who use and inject drugs in rural Appalachian Kentucky.

## Methods

### Design and sampling

Data were collected during the cohort study *Social Networks among Appalachian People* with an overall aim of identifying risk factors for transmission of infectious diseases including HCV, HIV, and herpes simplex virus type 2 among people who use drugs in the rural Central Appalachian region of eastern Kentucky, USA. As described previously (Havens et al., 2013), 503 participants were recruited from November 2008 to August 2010 using respondent-driven sampling (RDS) (Heckathorn, 1997), with data collected during the 18-month wave until February 2012. Eligible participants were 18 years or older, community-dwelling, and had used heroin, crack/cocaine, methamphetamine, and/or prescription opioids non-medically within the last six months. Participants with a positive HCV antibody test at study enrollment, six-month, or twelve-month follow-up and receiving test results and counseling at least 30 days prior to subsequent interviewing were included in this analysis. All participants gave informed consent and were compensated $50 USD for each study visit. Study procedures were approved by the University of Kentucky Institutional Review Board, and a Certificate of Confidentiality was obtained from NIH.

### Data collection

HCV screening was completed at each study visit using the Home Access® Hepatitis C Check serum antibody test with standard pre-test counseling given to all participants. This test utilizes dried blood spot specimens obtained by finger-stick and third-generation enzyme immunoassay to detect HCV serum antibodies; sensitivity and specificity are 98.2% and 99.6%, respectively (US Food and Drug Administration, 1999). Post-test counseling was tailored to test results with standard messages including advising seropositive participants to seek medical evaluation for HCV from a healthcare provider and avoid alcohol intake as recommended by CDC (Centers for Disease Control and Prevention, 1998; Smith et al., 2012) and to refrain from sharing syringes and other IDU-related equipment (AASLD-IDSA, 2016), along with information regarding local options to obtain appropriate follow-up medical care.

The primary outcome variable was self-reported contact of a healthcare provider for medical follow-up receipt of seropositive T&C during the study, assessed via the following question: "*After testing positive for hepatitis C did you contact a health professional to obtain follow-up testing?*" Self-reported seeking and receiving treatment for HCV was also collected, with the following question for the former item: "*Did you seek treatment for hepatitis C?*" Sociodemographic and behavioral data were collected via

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