Published in final edited form as:

J Prim Prev. 2017 October ; 38(5): 481–494. doi:10.1007/s10935-017-0483-6.

Silence surrounding hepatitis C status in risk relationships among rural people who use drugs

Megan G. Hofmeister^a, Jennifer R. Havens^b, and April M. Young^{b,c}

^aDepartment of Preventive Medicine and Environmental Health, University of Kentucky, 11 Washington Avenue, Lexington, KY 40536, USA. megan.hofmeister@uky.edu

^bCenter on Drug and Alcohol Research, University of Kentucky, 845 Angliana Avenue, Lexington, KY 40508, USA. jennifer.havens@uky.edu

^cDepartment of Epidemiology, University of Kentucky, 111 Washington Avenue, Lexington, KY 40536, USA. april.young@uky.edu

Abstract

Hepatitis C virus (HCV) has reached epidemic proportions in rural Central Appalachia in recent years. We sought to identify demographic, behavioral, and interpersonal characteristics associated with HCV serostatus disclosure among high risk people who use drugs (PWUD) in Appalachian Kentucky. HCV antibody-positive participants ($n=243$), drawn from the fifth follow-up assessment of a longitudinal study of rural PWUD, completed interviewer-administered questionnaires eliciting demographic and interpersonal characteristics, risk behaviors, and information about HCV disclosure. We assessed correlates of HCV disclosure using gender-stratified multivariate logistic regression. Participants reported having disclosed their HCV-positive status to a current sex partner (44.0%), family member (35.8%), close friend (9.5%), or past sex partner (6.6%). Of those reporting current ($n=72$) or past ($n=215$) injection drug use (IDU), only 2.8% disclosed to current and 0.9% disclosed to past IDU partners, respectively. Female participants were more likely than male participants to disclose to current sex partners and family member(s). In multivariate analysis, adjusting for time since testing HCV positive, older age and lifetime history of drug treatment were associated with decreased odds of HCV disclosure among females, while only lifetime history of drug treatment was associated with decreased odds of HCV disclosure among males. In summary, the almost complete absence of disclosure to current or former injection drug use partners was concerning. However, most participants (69.1%) reported disclosing their HCV status to at least one of their social referents, suggesting that family members, partners, and friends of people living with HCV could play a critical role in encouraging

Corresponding Author: April M. Young, PhD, MPH, Department of Epidemiology, University of Kentucky, 111 Washington Avenue, Lexington, KY 40536, USA., Phone: 859-218-2090, Fax: 859- 257-8811, april.young@uky.edu.

Compliance With Ethical Standards

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Conflict of Interest

The authors declare they have no conflicts of interest.

uptake of treatment. Although further research is warranted, it is clear that interventions are needed to encourage HCV disclosure among those most at risk of transmitting HCV.

Keywords

Hepatitis C; Substance abuse; Drug user; Disclosure; Rural; Social support

Introduction

At least 3.5 million individuals (Edlin, Eckhardt, Shu, Holmberg, & Swan, 2015) are infected with hepatitis C virus (HCV) in the United States, making HCV the most common blood-borne infection in the United States. The Centers for Disease Control and Prevention (CDC) estimates that nearly 30,000 cases of acute HCV occurred in 2013 in the United States (CDC, 2015). Between 2006–2012, state surveillance data from Central Appalachia (which includes regions of Kentucky, Tennessee, Virginia, and West Virginia) demonstrated a 364% increase in the number of acute HCV infections among persons up to 30 years of age (Zibbell et al., 2015). Among those cases of acute HCV in Central Appalachia with identified risks, injection drug use (IDU) was reported in almost three-fourths of cases (73%; Zibbell et al., 2015). IDU is the leading means of HCV transmission in the United States (Edlin & Carden, 2006; Smith et al., 2013). Despite the existence of national screening recommendations based on risk factors and birth cohort, a substantial proportion (40–85%) of HCV-positive individuals are unaware of their infection status (Smith et al., 2013). One study found that 72% of HCV-positive persons who inject drugs (PWID) were unaware of their status (Hagan et al., 2006).

Individuals with both acute and chronic HCV infections are often asymptomatic (Alter, 2007; CDC, 2015) and many never seek testing. The substantial lack of serostatus awareness among HCV-positive individuals places the partners of infected individuals, particularly those with whom they inject or share injection equipment, at risk of unwittingly acquiring HCV. Although highly successful curative treatments are available, these medications are often prohibitively expensive (Gritsenko & Hughes, 2015) and high risk populations (such as PWID) frequently lack access to health insurance or healthcare. Primary prevention of HCV infection thus remains an important public health approach to reducing morbidity, mortality, and the economic burden associated with HCV infection.

Serostatus disclosure has been described as a cornerstone of primary prevention strategies related to human immunodeficiency virus (HIV) transmission between sexual partners (Przybyla et al., 2013; Tshweneagae, Oss, & Mgutshini, 2015). HCV disclosure can similarly serve as an important preventive public health measure for HCV infection. Increased HCV disclosure could protect others against infection by facilitating avoidance of potential opportunities for HCV transmission, such as sharing intranasal or injection drug use equipment and sharing razors. Individuals who believe their injecting partner is HCV-positive are more likely to practice safer injecting habits (i.e., not inject with someone else's used needle or syringe; Hahn, Evans, Davidson, Lum, & Page, 2010). Thus, disclosure of

HCV may allow an infected individual's social contacts to make more informed decisions regarding risk behavior, potentially reducing HCV transmission.

While there have been numerous efforts to determine correlates of HIV disclosure (Camacho-Gonzalez et al., 2015; Przybyla et al., 2013; Sullivan, 2005; Tshweneagae et al., 2015), fewer studies have investigated the factors associated with HCV disclosure. Studies examining the disclosure of HIV often focus on serostatus disclosure among sexual partners, but their findings may not be applicable to understanding HCV status disclosure given that sexual transmission of HCV is rare (Terrault et al., 2013) and percutaneous transmission through shared needles/equipment among PWID is most common (CDC, 2015; Edlin et al., 2006; Smith et al., 2013). Similarly, HIV disclosure is legally mandated in many settings (Lehman et al., 2014) whereas HCV disclosure is not, suggesting that the factors impacting HIV disclosure may differ from those impacting HCV disclosure.

Social stigma surrounding disease status disclosure, particularly of infectious diseases perceived as being acquired through stigmatized risk behaviors, can adversely affect access to health care, employment, and social support (Crockett & Gifford, 2004). HCV disclosure has been described as a complex and emotionally difficult endeavor, with fear of a negative reaction, rejection, or stigmatization cited as barriers to HCV-positive status disclosure (Crockett et al., 2004; Fry & Bates, 2012). If these barriers can be overcome and stigma in the community is reduced, HCV-positive status disclosure may yield access to social support that could facilitate entry into HCV treatment. The association between disclosure, social support, and treatment seeking has not been examined in the context of HCV, but research suggests that successful pre-treatment engagement in peer-based HCV groups is a key predictor of HCV treatment success (Sylvestre & Zweben, 2007). Furthermore, peer support, in the form of collaborations between peer educators and medical providers, can effectively increase HCV assessment and treatment uptake by overcoming feelings of mistrust that HCV-infected individuals may have toward the medical system (Crawford & Bath, 2013).

Much of the published research that references data on HCV disclosure has been conducted internationally, primarily among PWID in urban settings (Carruthers, 2005; Crockett et al., 2004; Fry et al., 2012; Gyarmathy et al., 2011; Hopwood, Nakamura, & Treloar, 2010; McCreddie, Lyons, Horsburgh, Miller, & Frew, 2011; Temple-Smith, Gifford, & StoovÚ, 2004; Wozniak, Prakash, Taylor, & Wild, 2007), and most of these studies only briefly mention factors related to HCV disclosure rather than focusing on disclosure as the primary research outcome. Relatively little is known about factors that influence HCV-positive disclosure among high risk populations in rural settings. Appalachian Kentucky is an economically disadvantaged region suffering from mortality among young and middle-aged adults that is higher than many less developed countries (Murray, Kulkarni, & Ezzati, 2005). Recently, annual increases in acute HCV incidence among young (< 30 years) PWID in the United States have been at least twice as high in rural as urban jurisdictions (Suryaprasad et al., 2014). The largest increases are in or nearby Appalachian counties (Suryaprasad et al., 2014). When considered in combination with the recent significant increase in acute HCV infections among persons < 30 years in Kentucky, Tennessee, Virginia, and West Virginia (Zibbell et al., 2015), data suggest that Central Appalachia is currently an epicenter of HCV incidence in the United States. We conducted this analysis to identify demographic,

behavioral, and interpersonal characteristics associated with HCV serostatus disclosure among rural, high risk people who use drugs (PWUD) in Appalachian Kentucky.

Methods

Study Design

We collected data from PWUD ($n=415$) at their fifth follow-up assessment in the ongoing, longitudinal Social Networks among Appalachian People (SNAP) study. The goal of SNAP is to assess risk factors for HIV, HCV, and herpes among PWUD in the context of their social networks. Participants were recruited through respondent-driven sampling (Heckathorn, 1997, 2002) between November 2008 and September 2010 from an Appalachian county in Eastern Kentucky (sampling details are explained in Young, Rudolph, Quillen, & Havens, 2014). Respondent-driven sampling has been an effective technique for the recruitment of rural PWUD (Wang, Falck, Li, Rahman, & Carlson, 2007).

Individuals eligible for study participation were at least 18 years old, resided in Appalachian Kentucky, and in the past 30 days had used prescription opioids, cocaine, heroin, or methamphetamine to get high. All participants provided signed documentation of informed consent. Participants completed interviewer-administered surveys and HCV testing approximately every six months. For the baseline assessment and the first three follow-up visits, trained study staff tested participants for antibodies to HCV using the Home Access test (Home Access Health Corporation, Hoffman Estates, IL), explained in detail elsewhere (Havens et al., 2013). For all subsequent visits participants were tested using the OraQuick HCV rapid antibody test (Gao et al., 2014). We provided all participants with their test results, either in person or by telephone, and pre- and posttest counseling was provided according to CDC guidelines (CDC, n.d.). Participants who tested positive for HCV received information about local healthcare resources for additional testing and treatment. The Institutional Review Board at the University of Kentucky approved all study protocols.

A total of 415 participants completed the fifth follow-up assessment; this sample represented 82.5% of the original sample and 90.6% of those eligible for follow-up (i.e., those who were neither deceased nor incarcerated outside of Kentucky, and who were willing to continue to participate in the study). Participants lost to follow-up were less likely to be unemployed ($\chi^2=9.70$, $p=0.002$) than those retained, but otherwise did not differ from those remaining in the analysis in terms of demographic characteristics or HCV serostatus. For the fifth follow-up assessment (3.8–5.3 years since participant enrollment), we added questions to examine whether participants who had tested HCV antibody-positive at baseline or at any point during the study had disclosed their HCV-positive status to others. In total, 243 participants were asked,

After testing positive (here—at this location) for hepatitis C did you tell (please check all that apply): [your current sex partner, past sex partners, current injection drug use partners (people you inject with), past injection drug use partners (people you injected with), family member(s), close friend(s), spouse (if married)].

To assess correlates of HCV disclosure, we created a dichotomous variable to indicate whether participants disclosed their HCV-positive status to anyone. Dichotomization was

necessary because the limited number of participants disclosing to most of the identified person-type categories did not provide sufficient power to identify statistically significant differences in correlates of disclosure.

We obtained demographic, behavioral, and interpersonal data through interviewer-administered questionnaires. Demographic characteristics included gender, age (years), race, education, marital status, and unemployment. We also assessed lifetime history of IDU, lifetime history of drug treatment, and time (in years) since testing HCV positive. Drug treatment included methadone detoxification, methadone maintenance, Outpatient Drug Free, residential treatment, non-methadone detoxification, and 12-step programs (Alcoholics Anonymous/Narcotics Anonymous). We computed time since testing positive for HCV by calculating the years elapsed between the 5th follow-up assessment (i.e., the date at which participants answered questions about HCV disclosure) and the date of their first positive HCV test; most participants ($n=187$) received their first positive test during the SNAP study, but some ($n=56$) who tested positive at the SNAP study baseline assessment also reported having tested positive for HCV previously and provided the month and year of the first positive test. For the latter group, we computed years elapsed since testing positive for HCV by calculating the difference in years between the 5th follow-up assessment and the reported month/year of the first positive test. Finally, to examine the impact of social isolation and/or problems surrounding social interaction on HCV disclosure, we examined interpersonal characteristics including whether the participants: were dependent on someone else for the majority of their support, spent most of their free time alone (rather than with family or friends), and had a lifetime history of experiencing serious problems getting along with others for significant periods of time. We assessed the latter interpersonal characteristic with the question, “Have you had significant periods in which you have experienced serious problems getting along with your [mother, father, brothers/sisters, sexual partner/spouse, children, close friends, neighbors, co-workers] in your life?” We dichotomized data to a negative response if participants denied serious problems with all specified social referents, and to an affirmative response if participants acknowledged serious problems with any of them. We referred to the resulting covariate as ‘social conflict.’

Analysis

We used logistic regression to explore gender-stratified associations between HCV disclosure and demographic, behavioral, and interpersonal characteristics. We conducted gender-stratified analyses because previous research has identified gender differences in factors surrounding serostatus disclosure in both the HCV and HIV literature (Sullivan, 2005; Temple-Smith et al., 2004). We conducted all analyses using SAS software, version 9.4 (SAS Institute, 2014). Covariates in the initial multivariate models included gender, age, race, education, marital status, unemployment, dependence on someone else for majority of support, lifetime history of IDU, spent most of free time alone, social conflict, lifetime history of drug treatment, and time since testing HCV positive. We derived the final models through manual backward elimination with $\alpha_{\text{critical}}=0.05$; they included age, lifetime history of drug treatment, and time since testing HCV positive for females, and lifetime history of drug treatment and time since testing HCV positive for males.

We did not apply respondent-driven sampling weights to the data because rather than calculating population estimates of HCV disclosure, we focused on correlates of HCV disclosure in this sample of rural high risk PWUD. We assessed collinearity in both the full and final models using the %COLLIN_2011 macro (Zack, Singleton, Satterwhite, Delaney, & Wall, 2011). Covariates did not exceed a condition index of 30 in either the full or final model, indicating that multicollinearity was not present in either multivariate model.

Results

Participant Characteristics

Participants ($n=243$) were primarily male (57.2%), White (93.0%), and had at least a high school education (54.3%). The mean age was 33.8 years (range 20.5–56.5). Most (77.0%) tested HCV-positive for the first time within the SNAP study. The median time elapsed since testing HCV positive was 8.8 years (IQR 5.9) and 4.2 years (IQR 1.4) for participants who tested positive prior to entering the study and during the study, respectively; the overall mean time elapsed since testing HCV positive was 5.0 years (range=0.4–22.3). Demographic, behavioral, and interpersonal characteristics of the total sample and stratified by gender are presented in Table 1.

Positive Status Disclosure and Correlates

Most participants (69.1%) reported disclosing their HCV-positive status to at least one of their social referents: most commonly to current sex partners (44.0%), family members (35.8%), close friend(s) (9.5%), or past sex partners (6.6%). Few participants disclosed to current IDU partners (2.8%, calculated among the 72 who reported injecting within the past six months), spouses (if married) (2.2%, calculated among the 46 who were married), or past IDU partners (0.9%, calculated within the 215 who reported ever injecting drugs). Female participants were more likely to disclose to current sex partners ($\chi^2 p=0.03$) and family member(s) ($\chi^2 p=0.04$) than male participants, but otherwise there were no significant differences in disclosure between genders.

We present results from gender-stratified unadjusted logistic regression analyses in Table 2. We provide estimated, unadjusted odds ratios, 95% confidence intervals, and p values to show associations between covariates and HCV-positive status disclosure. Among females, a one year increase in age corresponded with an 8% reduction in the odds of disclosing HCV-positive status (odds ratio [OR]: 0.92, 95% CI [0.87, 0.98]). Female participants with a lifetime history of drug treatment had 62% lesser odds of disclosing their HCV-positive status than those with no history of drug treatment (OR : 0.38, 95% CI [0.15, 0.97]). Among men, lifetime histories of IDU and drug treatment were significantly associated with non-disclosure of HCV-positive status. In male participants, a lifetime history of IDU corresponded to a 79% reduction in the odds of disclosing HCV-positive status (OR : 0.21, 95% CI [0.05, 0.96]). Male participants with a lifetime history of drug treatment had 66% lesser odds of disclosing their HCV-positive status than those males with no history of drug treatment (OR : 0.34, 95% CI [0.16, 0.71]). Of note, we found no evidence of a dose-response relationship between weeks spent in drug treatment in the prior year and HCV disclosure (data not shown in table).

Our final multivariate logistic regression models revealed different correlates of disclosure by gender. We retained time since testing HCV positive in the gender-stratified final models to control for the effects of varying duration of serostatus awareness ($p=0.50$ and $p=0.40$ among females and males, respectively). Among females ($n=104$), adjusting for all other covariates in the model, age ($p=0.005$) and lifetime history of drug treatment ($p=0.02$) were independently associated with HCV-positive status disclosure. Holding all other covariates constant, a one year increase in age corresponded to a 9% reduction in the odds of disclosing HCV-positive status (*AOR*: 0.91, 95% CI [0.86, 0.97]). Female participants with a lifetime history of drug treatment had a 69% reduction in the odds of disclosing HCV-positive status relative to female participants with no history of drug treatment, adjusting for other covariates in the model (*AOR*: 0.31, 95% CI [0.11, 0.85]). Among males ($n=139$), adjusting for time since testing HCV positive, lifetime history of drug treatment ($p=0.003$) was independently associated with HCV-positive status disclosure. Holding all other covariates constant, a lifetime history of drug treatment in male participants corresponded to a 68% reduction in the odds of disclosing HCV-positive status compared to male participants without a history of drug treatment (*AOR*: 0.32, 95% CI [0.15, 0.68]).

Discussion

We believe that our study is the first of its kind to assess demographic, behavioral, and interpersonal characteristics associated with HCV serostatus disclosure among rural PWUD. We found that nearly one-third (30.9%) of participants did not disclose their HCV-positive status to anyone. Among individuals who disclosed their serostatus, disclosure to social referents who are potentially at greatest risk for infection through percutaneous transmission was rare (3.8% among current, and 1.4% among past IDU partners, respectively). These numbers are alarmingly low given that, among those who seroconverted or became aware of their HCV seropositivity during the study, 72% reported having injected drugs and 40% reported having shared injection equipment (e.g., needles, syringes, cookers, cotton, or rinse water) in the past 6 months. The reasons for non-disclosure warrant further research and likely include fear of stigma, maintenance of personal privacy, and fatalism. Previous research has found that current PWID perceive HCV infection as inevitable and ubiquitous (Wozniak et al., 2007); this fatalistic attitude could engender ambivalence about the need for HCV disclosure (Rhodes et al., 2008).

In our study, older age was associated with decreased odds of HCV disclosure among women. An association between age and disclosure has previously been identified in the HIV literature (Emlet, 2006; Grodensky et al., 2015), but not in the HCV literature. Prior research has found that older adults (> 50 years old) were less likely to disclose HIV than younger adults (20–39 years old; Emlet, 2006). Gender-stratified analyses in this study revealed that age was associated with HCV disclosure only among women ($p=0.005$). These data suggest that older women are less likely as a group to disclose their HCV-positive status than younger women, while age does not significantly influence male disclosure patterns. The reasons for this disparity are likely multifactorial, but may be related to a greater perception of social stigma surrounding drug use among older women compared to younger women or even men. A small, qualitative study of older (> 50 years of age) HIV-positive women in the southeastern United States supports this hypothesis: the women reported being

reluctant to disclose their status because they viewed it as more shameful at their older ages (Grodensky et al., 2015). Further research is needed to explore factors surrounding hesitancy to disclose HCV status among older women in this rural setting.

In our study, a lifetime history of drug treatment was associated with decreased odds of HCV disclosure among men and women. The *negative* association between lifetime history of drug treatment and HCV disclosure has not been identified in previous literature, and was an unexpected and novel finding. Although the nearly threefold decrease in odds of disclosure among those with a lifetime history of drug treatment seems counterintuitive, it is possible that individuals whose drug treatment was court-ordered (as was the case in 52% with a lifetime history of drug treatment in the study) were more reluctant to disclose their HCV-positive status out of fear that it would be seen as an admission of prior or current drug use, which could violate their probation. Additionally, individuals who successfully completed drug treatment may have developed a new social identity related to abstinence, and might consider HCV disclosure irrelevant in their current social context. This finding suggests that interventions aimed at increasing HCV disclosure should partner with drug treatment providers to clarify misperceptions among patients of the potential consequences and benefits of disclosing one's HCV serostatus.

Although few participants disclosed their HCV serostatus to people with whom they were in risk relationships, most (69%) disclosed their HCV serostatus to *someone*, most often current sex partners, family members, or friends. These findings suggest that supportive family, friends, and partners of people living with HCV could have a pivotal role in encouraging the uptake of newer, efficacious direct acting antiviral treatments for HCV. Of note, in recent research among PWUD in Appalachian Kentucky, 87% expressed willingness to encourage their peers' enrollment in HCV vaccine clinical trial research (Young, Stephens, Khaleel, & Havens, 2015). Although the promotion of HCV clinical trial research is different from that of HCV treatment, the study provides promising, preliminary evidence that peer-promotion of HCV treatment may be feasible. Research on the role of social support in encouraging uptake and adherence to new HCV treatment regimens is currently lacking. Given some evidence suggesting that peer support coupled with multidisciplinary care could facilitate engagement of PWUD in HCV-related services (Grebely et al., 2010), more research involving partners, family members, and friends of HCV-positive PWUD is needed to examine their awareness of HCV services and willingness to encourage uptake of HCV treatment. Further, to fully understand the feasibility and anticipate the possible impact of the peer-based promotion of HCV treatment, research exploring HCV-positive PWUD responsiveness to peer encouragement of treatment uptake is also needed.

This study has several limitations. Because the data we used were cross-sectional, inferences about causality or temporality are not possible. Second, the homogeneity of this rural, Appalachian sample may limit generalizability of the results to more diverse urban or rural populations. Third, behavioral and demographic data were self-reported and subject to recall and social desirability biases, as well as varying interpretations of question stems (i.e., the meaning of "significant periods" in the social conflict variable). Of note, HCV serostatus was *not* self-reported, which was a strength of the study. Fourth, as a result of the small sample size, the analysis may have lacked the statistical power to detect small differences

among some of the covariates, potentially increasing the probability of a type II error. Fifth, any disclosures made by the 56 individuals who were aware of their HCV-positive serostatus before enrollment in the study were not accounted for, potentially leading to an underestimation of disclosure. However, when these 56 individuals were removed from the analyses, the results were nearly identical, with the exception that lifetime history of drug treatment was no longer associated with disclosure among women in multivariate analyses. Sixth, information about disclosure in particular relationships (such as duration of the relationship or frequency of interaction) was not available. However, it does not appear that the tendency to disclose to sex partners is related to frequency of contact, and on average participants reported injecting more frequently in the prior 30 days than having sex. Finally, serostatus in this study was based on HCV antibody rather than RNA testing; antibody testing does not necessarily correlate with active HCV infection. However, a prior random sample of HCV antibody-positive participants from the study cohort revealed that 69% were HCV RNA-positive (Young et al., 2012), suggesting a high potential for transmission and reinforcing the importance of HCV disclosure, particularly to injection risk partners.

Despite these limitations, this study provides important insight into demographic, behavioral, and interpersonal correlates of HCV serostatus disclosure among high risk PWUD in rural Appalachia. Most striking was the almost complete absence of disclosure to current or former IDU partners, the social referents likely to be at highest risk of HCV infection given the efficiency of percutaneous transmission. Current post-test counseling guidelines for HCV testing do not mention disclosure (CDC, n.d.). Incorporating educational messages related to the importance of HCV disclosure into post-test counseling might help curtail the further spread of HCV. Findings from this study also suggest that messages targeted at older women should be prioritized since this group was identified as being especially hesitant to disclose HCV status. Partnering with drug treatment providers on interventions may represent another method to encourage HCV disclosure as a normative behavior among those most at risk of transmitting HCV.

Acknowledgments

Funding

This study was funded by the National Institutes of Health, National Institute on Drug Abuse (Grant numbers R01DA024598 and R01DA033862, to Jennifer R. Havens).

References

- Alter MJ. Epidemiology of hepatitis C virus infection. *World Journal of Gastroenterology*. 2007; 13(17):2436. [PubMed: 17552026]
- Camacho-Gonzalez AF, Wallins A, Toledo L, Murray A, Gaul Z, Sutton MY, Chakraborty R. Risk factors for HIV transmission and barriers to HIV disclosure: Metropolitan Atlanta youth perspectives. *AIDS Patient Care and STDs*. 2015; 30(1):18–24. [PubMed: 26588663]
- Carruthers SJ. Preventing hepatitis C: What do positive injectors do? *Drug and Alcohol Review*. 2005; 24(2):193–198. [PubMed: 16076589]
- Centers for Disease Control and Prevention (CDC). (n.d.). A Guide to Comprehensive Hepatitis C Counseling and Testing. Retrieved 4 March, 2016, from <http://www.cdc.gov/hepatitis/resources/professionals/pdfs/counselingandtesting.pdf>

- Centers for Disease Control and Prevention (CDC). Surveillance for Viral Hepatitis - United States, 2013. 2015. Retrieved 10 February, 2016, from <http://www.cdc.gov/hepatitis/statistics/2013surveillance/commentary.htm#hepatitisC>
- Centers for Disease Control and Prevention (CDC). Viral Hepatitis - Hepatitis C FAQs for Health Professionals. 2015. Retrieved 9 December, 2015, from <http://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#section1>
- Crawford S, Bath N. Peer support models for people with a history of injecting drug use undertaking assessment and treatment for hepatitis C virus infection. *Clinical Infectious Diseases*. 2013; 57(suppl 2):S75–S79. [PubMed: 23884070]
- Crockett B, Gifford SM. “Eyes Wide Shut”: Narratives of women living with hepatitis C in Australia. *Women & Health*. 2004; 39(4):117–137. [PubMed: 15691088]
- Edlin BR, Carden MR. Injection drug users: The overlooked core of the hepatitis C epidemic. *Clinical Infectious Diseases*. 2006; 42(5):673–676. [PubMed: 16447113]
- Edlin BR, Eckhardt BJ, Shu MA, Holmberg SD, Swan T. Toward a more accurate estimate of the prevalence of hepatitis C in the United States. *Hepatology*. 2015; 62(5):1353–1363. [PubMed: 26171595]
- Emler CA. A comparison of HIV stigma and disclosure patterns between older and younger adults living with HIV/AIDS. *AIDS Patient Care and STDs*. 2006; 20(5):350–358. [PubMed: 16706709]
- Fry M, Bates G. The tasks of self-managing hepatitis C: The significance of disclosure. *Psychology & Health*. 2012; 27(4):460–474. [PubMed: 21736430]
- Gao F, Talbot EA, Loring CH, Power JJ, Dionne-Odom J, Alroy-Preis S, Bean CL. Performance of the OraQuick HCV rapid antibody test for screening exposed patients in a hepatitis C outbreak investigation. *Journal of Clinical Microbiology*. 2014; 52(7):2650–2652. [PubMed: 24789176]
- Grebely J, Knight E, Genoway KA, Viljoen M, Khara M, Elliott D, DeVlaming S. Optimizing assessment and treatment for hepatitis C virus infection in illicit drug users: a novel model incorporating multidisciplinary care and peer support. *European Journal of Gastroenterology & Hepatology*. 2010; 22(3):270–277. [PubMed: 20425880]
- Gritsenko D, Hughes G. Ledipasvir/Sofosbuvir (Harvoni): Improving options for hepatitis C virus infection. *P T*. 2015; 40(4):256–276. [PubMed: 25859119]
- Grodensky CA, Golin CE, Jones C, Mamo M, Dennis AC, Abernethy MG, Patterson KB. “I should know better”: The roles of relationships, spirituality, disclosure, stigma, and shame for older women living with HIV seeking support in the South. *Journal of the Association of Nurses in AIDS Care*. 2015; 26(1):12–23. [PubMed: 24630627]
- Gyarmathy VA, Latkin CA. Individual and social factors associated with participation in treatment programs for drug users. *Substance Use & Misuse*. 2008; 43(12–13):1865–1881. [PubMed: 19016169]
- Gyarmathy VA, Neaigus A, Li N, Ujhelyi E, Caplinskiene I, Caplinskas S, Latkin CA. Infection disclosure in the injecting dyads of Hungarian and Lithuanian injecting drug users who self-reported being infected with hepatitis C virus or human immunodeficiency virus. *Scandinavian Journal of Infectious Diseases*. 2011; 43(1):32–42. [PubMed: 20840002]
- Hagan H, Campbell J, Thiede H, Strathdee S, Ouellet L, Kapadia F, Garfein RS. Self-reported hepatitis C virus antibody status and risk behavior in young injectors. *Public Health Reports*. 2006; 121(6):710–719. [PubMed: 17278406]
- Hahn JA, Evans JL, Davidson PJ, Lum PJ, Page K. Hepatitis C virus risk behaviors within the partnerships of young injecting drug users. *Addiction*. 2010; 105(7):1254–1264. [PubMed: 20491725]
- Havens JR, Lofwall MR, Frost SDW, Oser CB, Leukefeld CG, Crosby RA. Individual and network factors associated with prevalent hepatitis C infection among rural Appalachian injection drug users. *American Journal of Public Health*. 2013; 103(1):e44–e52.
- Heckathorn DD. Respondent-driven sampling: A new approach to the study of hidden populations. *Social Problems*. 1997; 44(2):174–199.
- Heckathorn DD. Respondent-driven sampling II: Deriving valid population estimates from chain-referral samples of hidden populations. *Social Problems*. 2002; 49(1):11–34.

- Hopwood M, Nakamura T, Treloar C. Disclosing hepatitis C infection within everyday contexts implications for accessing support and healthcare. *Journal of Health Psychology*. 2010; 15(6):811–818. [PubMed: 20656767]
- Lehman JS, Carr MH, Nichol AJ, Ruisanchez A, Knight DW, Langford AE, Mermin JH. Prevalence and public health implications of state laws that criminalize potential HIV exposure in the United States. *AIDS and Behavior*. 2014; 18(6):997–1006. [PubMed: 24633716]
- McCreaddie M, Lyons I, Horsburgh D, Miller M, Frew J. The isolating and insulating effects of hepatitis C: A substantive grounded theory. *Gastroenterology Nursing*. 2011; 34(1):49–59. [PubMed: 21301264]
- Murray CJ, Kulkarni S, Ezzati M. Eight Americas: New perspectives on U.S. health disparities. *American Journal of Preventive Medicine*. 2005; 29(5)(Suppl 1):4–10. [PubMed: 16389119]
- Przybyla SM, Golin CE, Widman L, Grodensky CA, Earp JA, Suchindran C. Serostatus disclosure to sexual partners among people living with HIV: Examining the roles of partner characteristics and stigma. *AIDS Care*. 2013; 25(5):566–572. [PubMed: 23020136]
- Rhodes T, Prodanovi A, Žiki B, Kuneski E, Pavi evi T, Karadži D, Bernays S. Trust, disruption and responsibility in accounts of injecting equipment sharing and hepatitis C risk. *Health, Risk and Society*. 2008; 10(3):221–240.
- SAS Institute. Base SAS 9.4 Procedures Guide. SAS Institute; 2014.
- Smith BD, Jewett A, Burt RD, Zibbell JE, Yartel AK, DiNenno E. “To share or not to share?” Serosorting by hepatitis C status in the sharing of drug injection equipment among NHBS-IDU2 participants. *Journal of Infectious Diseases*. 2013; 208(12):1934–1942. [PubMed: 24136794]
- Sullivan KM. Male self-disclosure of HIV-positive serostatus to sex partners: A review of the literature. *Journal of the Association of Nurses in AIDS Care*. 2005; 16(6):33–47.
- Suryaprasad AG, White JZ, Xu F, Eichler B-A, Hamilton J, Patel A, Fisher C. Emerging epidemic of hepatitis C virus infections among young nonurban persons who inject drugs in the United States, 2006–2012. *Clinical Infectious Diseases*. 2014; 59(10):1411–1419. [PubMed: 25114031]
- Sylvestre DL, Zweben JE. Integrating HCV services for drug users: A model to improve engagement and outcomes. *International Journal of Drug Policy*. 2007; 18(5):406–410. [PubMed: 17854729]
- Temple-Smith M, Gifford S, StoovÚ M. The lived experience of men and women with hepatitis C: Implications for support needs and health information. *Australian Health Review*. 2004; 27(2):46–56. [PubMed: 15525236]
- Terrault NA, Dodge JL, Murphy EL, Tavis JE, Kiss A, Levin TR, Alter MJ. Sexual transmission of hepatitis C virus among monogamous heterosexual couples: The HCV partners study. *Hepatology*. 2013; 57(3):881–889. [PubMed: 23175457]
- Tshweneagae GT, Oss VM, Mgutshini T. Disclosure of HIV status to sexual partners by people living with HIV. *Curationis*. 2015; 38(1):1–6.
- Wang J, Falck RS, Li L, Rahman A, Carlson RG. Respondent-driven sampling in the recruitment of illicit stimulant drug users in a rural setting: Findings and technical issues. *Addictive Behaviors*. 2007; 32(5):924–937. [PubMed: 16901654]
- Wozniak L, Prakash M, Taylor M, Wild TC. Everybody's got it, but...: Situational and strategic participation in normalized HCV discourse among injection drug users in Edmonton, Canada. *International Journal of Drug Policy*. 2007; 18(5):388–396. [PubMed: 17854727]
- Young AM, Crosby RA, Oser CB, Leukefeld CG, Stephens DB, Havens JR. Hepatitis C viremia and genotype distribution among a sample of nonmedical prescription drug users exposed to HCV in rural Appalachia. *Journal of Medical Virology*. 2012; 84(9):1376–1387. [PubMed: 22825816]
- Young AM, Rudolph AE, Quillen D, Havens JR. Spatial, temporal and relational patterns in respondent-driven sampling: Evidence from a social network study of rural drug users. *Journal of Epidemiology and Community Health*. 2014; 68(8):792–798. [PubMed: 24692631]
- Young AM, Stephens DB, Khaleel HA, Havens JR. Hepatitis C vaccine clinical trials among people who use drugs: Potential for participation and involvement in recruitment. *Contemporary Clinical Trials*. 2015; 41:9–16. [PubMed: 25553715]
- Zack, M., Singleton, J., Satterwhite, C., Delaney, K., Wall, K. Collinearity macro (SAS). Department of Epidemiology RSPH at Emory University; 2011. (contact dkleinb@emory.edu)

Zibbell JE, Iqbal K, Patel RC, Suryaprasad A, Sanders KJ, Moore-Moravian L, Holtzman D. Increases in hepatitis C virus infection related to injection drug use among persons aged ≥ 30 years- Kentucky, Tennessee, Virginia, and West Virginia, 2006–2012. *Morbidity and Mortality Weekly Report*. 2015; 64(17):453–458. [PubMed: 25950251]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Demographic, behavioral, and interpersonal characteristics of total sample ($n=243$) and by gender (104 females and 139 males)

Characteristic	Total n (%)	Female ($n=104$), n (%)	Male ($n=139$), n (%)
<i>Demographic</i>			
Age (years), mean (SD)	33.8 (7.8)	32.9 (7.7)	34.5 (7.8)
White	226 (93.0)	100 (96.2)	126 (90.6)
High school graduate	132 (54.3)	53 (51.0)	79 (56.8)
Currently married	46 (18.9)	20 (19.2)	26 (18.7)
Unemployed	106 (43.6)	50 (48.1)	56 (40.3)
<i>Interpersonal</i>			
Disclosed HCV status	168 (69.1)	76 (73.1)	92 (66.2)
Spends most of free time alone	71 (29.2)	22 (21.2)	49 (35.3)
Social conflict	31 (12.8)	15 (14.4)	16 (11.5)
Dependent on someone else for majority of support	83 (34.2)	47 (45.2)	36 (25.9)
<i>Other characteristics</i>			
Lifetime history of IDU	215 (88.5)	94 (90.4)	121 (87.1)
Lifetime history of drug treatment ^a	105 (43.2)	57 (54.8)	48 (34.5)
Time since testing HCV positive (years), mean (SD)	5.0 (3.5)	5.0 (3.7)	5.1 (3.4)

HCV=Hepatitis C virus; SD =Standard deviation

^aDrug treatment includes methadone detoxification, methadone maintenance, Outpatient Drug Free, residential treatment, non-methadone detoxification, and 12-step programs (Alcoholics Anonymous/ Narcotics Anonymous)

Table 2

Bivariate, gender-stratified associations with HCV disclosure

Characteristic	Female (n=104)			Male (n=139)		
	Crude OR	95% CI	p value	Crude OR	95% CI	p value
<i>Demographic</i>						
Age (years)	0.92	(0.87, 0.98)	0.006**	1.00	(0.95, 1.04)	0.944
White	---	---	---	2.51	(0.79, 7.95)	0.118
High school graduate	1.56	(0.65, 3.74)	0.317	0.65	(0.31, 1.33)	0.235
Currently married	1.60	(0.49, 5.28)	0.441	1.49	(0.58, 3.84)	0.412
Unemployed	1.10	(0.46, 2.61)	0.838	1.72	(0.82, 3.59)	0.152
<i>Interpersonal</i>						
Spends most of free time alone	0.56	(0.21, 1.54)	0.264	1.45	(0.68, 3.08)	0.336
Social conflict	2.68	(0.57, 12.73)	0.214	0.35	(0.12, 1.00)	0.051
Dependent on someone else for majority of support	0.93	(0.39, 2.23)	0.878	1.03	(0.46, 2.30)	0.944
<i>Other characteristics</i>						
Lifetime history of IDU	0.65	(0.13, 3.29)	0.606	0.21	(0.05, 0.96)	0.044*
Lifetime history of drug treatment ^b	0.38	(0.15, 0.97)	0.042*	0.34	(0.16, 0.71)	0.004**
Time since testing HCV positive (years)	0.95	(0.85, 1.06)	0.325	1.03	(0.92, 1.14)	0.627

HCV=Hepatitis C virus; OR=Odds ratio; CI=Confidence interval

^aQuasi-complete separation of the data related to race occurred among females due to the association of the covariate with only one outcome, leading to an infinite parameter estimate.

^bDrug treatment includes methadone detoxification, methadone maintenance, Outpatient Drug Free, residential treatment, non-methadone detoxification, and 12-step programs (Alcoholics Anonymous/Narcotics Anonymous)

* $p < 0.05$.

** $p < 0.01$.