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## Hepatitis C management by addiction medicine physicians: Results from a national survey

Alain H. Litwin, M.D., M.P.H.<sup>a,b,\*</sup>, Hillary V. Kunins, M.D., M.P.H., M.S.<sup>a,b</sup>, Karina M. Berg, M.D., M.S.<sup>a,b</sup>, Alex D. Federman, M.D., M.P.H.<sup>c</sup>, Karyn K. Heavner, M.P.H.<sup>d</sup>, Marc N. Gourevitch, M.D., M.P.H.<sup>e</sup>, and Julia H. Arnsten, M.D., M.P.H.<sup>a,b,f</sup>

<sup>a</sup> Division of General Internal Medicine, Department of Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx, NY, USA

<sup>b</sup> Division of Substance Abuse, Department of Psychiatry and Behavioral Sciences, Albert Einstein College of Medicine, Bronx, NY, USA

<sup>c</sup> Division of General Internal Medicine, Mount Sinai School of Medicine, New York, NY, USA

<sup>d</sup> New York State Department of Health AIDS Institute, Albany, NY, USA

<sup>e</sup> Division of General Internal Medicine, New York University School of Medicine, New York, NY, USA

<sup>f</sup> Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx, NY, USA

### Abstract

Drug users are disproportionately affected by hepatitis C virus (HCV), yet they face barriers to health care that place them at risk for levels of HCV-related care that are lower than those of nondrug users. Substance abuse treatment physicians may treat more HCV-infected persons than other generalist physicians, yet little is known about how such physicians facilitate HCV-related care. We conducted a nationwide survey of American Society of Addiction Medicine physicians ( $n = 320$ ) to determine substance abuse physicians' HCV-related management practices and to describe factors associated with these practices. We found that substance abuse treatment physicians promote several elements of HCV-related care, including screening for HCV antibodies, recommending vaccinations against hepatitis A and B, and referring patients to subspecialists for HCV treatment. Substance abuse physicians who also provide primary medical or HIV-related care were most likely to facilitate HCV-related care. A significant minority of physicians were either providing HCV antiviral treatment or willing to provide HCV antiviral treatment.

### Keywords

Hepatitis C virus; Chronic hepatitis C; Drug users; Substance abuse treatment physicians; Addiction medicine

### 1. Introduction

Hepatitis C virus (HCV) infection is common among injection drug users (IDUs), with prevalence approaching 95% in some studies (Armstrong et al., 2006; Garfein, Vlahov, Galai,

\*Corresponding author. Division of General Internal Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, 111 East 210th Street, Bronx, NY 10467, USA. Tel.: +1 718 944 3862; fax: +1 718 944 3841. alitwin@montefiore.org (A.H. Litwin).

Doherty, & Nelson, 1996; Lorvick, Kral, Seal, Gee, & Edlin, 2001; Murrill et al., 2002; Thomas et al., 1995). IDUs constitute 60% of the approximately 5 million people in the United States who are infected with HCV (Edlin, 2005). Although past treatment options have been relatively ineffective, new treatment advances have substantially improved outcomes (Fried et al., 2002; Manns et al., 2001). A growing number of studies now provide evidence for the efficacy of interferon-based therapy for HCV-infected patients with active substance abuse disorders (Backmund, Meyer, Von Zielonka, & Eichenlaub, 2001; Cournot et al., 2004; Dalgard et al., 2002; Sylvestre, Litwin, Clements, & Gourevitch, 2005; Van Thiel, Anantharaju, & Creech, 2003). However, despite the high prevalence of HCV infection among IDUs, few have been treated with interferon-based antiviral therapy (Edlin et al., 2001; Hagan et al., 2006). Low HCV treatment rates persist despite expanded indications for the treatment of active IDUs (National Institutes of Health Consensus Development Conference Statement on the Management of Hepatitis C, 2002).

The linkage of primary care with substance abuse treatment has been shown to provide an effective framework for treating HIV infection and tuberculosis, both of which are highly prevalent among drug users (Gourevitch, Hartel, Selwyn, Schoenbaum, & Klein, 1999; Selwyn et al., 1989), and such linkages may also promote treatment for HCV. Substance abuse treatment physicians are generally psychiatrists and primary care providers who are proficient in treating substance abuse and alcoholism. Because HCV is also prevalent among patients treated by substance abuse treatment physicians, such physicians may greatly facilitate drug users' access to HCV care, much as they did for drug users' access to HIV and tuberculosis care in the 1990s (O'Connor, Molde, Henry, Shockor, & Schottenfeld, 1992; O'Connor, Selwyn, & Schottenfeld, 1994). However, barriers to initiating HCV-related care persist for substance abuse treatment physicians and include lack of needed information and resources, and concerns about adherence and psychiatric comorbidity among patients with active drug and alcohol abuse (Davis & Rodrigue, 2001).

Although primary care providers have been targeted as gatekeepers for HCV-related care, studies have shown that most primary care providers care for a few HCV-infected patients and refer most to subspecialists (Clark, Yawn, Galliher, Temte, & Hickner, 2005; Shehab, Sonnad, Jeffries, Gunaratnum, & Lok, 1999; Shehab, Sonnad, & Lok, 2001). It is unknown whether similar HCV-related practice and referral patterns exist among substance abuse treatment physicians. Among drug treatment program managers, a nationwide study found that many programs refer HCV-infected patients to subspecialists, but this study did not assess physician factors associated with referrals and lacked details about the content and volume of the HCV-related medical care provided at drug treatment programs (Strauss, Falkin, Vassilev, Des Jarleis, & Astone, 2002). Understanding physician factors associated with HCV-related practice patterns is a critical step in developing comprehensive strategies to address the HCV epidemic among drug users. We therefore conducted a nationwide survey to determine substance abuse treatment physicians' HCV-related management practices and to describe factors associated with these practices.

## 2. Materials and methods

### 2.1. Study population

We conducted a cross-sectional survey of substance abuse physicians identified through the American Society of Addiction Medicine (ASAM) member list. ASAM is the largest professional society of physicians (3,171 members) that is dedicated to treating persons with addiction disorders in the United States. The most common clinical specialties of ASAM members are psychiatry (34%), internal medicine (17%), and family medicine (17%); 6% of members list themselves as general practitioners. ASAM provided a list of 1,831 member physicians who had previously agreed to release their names and addresses for such purposes;

in June 2003, we randomly selected 810 physicians to receive a mailed survey (described below). The mailing was timed to occur approximately 1 year after the release of the National Institutes of Health Consensus Development Conference Statement on the Management of Hepatitis C (2002). Physicians who reported that they were not currently caring for drug users were later excluded from all analyses.

## 2.2. Survey development

The survey was adapted from an instrument developed by Shehab et al. (1999) and included items designed to assess physician, practice, and patient characteristics, and HCV-related practice patterns. The survey was piloted among 10 physicians who worked in drug treatment settings and was modified based on their responses and feedback. Surveys were then mailed to the 810 physicians at their sites of practice. The mail contained an introductory letter, a stamped and addressed return envelope, and a US\$5 bill as compensation for time spent completing the survey. A second survey, without compensation, was mailed if the first was not returned within 4 weeks. The Albert Einstein College of Medicine Committee on Clinical Investigation approved the survey and study methods.

## 2.3. Survey domains

Physician characteristics included primary medical specialty, addiction medicine certification, number of years in practice, hours spent weekly in direct patient care, provision of HIV or other primary medical care (e.g., caring for hypertension or diabetes), performance of routine or annual physical exams, estimated number of patients being treated for drug dependence, and estimated number of patients with HCV infection.

Practice characteristics included provision of on-site primary medical or mental health care, practice setting (e.g., inpatient, outpatient, or residential), hospital affiliation, substance abuse treatment type (e.g., opiate agonist treatment, alcohol detoxification and rehabilitation, or other), practice configuration (free-standing vs. network), and financial status (for-profit, nonprofit, or public). They also included the characteristics of patients seen in the practice setting, including insurance and racial/ethnic mix of patients, estimated prevalence of psychiatric comorbidity among patients, and patients' drug use characteristics (i.e., substances used and number of IDUs). Physicians were asked to specify the proportion of their patients in each response category, and their responses were dichotomized such that "most patients" was defined as at least 50% of that physician's patients.

## 2.4. HCV-related practices (outcome variables)

We defined four outcome variables to capture physicians' HCV-related management practices: (1) screening most (at least 50% of) IDU patients for HCV antibodies; (2) recommending hepatitis A virus (HAV) and hepatitis B virus (HBV) vaccinations to most (at least 50% of) nonimmune HCV-infected patients; (3) directly treating or referring for subspecialist care most (at least 50% of) HCV-infected patients during the past 12 months; and (4) direct prescription of HCV antiviral treatment by the substance abuse treatment physician to at least one patient during the past 12 months. Factors associated with screening for HCV antibodies were analyzed and reported for all physicians who reported providing care to drug users. The other three outcomes were analyzed and reported only for those physicians currently caring for at least one patient with chronic HCV infection.

## 2.5. Data analysis

Univariate logistic regression models were first constructed to identify the associations between physician, practice, and patient characteristics, and each of the four outcome variables. We then constructed separate multivariate logistic regression models to identify the

independent associations of these characteristics with each outcome variable. Because of collinearity with the direct provision of primary medical care, some variables (primary medical specialty, provision of routine or annual exams, provision of HIV-related care, and availability of on-site medical care) were not included in multivariate models. All multivariate models were adjusted for practice setting (inpatient, outpatient, or residential) and number of patients. Only covariates associated ( $p < .10$ ) with each outcome in univariate analyses were eligible for inclusion into initial multivariate models. Nonsignificant variables were removed sequentially until the best final model had been achieved. All final models included only variables significant at  $p < .05$ , and model fit was assessed with goodness-of-fit tests. Data management and analyses were performed using STATA 8.2.

### 3. Results

Of 810 surveys mailed, 8 were returned because of undeliverable addresses and 1 was delivered to a non-physician, leaving 801. Four hundred nineteen of the remaining 801 surveys were ultimately completed, for an overall response rate of 52%. Ninety-nine physicians (22%) were not providing care to drug users and, therefore, did not complete the entire survey, as instructed in the mailing. The remaining 320 physicians reported currently providing care to drug users.

#### 3.1. Physician and practice setting characteristics

The specialties of physicians in the study sample resembled those of physicians in ASAM: psychiatry (39%), internal medicine (20%), and family medicine (23%) (Table 1). The majority of physicians in this sample were board-certified in both their primary specialty (82%) and in addiction medicine (66%). Physicians were both experienced and active (a median of 20 years in practice and 30 hours/week in direct patient care), and 38% provided primary medical care to patients currently under their treatment for drug dependence. Surveyed physicians reported currently treating a median of 50 patients for drug dependence, alcohol dependence, or both (interquartile range [IQR] = 20–169), and a median of 15 patients with HCV infection (IQR = 5–60).

More than half of responding physicians (55%) worked primarily in alcohol detoxification or rehabilitation settings, and more than one quarter (28%) worked primarily in opiate agonist treatment settings. More than half worked in settings that delivered on-site primary medical (54%) or mental health care (64%).

A significant minority of physicians reported that most of their patients were insured by Medicaid (22%) or were uninsured (23%), and one third (32%) reported that most of their patients were African American or Latino. The proportion of physicians reporting that most of their patients had used a specific substance in the previous 12 months was 62% for alcohol, 34% for heroin, 29% for other illicit opiates, 29% for cocaine, and 22% for injection drug use. Forty-seven percent of physicians reported that most of their patients had a history of major depression. Because these patient characteristics were not associated ( $p > .10$ ) with any of the four outcomes in univariate analyses, they were not considered in subsequent multivariate analyses.

#### 3.2. HCV-related practices

**3.2.1. Factors associated with HCV screening**—Most physicians (87%) reported screening at least one IDU patient for HCV antibodies, and 61% reported screening most IDU patients for HCV antibodies (Table 1). In univariate analyses, physicians were more likely to screen most IDU patients for HCV antibodies if the physicians were specialists in family medicine (vs. psychiatry), performed routine or annual physical exams, or provided primary or HIV-related medical care. Similarly, physicians were more likely to screen most IDU

patients for HCV antibodies if they worked in practice settings that were inpatient (vs. outpatient), affiliated with a hospital, part of a network, or nonprofit or publicly owned (vs. privately owned). In multivariate analyses, factors independently associated with screening for HCV antibodies included: provision of primary medical care (adjusted odds ratio [OR<sub>adj</sub>] = 3.18; 95% confidence interval [95% CI] = 1.88, 5.38), hospital-affiliated setting (OR<sub>adj</sub> = 2.56; 95% CI = 1.50, 4.37), and nonprofit or public setting (OR<sub>adj</sub> = 1.79; 95% CI = 1.08, 3.03).

**3.2.2. Factors associated with provision of HAV and HBV vaccinations**—Of the physicians who reported currently caring for at least one patient with chronic HCV ( $n = 262$ ), 55% reported recommending HAV vaccination to most nonimmune patients, and 65% reported recommending HBV vaccination to most nonimmune patients (Table 2). In univariate analyses, physicians were more likely to report recommending vaccination against both HAV and HBV to most HCV-infected patients if the physicians were specialists in internal or family medicine, provided routine or annual physical exams, or provided primary or HIV-related medical care. Physicians were less likely to vaccinate if they worked in inpatient settings. In multivariate analyses, physicians who provided primary medical care (compared to physicians who provided substance abuse treatment only) were more likely to vaccinate against HAV (OR<sub>adj</sub> = 2.92; 95% CI = 1.70, 5.00) and HBV (OR<sub>adj</sub> = 2.90; 95% CI = 1.63, 5.13), whereas physicians who worked in inpatient settings (compared to outpatient settings) were less likely to vaccinate against HAV (OR<sub>adj</sub> = 0.47; 95% CI = 0.25, 0.87).

**3.2.3. Factors associated with referral for HCV treatment**—The majority of physicians (82%) made at least one referral for HCV treatment in the past 12 months (median number of referrals = 6; IQR = 2–20), and 50% reported referring most HCV-infected patients for treatment (Table 2). These proportions include patients who were directly treated by substance abuse treatment physicians (i.e., referred to self). In univariate analyses, physicians were more likely to refer most HCV-infected patients if the physicians were specialists in family medicine, provided primary medical care, currently cared for ≤15 HCV-infected drug users, or worked in inpatient practice settings, alcohol detoxification or rehabilitation programs (vs. opiate agonist treatment programs), or hospital-affiliated practices. In multivariate analyses, physicians who provided primary medical care (OR<sub>adj</sub> = 1.87; 95% CI = 1.08, 3.23) or who currently cared for ≤15 HCV-infected patients (OR<sub>adj</sub> = 4.45; 95% CI = 2.57, 2.70) were more likely to refer most HCV-infected patients for treatment.

**3.2.4. Factors associated with direct prescription of HCV antiviral treatment**—Few physicians (9%) reported directly prescribing HCV antiviral treatment ( $Mdn = 5$ ; IQR = 2–10) (Table 2). Among physicians not already directly prescribing antiviral treatment, 31% reported willingness to evaluate and treat HCV (by directly prescribing pegylated interferon and ribavirin without referral to a hepatologist) if given appropriate training and resources. In univariate and multivariate analyses, physicians who provided primary medical care were more likely to have provided interferon-based treatment to any HCV-infected patient (OR<sub>adj</sub> = 3.59; 95% CI = 1.44, 6.91), and physicians in practice for at least 20 years were less likely to have provided interferon-based treatment (OR<sub>adj</sub> = 0.32; 95% CI = 0.12, 0.81).

## 4. Discussion

Our study reveals three important findings associated with HCV-related management practices among substance abuse treatment physicians. First, substance abuse treatment physicians promote several important elements of HCV-related care, including screening IDUs for HCV, recommending hepatitis A and B vaccinations to nonimmune HCV-infected patients, and referring HCV-infected patients for HCV treatment. Still, the reported rates of these interventions indicate much room for improvement. Second, substance abuse treatment physicians who provide primary medical care to their patients are more likely to screen for

HCV antibodies, to recommend hepatitis A and B vaccinations, and to refer to HCV specialists than those who do not provide primary medical care. Third, only 9% of surveyed substance abuse treatment physicians reported directly treating any HCV-infected patient, although an additional third reported willingness to directly provide HCV antiviral treatment if given needed resources and education.

A large minority (39%) of surveyed physicians reported that they did not screen most IDUs for HCV antibodies. Because up to 90% of IDUs are infected with HCV, suboptimal screening practices will continue to leave many IDUs unaware of their HCV infection status (Best et al., 1999). Screening is an essential first step in HCV-related care, allowing infected persons the possibility of receiving vaccinations and antiviral treatment, whether through referral or through direct treatment by the screening clinician. Our results demonstrate that physicians who do not provide primary medical care or who work in substance abuse treatment settings that are unaffiliated with a hospital or are privately owned are less likely to screen for HCV antibodies. Further research is needed to understand how one can intervene with these groups of physicians to promote more universal HCV screening practices.

HAV and HBV are important public health concerns for HCV-infected drug users because of the increased risk of severe liver disease due to acute HAV infection (Vento et al., 1998) or superimposed chronic HBV infection (Sterling & Sulkowski, 2004). Yet, substantial minorities of surveyed physicians failed to recommend HAV (45%) or HBV (35%) vaccinations to most HCV-infected patients. These low rates may be no worse than those of gastroenterologists and hepatologists: One nationwide study found that many subspecialists almost never recommended vaccinations against HAV (53%) or HBV (30%) to HCV-infected patients (Everhart, Stolar, & Hoofnagle, 1997). The importance of enlisting substance abuse treatment physicians to recommend and deliver HAV and HBV vaccines is underscored by a study of HCV-infected patients treated by primary care providers, which revealed that only 1.6% and 3.0% of HCV-infected patients had received HAV and HBV vaccines, respectively (Nicklin, Schultz, Bessinger, & Wilson, 1999). In our study, physicians who provided primary medical care were more likely to recommend vaccines against HAV and HBV. This subgroup of substance abuse treatment physicians may have the resources to either administer the vaccines themselves or to supervise other health care professionals in vaccine administration. Regardless of resources, vaccine recommendation is a brief intervention that can be delivered by all substance abuse treatment physicians. Linkages should be developed to facilitate the actual provision of these vaccines, especially for physicians who do not provide primary medical care.

Referral to HCV subspecialists for HCV-related treatment is a crucial step in facilitating drug users' access to antiviral treatment for HCV. Our study found that half of surveyed physicians did not refer most of their HCV-infected patients for treatment. Reasons for inadequate referrals by substance abuse treatment physicians might include the following: restrictive eligibility criteria by either the referring physician or the accepting physician, structural barriers (e.g., lack of adequate insurance), not making HCV-related care a priority, or pessimism about the tolerability and effectiveness of HCV treatment (Edlin et al., 2001). Again, we found that surveyed physicians who provided primary medical care were more likely to refer to subspecialists. This is consistent with the role of primary care providers, who often refer their patients to subspecialists for the treatment of complex diseases. It is noteworthy that physicians who managed a greater number of HCV-infected patients were less likely to refer most HCV-infected patients for treatment, even after taking into account the patients they treated directly. This finding suggests that physicians who care for many HCV-infected patients, including those who work in opiate-agonist treatment centers, may need additional resources or training to provide optimal HCV-related care. Such resources might include case managers focused on

HCV-related referrals, or access to networks of local psychiatrists and HCV specialists who are willing to treat drug users.

Important, very few substance abuse treatment physicians (9%) reported providing direct antiviral treatment to their HCV-infected patients, but a third more were willing to do so if given appropriate training and resources. This proportion compares favorably to another nationwide survey, which found that only 1% of primary care providers had treated patients directly for HCV (Shehab et al., 1999), and suggests that substance abuse treatment physicians may be using innovative approaches to integrate HCV antiviral treatment into their practices. Physicians who provided primary medical care or HIV-related care were more likely to directly prescribe antiviral treatment for HCV than those who did not provide either form of primary medical care. Our findings suggest that substance abuse treatment programs should further capitalize on existing HIV medical care infrastructures built into some substance abuse treatment programs (Selwyn et al., 1989). Focusing resources on providers who are willing to codeliver addiction and HCV-related care is a promising strategy to further increase the overall number of drug users who are being treated for HCV.

Our findings are consistent with the only other large national survey of HCV-related management practices in drug treatment settings. This survey of drug treatment program managers found that programs with on-site medical staff and that required routine/annual medical exams and network/hospital affiliations were more likely to provide on-site HCV-related care (Hagan, Staruss, Astone, & Des Jarleis, 2005; Strauss et al., 2002; Vassilev, Strauss, Astone, Friedmann, & Des Jarleis, 2004). In contrast to our study, this survey of drug treatment program managers also found that residential programs were more likely to provide on-site HCV-related care; however, our sample included few physicians working within residential settings. Both our survey of substance abuse treatment physicians and this earlier survey of drug treatment programs lend support to the strategy of integrating primary medical care into substance abuse treatment to optimize access to care for chronic HCV.

Our study had several limitations. It is not known how similar ASAM members are to substance abuse treatment physicians who are not members of ASAM. ASAM members may have greater experience with and knowledge of addiction medicine than non-ASAM members. It is also possible that physicians who completed the survey may have had more favorable HCV-related practice patterns. We do not know if recommendations to obtain HAV and HBV vaccinations translate into increased receipt of vaccines, or if referral for HCV care translates to actual receipt of HCV subspecialty care or to initiation of interferon-based therapy for HCV (Montano & Philip, 1995). Finally, all data reflect self-report and constitute physicians' estimates of both the prevalence of conditions among their patients and the prevalence of their own behaviors, which are likely to be imprecise. Specifically, physicians may have overestimated their performance due to social desirability bias, leaving open the possibility that HCV-related management practices are actually worse than what we have documented.

HCV is the most common bloodborne infection among IDUs and, if left untreated, may lead to cirrhosis, liver cancer, and death (Alter & Moyer, 1998; Lauer & Walker, 2002). Substance abuse treatment physicians are already serving as crucial health promoters and public health partners in addressing the HCV epidemic, and have the potential for taking an even more central role. It is essential for substance abuse physicians to identify patients who are at risk for HCV and to institute appropriate management, referral, and treatment. In particular, resources should be focused on substance abuse treatment physicians who already provide primary medical or HIV-related care. Additional strategic interventions focused on facilitating HCV-related care for drug users must be developed to enhance the current level of HCV-related care provided by all substance abuse treatment physicians.

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**Table 1**Association of physician ( $N = 320$ ) and practice characteristics with screening for HCV antibodies

Characteristics	<i>n</i> (%)	Odds of screening for HCV antibodies [OR (95% CI)]
Physician characteristics		
Primary specialty <sup>a</sup>		
Psychiatry	124 (39)	Reference
Family practice	72 (23)	2.93 (1.53, 5.59)**
Internal medicine	65 (20)	1.76 (0.94, 3.28)
None of the above	62 (19)	1.03 (0.56, 1.91)
≥30 hours/week in patient care	216 (68)	0.79 (0.49, 1.28)
≥20 years in practice	177 (55)	1.22 (0.77, 1.91)
Performs routine or annual exams	246 (77)	1.90 (1.12, 3.20)*
Provides primary medical care (e.g., for diabetes)	123 (38)	2.60 (1.59, 4.24)***
Provides HIV-related primary care	52 (16)	1.95 (1.01, 3.77)*
≥50 patients treated for drug dependence	169 (53)	1.20 (0.77, 1.89)
Practice characteristics		
Practice setting		
Outpatient	205 (64)	Reference
Inpatient	87 (27)	1.81 (1.06, 3.08)*
Residential	28 (9)	2.44 (0.99, 6.00)
Substance abuse treatment modality		
Opioid agonist treatment	88 (28)	Reference
Alcohol detoxification, rehabilitation, or both	135 (42)	1.87 (1.07, 3.25)*
Other	97 (30)	1.14 (0.64, 2.04)
Hospital-affiliated	156 (49)	2.28 (1.44, 3.61)***
Network-affiliated	150 (47)	1.90 (1.20, 3.01)**
Nonprofit or public	205 (64)	2.05 (1.29, 3.27)**

Note. Additional specialties cited commonly included anesthesiology, emergency medicine, general practitioner, pain medicine, and pediatrics.

<sup>a</sup> Responses are not mutually exclusive.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .

**Table 2**

Univariate associations of physician ( $N = 262$ ) and practice characteristics with HAV vaccination, referral for HCV care, or direct HCV treatment

Characteristics	HAV vaccination <sup>a</sup> [OR (95% CI)]	Referral for HCV care <sup>b</sup> [OR (95% CI)]	Direct HCV treatment <sup>c</sup> [OR (95% CI)]
Physician characteristics			
Primary medical specialty			
Psychiatry	Reference	Reference	Reference
Family medicine	2.45 (1.24, 4.83)*	2.16 (1.11, 4.20)*	0.58 (0.11, 3.01)
Internal medicine	2.93 (1.49, 5.76)**	1.11 (0.58, 2.11)	3.69 (1.24, 11.0)*
Other	1.16 (0.59, 2.31)	1.49 (0.75, 2.95)	1.85 (0.51, 6.63)
≥ 30 hours/week in patient care	0.96 (0.57, 1.60)	1.49 (0.89, 2.51)	1.17 (0.46, 2.96)
≥ 20 years in practice	0.86 (0.53, 1.41)	1.63 (0.99, 2.67)	0.38 (0.15, 0.92)*
Performs routine or annual exams	1.98 (1.07, 3.64)*	1.85 (1.00, 3.44)	1.23 (0.40, 3.77)
Provides primary medical care	2.61 (1.55, 4.40)***	1.94 (1.17, 3.22)*	3.22 (1.31, 7.89)*
Provides HIV-related primary care	2.63 (1.29, 5.35)**	1.19 (0.62, 2.26)	3.63 (1.46, 9.00)**
≤ 15 Current HCV-infected patients	0.76 (0.47, 1.24)	4.80 (2.84, 8.12)***	0.96 (0.41, 2.27)
Practice characteristics			
Practice modality			
Outpatient	Reference	Reference	Reference
Inpatient	0.52 (0.30, 0.92)*	2.29 (1.29, 4.06)**	1.00 (0.37, 2.72)
Residential	0.86 (0.37, 2.01)	1.69 (0.72, 3.93)	1.48 (0.39, 5.57)
Treatment modality			
Opioid agonist treatment	Reference	Reference	Reference
Alcohol detoxification, rehabilitation, or both	0.76 (0.42, 1.36)	2.25 (1.24, 4.08)*	0.61 (0.20, 1.89)
Other	0.93 (0.49, 1.77)	1.68 (0.88, 3.19)	1.56 (0.56, 4.33)
Hospital-affiliated	1.25 (0.76, 2.03)	1.66 (1.02, 2.71)*	0.76 (0.32, 1.81)
Network-affiliated	1.05 (0.65, 1.72)	1.15 (0.71, 1.87)	0.84 (0.36, 2.00)
Nonprofit or public	1.13 (0.68, 1.90)	1.10 (0.66, 1.83)	1.88 (0.67, 5.25)

<sup>a</sup>Recommended HAV vaccinations to most HCV-infected patients.

<sup>b</sup>Referred most HCV-infected patients for HCV care during the past 12 months, including patients directly treated by substance abuse treatment physicians (i.e., referred to self).

<sup>c</sup>Treated any HCV-infected patient during the past 12 months.

\*  $p < .05$ .

\*\*  $p < .01$ .

\*\*\*  $p < .001$ .