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Screening for Depressive Symptoms Among HCV-Infected Injection Drug Users: Examination of the Utility of the CES-D and the Beck Depression Inventory

Elizabeth T. Golub, Mary Latka, Holly Hagan, Jennifer R. Havens, Sharon M. Hudson, Farzana Kapadia, Jennifer V. Campbell, Richard S. Garfein, David L. Thomas, and Steffanie A. Strathdee for the STRIVE Project

ABSTRACT *The prevalence of depression is high among injection drug users (IDUs) and among those infected with the hepatitis C virus (HCV). Moreover, one of the drugs used in the standard treatment for HCV infection (interferon) has been known to exacerbate underlying psychiatric disorders such as depression and has been associated with the development of major depressive disorder among HCV-infected patients. For these reasons, the most recent National Institutes of Health consensus statement on the management of HCV infection recommends the identification and treatment of depression prior to the start of HCV treatment. This study aimed to examine the extent of current moderate/severe depressive symptoms in a cohort of HCV-infected IDUs as measured by two screening tools, the Center for Epidemiologic Studies Depression Scale (CES-D) and the Beck Depression Inventory (BDI). Subjects were participants in a multisite behavioral intervention trial among HCV-seropositive, human immunodeficiency virus-negative IDUs aged 18–35 years; the trial was designed to prevent secondary transmission of HCV and to enhance uptake of HCV treatment. Baseline data on demographics, risk behaviors, depression, alcohol use, and health care utilization were measured via audio computer-assisted self-interview. A factor analysis was conducted on each scale to examine the clustering of items used in each to measure depressive symptoms. Baseline depressive symptoms, as measured via the CES-D and the BDI, were also compared using Pearson's correlation coefficient. Of 193 HCV-infected individuals enrolled to date, 75.6% were male, and 65.3% were white. Median age was 25.8 years. Factor analyses revealed that these scales measured depression differently; a distinct somatic component was present in the BDI, but not the CES-D. Using cutoff scores of 23 for the CES-D and 19 for the BDI, 44.0% and 41.5% of the participants were identified as having moderate/severe depressive symptoms, respectively. Over half (56.0%) were identified as having depressive symptoms*

Drs. Golub and Strathdee and Ms. Havens are with the Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology, Baltimore, Maryland; Dr. Latka and Ms. Kapadia are with the New York Academy of Medicine, Center for Urban Epidemiologic Studies, New York, New York; Dr. Hagan is with the National Development and Research Institutes, Center for Drug Use and HIV Research, New York, New York; Dr. Hudson is with the Health Research Association, Los Angeles, California; Ms. Campbell is with Public Health–Seattle and King County, Seattle, Washington; Dr. Garfein is with the Centers for Disease Control and Prevention, Division of HIV/AIDS Prevention, Epidemiology Branch, Atlanta, Georgia; and Dr. Thomas is with Johns Hopkins University School of Medicine, Baltimore, Maryland.

Dr. Strathdee is now with the University of California, San Diego.

Correspondence: Elizabeth T. Golub, PhD, Assistant Scientist, Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology, Infectious Diseases Program, 627 North Washington Street, Baltimore, MD 21205. (E-mail: egolub@jhsph.edu)

by either scale. However, there was only moderate agreement between the two scales (κ=0.46). Depressive symptoms were highly prevalent in this cohort of HCV-infected IDUs. Results indicated that both scales should be used in tandem to have the most sensitive detection of depressive symptoms, thereby maximizing the potential for HCV treatment success.

KEYWORDS *Injection drug users (IDUs), Interferon, Hepatitis C infection, Depression, Center for Epidemiologic Studies Depression Scale (CES-D), Beck Depression Inventory (BDI).*

INTRODUCTION

Injection drug use accounts for at least 60% of incident hepatitis C virus (HCV) infection cases in the United States.[1] Although HCV therapies such as standard or pegylated interferon alfa and ribavirin have been effective in 40%–50% of treated patients, injection drug users (IDUs) are significantly underrepresented among those receiving HCV therapies.[2–4] In Baltimore, Maryland, between 1989 and 1998 only 1 of 1,667 (0.06%) HCV-infected IDUs reported having received interferon alfa therapy for HCV infection.[2]

Prior to 2002, the National Institutes of Health (NIH) consensus statement on the management of HCV infection had identified current injection drug use and a history of depression as contraindications for treatment,[5] exclusions that undoubtedly contributed to the very low proportion of HCV-infected IDUs treated. However, the revised NIH Consensus Statement for Treatment of HCV Infection issued in 2002 removed these stipulations, making it clear that efforts should be made to increase the availability of HCV treatment to persons such as IDUs or those with comorbid neuropsychiatric conditions.[3] However, even though the recommendation not to treat IDUs was retracted, the high prevalence of depression among IDUs may represent a formidable barrier to care.

Despite revisions to these guiding principles for treating HCV infection, depression remains a highly prevalent condition that can complicate the treatment of HCV infection. Interferon alfa treatment has been associated with the development of major depressive disorders among HCV-infected individuals.[6,7] Suicides have been reported even among persons without antecedent depression. Therefore, depression remains a relative contraindication to interferon alfa treatment. Among those infected with HCV, the prevalence of psychological disorders, including depression, is estimated[3] to be 20% to 30%. The prevalence of depression among IDUs is also high.[8–12] One study found major depressive disorder in 34% of IDUs.[13] A study of low-income IDUs in Baltimore found that one third scored high on depressive symptoms (Center for Epidemiologic Studies Depression Scale [CES-D] $\geq$16).[12] Another study of IDUs found that 54% of needle-exchange program attenders and 42% of those enrolled in a methadone maintenance treatment program met the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (*DSM-IV*)[14] criteria for major depressive disorder.[15] Furthermore, depression severity has been associated with a greater frequency of injection risk behaviors among depressed IDUs.[16] Moreover, HCV-seropositive persons with severe mental illness are less than half as likely as HCV-negative persons to have a regular source of medical care for potentially diagnosis and treatment of depression.[17]

Recognizing the association among interferon alfa treatment, depression, and HCV infection,[6] the Consensus Statement for HCV Treatment recommended the evaluation and treatment of depression before initiating interferon therapy for HCV

infection.[3] It is therefore important to identify an appropriate screening tool for depression. Other studies have addressed this issue among non-IDU populations[18]; however, such identification is especially needed among IDUs to ensure that depression among HCV-infected IDUs can be treated prior to, or concurrently with, HCV treatment.

The CES-D and Beck Depression Inventory (BDI) are commonly used as screening tools for depressive symptoms in community-based and clinic populations. Although the CES-D is easy to administer and is relevant to community-based samples, it was not intended to identify those with clinical depression. Conversely, the BDI is believed to capture clinical depression more sensitively, but may overestimate depression if physical symptoms related to HCV infection are present. We administered these two commonly used scales to measure the extent of severe depressive symptoms among young HCV-positive IDUs in three US cities. We also investigated whether these two scales measure depressive symptoms in the same way with the intention of guiding clinicians and researchers with respect to the identification of persons who should be considered for antidepressant therapy before initiating interferon therapy.

METHODS

Study Participants

Young adult IDUs in Baltimore; New York City; Seattle, Washington; Chicago, Illinois; and Los Angeles, California were recruited using community-based outreach, targeted sampling, and peer-driven referrals and were invited to participate in a multicenter cross-sectional survey of sexual and injection risk behaviors and their associations with HIV and HCV infections. This survey also served as a screening process and baseline assessment for enrolling those who tested HIV and HCV seronegative to participate in a trial, the Drug Users Intervention Trial (DUIT), to test the efficacy of a behavioral intervention for reducing the risk of HIV and HCV infection from injection and sexual practices among young adult IDUs.

Individuals in Baltimore, New York, and Seattle who were ineligible for the DUIT study because they were HCV seropositive were invited to join the present study, the Study to Reduce Intravenous Exposures (STRIVE). STRIVE is an ongoing behavioral intervention trial designed to prevent secondary HCV transmission and facilitate entry into HCV treatment among HCV-infected, HIV-negative IDUs. Given that treatment of HCV infection is complicated by HIV coinfection and that the number of coinfected IDUs recruited for this study would be too small to analyze the impact of coinfection separately, HIV-seropositive individuals were ineligible for the study and were referred for appropriate medical care.

Participants screened for either study complete a baseline survey on demographics and risk behaviors; the survey used audio computer-assisted self-interview (ACASI), which has been useful in collecting sensitive information from research participants.[19–21] Subjects also undergo HIV and HCV antibody screening and receive pretest counseling according to Centers for Disease Control and Prevention guidelines.[22] Anti-HCV is evaluated using enzyme immunoassay. All subjects are asked to return in 2 weeks to receive posttest counseling and medical referrals when appropriate. At this visit, HIV-seronegative subjects are invited to enroll in either of the two behavioral intervention studies based on their HCV serostatus. In 2003, recruitment into STRIVE was extended to persons not screened as described above (e.g., previous participants from other studies or those with known HCV-seropositive

status) and included persons aged 18–35 years (the maximum age for the DUIT study is 30 years).

The present analysis focused only on subjects enrolled in the STRIVE study between June 2002 and May 2003. Subjects were eligible for STRIVE if they were aged 18–35 years, reported injecting illicit drugs within the prior 6 months, had documentation of an HCV-positive serostatus, and had completed the DUIT baseline assessment survey. The institutional review boards at each study site approved this study (in Baltimore, Johns Hopkins School of Public Health Committee on Human Research; in Seattle, University of Washington Human Subjects Division; in New York, New York Academy of Medicine).

After providing written informed consent, all STRIVE participants provided further serum samples for liver function testing as well as qualitative HCV ribonucleic acid (RNA) testing. Subjects also completed an additional ACASI survey that included questions on health care utilization, experiences with HCV treatment and prevention counseling, alcohol consumption and dependence, and depression. Baseline depressive symptoms were assessed via the CES-D and the BDI, both of which were administered by ACASI.

The CES-D was developed in 1977 to measure depressive symptoms in population samples.[22] The scale contains 20 items that refer to symptomatology in the previous week. Each item in the CES-D is scored from 0 (presence of symptom rarely or none of the time or less than 1 day in the past week) to 3 (most or all of the time or 5 to 7 days of the past week). Of the 20 statements, 4 are reverse scored before summing to achieve a total scale score from 0 to 60. Good reliability and validity has been demonstrated in a HCV-positive population[24] and in different ethnic contexts.[25] A cutoff score of 23 was utilized to classify moderate/severe depressive symptoms in this study. This cutoff has been suggested and utilized by other studies to reduce the number of false-positive classifications, especially among populations such as drug users, who are known to have higher rates of depression.[11,13,26,27] The internal validity of the scale was .91 using Cronbach's α.

The BDI[28] was also utilized to measure depressive symptoms in this sample. This scale contains 21 items and also references symptoms experienced during the past week. Each item in the BDI is scored from 0 to 3, with zero representing the absence of the symptom (e.g., "I do not feel sad"), and 1 to 3 representing differing levels of the symptom (e.g., "I feel sad," "I am sad all of the time, and I can't snap out of it," and "I am so sad or unhappy that I can't stand it"). All items are summed and possible scale scores range from 0 to 63. A cutoff score of 19 was used to classify moderate/severe depressive symptoms. Although the literature is scant regarding BDI cutoffs for IDUs, one study used this cutoff score of 19 to minimize false positives.[29] The reliability and validity of this instrument has been demonstrated in both clinical and nonclinical populations,[30] including heroin users.[31,32] The BDI was internally consistent ($\alpha = .92$) in our sample.

Following completion of the STRIVE ACASI survey, participants were asked to return 2 weeks later, at which point they were randomly assigned to participate in either a six-session behavioral intervention or a six-session attention control condition. The analyses presented here focused solely on baseline data (i.e., prerandomization). Moreover, only those with serum samples that showed the presence of the HCV virus by polymerase chain reaction (PCR) testing were included in these analyses because those are the individuals who would be potential candidates for HCV treatment.

Statistical Analysis

To examine the baseline sociodemographic characteristics of the sample, frequencies and cross-tabulations were calculated, and comparisons were made using chi-square analysis for categorical variables. Principal components factor analysis was also conducted to examine the comparability of the underlying factors of each scale. Only factors with eigen values greater than 1 were examined utilizing a varimax rotation. Finally, agreement between the CES-D and BDI was assessed by calculating Pearson's correlation coefficient and the κ statistic. All analyses were conducted using STATA version 8 (College Station, TX).

RESULTS

Of the 320 participants who provided baseline data between June 2002 and May 2003, 55 (17.2%) participants were missing items from either the CES-D or BDI and were therefore excluded from the current analysis. Of the remaining 265, there were 3 (1.1%) missing HCV RNA data; for an additional 69 (26.0%) HCV-seropositive participants, PCR analysis showed no evidence of HCV RNA. In comparing those who were excluded (n = 127) with the rest of the sample (n = 193), there were no statistically significant differences on any of the following variables: gender, site, age, race, education, homelessness, history of incarceration, age at first injection, or number of injections per day. Specifically, comparisons of the 69 RNA-negative participants and the 193 RNA-positive participants also revealed that there were no statistically significant differences on any of those variables. There was also no difference in the proportion of participants found to have moderate/severe depressive symptoms by either scale when we compared the PCR-negative and PCR-positive individuals.

Of the remaining 193 participants, 146 (75.6%) were male, 126 (65.3%) were white, and the median age was 25.8 years (interquartile range [IQR] 23.7–28.3; see Table 1). More than half (107, 55.4%) had at least a high school education, and 103 (53.4%) reported being homeless during the prior 6 months. For 121 (62.7%) participants, this study was their first positive HCV antibody test. Median depression scores were 16 (IQR 9–23.5) for the BDI and 21 (IQR 14.5–28) for the CES-D. Univariate analyses revealed that, in accordance with the existing literature on depression, women were significantly more likely than men to exhibit moderate/severe depressive symptoms, both by the CES-D ($P = .01$) and the BDI ($P = .06$). However, both scales indicated that nearly 40% of men exhibited depressive symptoms. None of the other demographic characteristics or injection risk behaviors examined were significantly associated with the presence of depressive symptoms.

In the initial analyses of the CES-D by Radloff[23] in 1977, a four-factor model comprised of negative affect, positive affect, somatic and retarded activity, and interpersonal concerns was identified. We began by analyzing the CES-D using this traditional four-factor structure; however, the scale items did not align into the four factors, with several items loading high on both psychological and somatic factors. Therefore, we reanalyzed the data using three-factor (depressed affect/somatic, positive affect, and negative affect) and two-factor (negative affect/depressed affect/somatic, and positive affect) structures. We found that the simple two-factor structure did the best job of describing the data with clear differentiation between positive affect items and somatic and negative affect items; the two factors accounted for 50% of the variance. The results of the two-factor structure are presented in Table 2. The first factor contains both negative and depressed affect, as well as somatic symptoms,

TABLE 1. Baseline characteristics of 193 HCV-infected IDUs in Baltimore, New York, and Seattle, enrolled June 2002 to May 2003, by presence of moderate/severe depressive symptoms

	Total Cohort (N = 193)		CES-D ≥23 (n = 85)			BDI ≥ 19 (n = 80)		
	n	%	n	%	*P*	n	%	*P*
Gender								
Male	146	75.6	57	39.0		55	37.7	
Female	47	24.4	28	59.6	.014	25	53.2	.060
Site								
Baltimore	102	52.8	38	37.3		41	40.2	
New York	43	22.3	22	51.2		22	51.2	
Seattle	48	24.9	25	52.1	.132	17	35.4	.293
Age: median (IQR)	25.8 (23.7–28.3)		26.2 (24.1–28.3)			26.2 (23.9–28.7)		
Race/ethnicity								
White	126	65.3	54	42.9		51	40.5	
Hispanic	39	20.2	19	48.7		19	48.7	
Black	10	5.2	4	40.0		4	40.0	
Other	18	9.3	8	44.4	.922	6	33.3	.707
High school education								
Yes	107	55.4	51	47.7		40	37.4	
No	86	44.6	34	39.5	.258	40	46.5	.201
Homeless (past 6 months)								
Yes	103	53.4	49	47.6		48	46.6	
No	89	46.1	36	40.5	.412	32	36.0	.230

TABLE 1. ***Continued***

	Total Cohort (N = 193)		CES-D ≥ 23 (n = 85)			BDI ≥ 19 (n = 80)		
	n	%	n	%	*P*	n	%	*P*
Ever incarcerated								
Yes	166	86.0	75	45.2		73	44.0	
No	27	14.0	10	37.0	.429	7	25.9	.077
Age at first injection, median (IQR)	18 (16–21)		18 (16.5–21)			18(16–21)		
Number of injections/day over the past three months, median (IQR)	4 (3–6)		4 (3–6)			5 (3–6)		
First positive HCV antibody test								
Yes	121	62.7	48	39.7		47	38.8	
No	72	37.3	37	51.4	.113	33	45.8	.340
BDI, median (IQR)	16 (9–23.5)							
CES-D, median (IQR)	21 (14.5–28)							

TABLE 2. Factor loadings for the CES-D among 193 HCV-infected IDUs enrolled in Baltimore, New York, and Seattle, June 2002 to May 2003

	Negative affect/depressed affect/somatic	Positive affect
Bothered by things	**.659**	−.161
Poor appetite	**.555**	−.147
Couldn't shake the blues	**.801**	−.120
Couldn't keep mind on what I was doing	**.713**	.028
Felt depressed	**.763**	−.201
Everything I did was an effort	**.594**	.132
Life a failure	**.663**	−.246
Felt fearful	**.703**	.034
Restless sleep	**.621**	−.091
Talked less than usual	**.585**	.009
Felt lonely	**.734**	−.152
People were unfriendly	**.562**	.066
Crying spells	**.576**	−.130
Felt sad	**.727**	−.288
People disliked me	**.686**	−.138
Could not get going	**.787**	−.119
Just as good as others	.037	**.806**
Felt hopeful about the future	.088	**.732**
I was happy	−.261	**.746**
I enjoyed life	−.254	**.711**
% Variance explained	0.39	0.11

Bold indicates items that loaded on each of the two factors.

and the second factor encompasses positive affect. The second factor contained the four reverse-scored items, which is consistent with previous studies.[23]

Table 3 displays the factor loadings for the BDI. Three factors, accounting for 53% of the variance, were identified. The first factor, negative affect, accounted for the majority (39%) of the variance, indicating the items in this factor are more likely than those in the other two factors to identify persons with depressive symptoms. In accordance with studies examining the underlying latent structure of the BDI,[30] three specific factors were identified. Two of the items, sleep and worried about health, did not load distinctly onto any of the three factors.

There were 22 (11.4%) participants who reported having sought HCV testing because of the presence of symptoms that they felt were related to their HCV infection. To discern whether the presence of such symptoms was associated with higher scores on the BDI, the six items that loaded on the somatic factor (sleep, tiredness, appetite, appearance, loss of interest in people, and interest in sex) were compared with the presence or absence of HCV-related symptoms. Those reporting HCV-related symptoms were no more likely ($P > .05$) to report somatic symptoms of depression than were those without HCV-related symptoms.

We next examined the extent of current depressive symptoms in this cohort. Using cutoff scores of 23 for the CES-D and 19 for the BDI, 44.0% (85/193) and 41.5% (80/193) of the participants were identified as having moderate/severe depressive symptoms, respectively (Figure). We identified 108 (56.0%) IDUs as having moderate/severe depressive symptoms by either the CES-D or the BDI.

TABLE 3. Factor loadings for the BDI among 193 HCV-infected IDUs enrolled in Baltimore, New York, and Seattle, June 2002 to May 2003

Items	Negative affect	Somatic/ Negative affect	Irritability
Feel like failure	**0.78**	0.18	–0.11
Feel worse than anyone else	**0.77**	0.24	0.11
Feel guilty	**0.73**	0.19	–0.18
Disappointed in self	**0.73**	0.34	–0.13
Discouraged about future	**0.73**	0.15	0.07
Being punished	**0.72**	0.19	0.11
Feel sad	**0.72**	0.24	–0.03
Satisfaction out of things	**0.64**	0.32	–0.25
Suicidal ideation	**0.63**	0.15	0.07
Decision making	**0.57**	0.43	–0.16
Work hard	**0.56**	0.47	–0.11
Cry	**0.53**	0.07	0.33
Appetite	0.13	**0.70**	0.04
Tired	0.27	**0.68**	–0.01
Appearance	0.39	**0.58**	–0.03
Interest in sex	0.39	**0.57**	0.17
Lost interest in people	0.46	**0.55**	–0.01
Weight loss	0.06	**0.54**	–0.38
Irritable	–0.09	0.02	**0.82**
Sleep	0.40	0.49	–0.02
Worried about health	0.29	0.49	0.12
% Variance explained	0.41	0.07	0.05

*Bold indicates items that loaded on each of the three factors.

		Moderate / Severe Depressive Symptoms via BDI		
		Yes (BDI ≥19)	**No (BDI <19)**	
Moderate / Severe Depressive Symptoms via CES-D	**Yes (CES-D ≥23)**	57 [1] (71.2) [2] (67.1) [3]	28 [1] (24.8) [2] (32.9) [3]	85 (44.0%)
	No (CES-D <23)	23 [1] (28.8) [2] (21.3) [3]	85 [1] (75.2) [2] (78.7) [3]	108
*Kappa = 0.46		80 (41.5%)	113	193

N,[1] (Column %),[2] (Row %)[3]

FIGURE. Comparison of the BDI and CES-D for detecting moderate/severe depressive symptoms among 193 HCV-infected IDUs.

Depressive symptoms were identified by only the CES-D (and not the BDI) in 28 (14.5%) participants and by only the BDI (but not the CES-D) in 23 (11.9%) participants. The total scores for the CES-D and BDI were significantly correlated ($r = 0.46$, $P < .01$); however, there was only moderate agreement between the two scales ($\kappa = 0.46$).

DISCUSSION

The main purpose of this analysis was to examine the extent of current moderate-to-severe depressive symptoms in a cohort of HCV-infected, HIV-negative young IDUs; this was measured by both the CES-D, which is most often used in research settings, and the BDI, more typically used in clinical settings. In this sample of predominantly male, white, HCV-infected IDUs, there was a high prevalence of depressive symptoms. Although the odds of being depressed were greater for women in this study, a large proportion of men were found to have depression. Given that none of the other sociodemographic or behavioral factors analyzed were associated with depression by these scales, we did not identify any patient characteristics that clinicians could use to indicate whom to evaluate for depression.

Both the CES-D and the BDI identified nearly half of the sample as having moderate/severe depressive symptoms. Using both scales in tandem and considering all those identified by either scale, about three fifths of our sample was found to be moderately to severely depressed. This is consistent with the literature regarding both HCV-seropositive and HCV-negative IDUs,[8–11,13,14,27] and highlights the importance of finding an effective screening tool to be used among HCV-infected IDUs so that their depression can be addressed and ideally treated prior to initiating HCV treatment.

The results of the factor analysis indicated that, although there was a clear somatic component to the BDI, a distinct somatic factor was not present for the CES-D. Higher CES-D scores may therefore be more indicative of depressive, rather than somatic, symptoms. Because the BDI has a distinct somatic component, the potential for inflation of depression scores among a symptomatic sample is high. However, given the low prevalence of HCV-related symptoms in this sample of young IDUs, that potential is somewhat lessened. In addition, because the somatic factor contributed little to the overall variability, it is unlikely that the presence of HCV-related symptoms would lead to misclassification of participants as depressed. Moreover, we found that, in this cohort, those with HCV-related symptoms were no more likely to elicit somatic symptoms of depression via the BDI than were those without HCV-related symptoms. Because the goal of screening for depressive symptoms in this population is to refer such individuals for proper diagnosis and treatment, it appears that using both scales in tandem would be most sensitive as this strategy would identify the greatest number of potential cases of depression.

One major difference between the factor analyses of the two scales was the presence of a distinct irritability factor on the BDI. Although other studies have examined the issue of irritability among HCV-infected patients,[7,33] the literature makes little reference to irritability specific to IDU populations. As the manifestations of depressive symptoms may differ from person to person or even between populations, this further suggests that both the CES-D and BDI used together would be the more sensitive screening method.

Given the lack of a gold standard (i.e., a clinical diagnosis of depression) in a nonclinical setting, it is difficult to recommend one screening tool over the other. Because the goal of the clinician is to refer those who elicit depressive symptoms for

further psychiatric evaluation and potential treatment prior to the start of HCV treatment, using both scales in tandem appears to identify more potential cases than using the BDI or CES-D alone. Given the importance of treating depression prior to commencing HCV treatment, those who have elevated depression scores by either scale should be referred for psychiatric evaluation. Because the current NIH Consensus Statement on the treatment of HCV recommends the identification and treatment of depression prior to the start of HCV treatment, using a more sensitive screening method is preferable to improve HCV treatment success for the greatest number of IDUs and prevent harm and discomfort to patients experiencing symptoms of depression.

These data have some direct clinical relevance. Moderate/severe depression is considered a relative contraindication to interferon alfa administration.[3] Therefore, our data suggested that, in up to half of cases, clinicians using one or both of these instruments to screen HCV-infected young IDUs should focus on treatment of depression rather than HCV infection. Unfortunately, there are few data to indicate which forms of depression treatment (e.g., cognitive–behavioral, medical) work best in HCV-infected IDUs. On the other hand, most data suggested that interferon alfa causes depression by diminishing the net amount of serotonin at the neurosynaptic junction; accordingly, there are data that indicate that use of serotonin uptake inhibitors reduces the incidence of depression related to interferon alfa.[34,35]

It is important to note that these screening tools may not be sensitive or specific for depression related to interferon alfa. Not all instances can be predicted by screening instruments used before treatment (D. Bernstein et al.[36], presented at AASLD 2002), and Schaefer et al.[37] recently showed that persons with underlying psychiatric disease could sustain courses of interferon alfa if depression was also carefully treated. In addition, depression is only a relative contraindication to HCV treatment, which may still be indicated if there is severe liver disease. Therefore, given the morbidity and mortality associated with depression related to interferon alfa and the proven benefits of medical treatment of both conditions, clinicians should use the best available instruments to identify patients most likely to experience interferon-related neuropsychiatric adverse effects so that such patients can be managed accordingly.

This study was limited to young adult, HCV-infected IDUs who were participating in a research study. It is therefore likely that these results may not be generalizable to the greater population of HCV-infected IDUs in the same age group. We did conduct analyses separately for early versus later enrollees; these yielded similar results. Overall, we conclude that these data indicated that screening and treatment for depression must be an integral component of any program to treat HCV infection among young IDUs.

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