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Hepatitis C Treatment Eligibility and Comorbid Medical Illness in Methadone Maintenance (MMT) and Non-MMT Patients: A Case-Control Study

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Abstract

Objective—Comorbid medical illness is common in patients with chronic hepatitis C (HCV) infection and those in methadone treatment (MMT), yet little is known about the impact of medical comorbidity on HCV treatment eligibility in MMT versus non-MMT patients.

Methods—Medical illness and HCV treatment eligibility were compared in a case-control study of MMT and non-MMT patients with untreated chronic HCV matched for age, gender, and race. Comorbid diseases, Cumulative Illness Rating Scale (CIRS) scores, and HCV treatment eligibility rates were compared in 80 MMT patients entering an HCV treatment trial and 80 non-MMT patients entering HCV treatment in an urban gastroenterology clinic.

Results—Comorbid chronic medical conditions were present in 91% of MMT and 85% of non-MMT patients. Patients in both groups had an average of 3 medical conditions; the overall CIRS medical severity level was mild-moderate. Despite similar medical severity in both groups, a significantly higher proportion (77%) of non-MMT patients than MMT patients (56%) were eligible for HCV treatment [$p = .01$]. Specific comorbid medical and psychiatric illness led to ineligibility in only 18% of MMT and 16% of non-MMT patients. However, failure to complete the medical evaluation process was significantly [$p = .001$] more likely to cause ineligibility among MMT patients (19%) than non-MMT patients (0%).

Conclusions—HCV patients -- whether MMT or non-MMT -- had similar levels of comorbid medical diseases of a mild-moderate severity, yet fewer MMT than non-MMT patients were eligible for HCV treatment. The most common reason for HCV treatment ineligibility in MMT patients was failure to complete the required medical evaluation process.

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Keywords

hepatitis C; treatment; methadone; opioid; substance abuse; comorbidity; psychiatry

Introduction

The prevalence of chronic hepatitis C virus (HCV) infection globally is estimated to be approximately 3%; in the United States, 1.8% of the population (approximately 4 million) are estimated to be HCV antibody positive, of whom approximately 3.2 million have chronic hepatitis C infection.¹ HCV is the leading cause of chronic liver disease and can progress to cirrhosis, liver failure, and hepatocellular carcinoma.² Injection drug use accounts for the majority of new HCV infections in industrialized countries such as the United States.^{3,4} Hagan and colleagues conducted a meta-analysis of HCV epidemiological studies in injection drug users (IDUs) that found a high risk of acquiring HCV infection rapidly after initiation of injection practices.⁴ Seroconversion rates consistently increase with the number of years of injection drug use and frequency of injecting.⁴⁻¹⁰

HCV infected persons are more likely to have medical, psychiatric, and substance use disorders than non-infected persons.¹¹ Patients with substance use disorders (SUDs) also have significantly higher medical disease burden than age and gender matched US non-substance users.¹² SUD patients, particularly those who are opioid dependent, have high rates of respiratory, cardiac, gastrointestinal, endocrine, and infectious diseases.¹³⁻¹⁵

MMT patients are often considered poor candidates for HCV treatment due to concerns regarding relapse to substance use leading to reinfection, as well as poor adherence, and high levels of psychosocial stressors and comorbid medical/psychiatric disease.¹⁶⁻²⁰ However, the National Institutes of Health (NIH) 2002 HCV treatment guidelines encourage case by case assessment to determine treatment eligibility and recommend that substance use disorder, in and of itself, should not cause exclusion.²¹ These recommendations leave it up to the clinician to assess the risk-benefit ratio of HCV treatment.

Some studies have shown that patients with substance use histories, including those in MMT, can be successfully treated with pegylated interferon and ribavirin.²²⁻²⁴ However, findings from other studies of patients with high rates of substance use, treated in naturalistic settings as opposed to specialized clinics, have found less encouraging results. For example, 86% of chronic HCV patients in an urban VA setting did not initiate HCV treatment.²⁵ In an urban community sample, 72% were clinically ineligible for HCV treatment, with a third of these having medical or psychiatric contraindications and over a third failing to adhere to evaluation procedures. Thirteen percent were excluded due to current substance use, 11% declined treatment, and only 28% started treatment.²⁶ In a retrospective review of chronic HCV patients in a community sample (Olmsted County, MI), the most frequent reasons for failure to initiate HCV treatment were current use of alcohol or other substances (19%), medical contraindications (16%), depression (14%), and patient refusal (13%).²⁷ Mehta et al. studied HCV-human immunodeficiency virus (HIV) coinfecting patients in an urban HIV clinic who were referred for HCV care and found that of those who kept their first appointment, 32% did not complete their pre-treatment medical evaluation and only 37%

became eligible for HCV care.²⁸ These reports indicate that both medical comorbidity as well as nonadherence to medical evaluation are major causes of non-eligibility in urban community-based samples of patients with chronic HCV infection.

At the time of this report, to our knowledge there were no available reports examining medical illness comorbidity and its relationship to HCV treatment eligibility in MMT versus non-MMT patients with chronic HCV infection. We compared two matched cohorts of patients with untreated chronic HCV infection. The first cohort consisted of 80 opioid-dependent MMT patients in a community-based university-affiliated Central New York MMT program. The MMT patients had entered a National Institute on Drug Abuse (NIDA)-funded research study that offered evaluation for HCV treatment ([ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00148031) Identifier NCT 00148031). The second cohort was a comparison group consisting of 80 non-MMT/non-opioid dependent patients with chronic HCV infection. The non-MMT patients were attending a university-affiliated Central New York urban gastroenterology clinic to be evaluated for HCV treatment. The investigators hypothesized that there would be greater comorbid medical disease severity and a lower rate of HCV treatment eligibility in the MMT group. The aim of this study was to compare opioid dependent/MMT patients to non-opioid-dependent/non-MMT patients using a case-control design to assess differences in chronic comorbid medical disease severity and HCV treatment eligibility. Our goal was to provide insight into factors affecting HCV treatment uptake by opioid dependent patients receiving MMT and to aid in the development of strategies to increase HCV treatment initiation in MMT patients with chronic HCV infection.

Methods

This case-control study compared comorbid medical disease severity and HCV treatment eligibility in 80 MMT and 80 non-MMT patients with untreated chronic HCV infection. Study procedures were approved by the institutional review boards of SUNY Upstate Medical University and Crouse Hospital and all participants provided written informed consent.

Study Sample

All patients – whether in the MMT or non-MMT group -- had attended at least one initial appointment for HCV treatment evaluation.

MMT group—Eligible participants were opioid-dependent patients, between the ages of 18 and 65, enrolled in MMT for a minimum of 90 days and diagnosed with untreated chronic HCV infection via quantitative HCV RNA testing. Eighty MMT patients (the “MMT group”) were selected from a larger cohort of subjects who had enrolled in a parent study -- a NIDA-funded clinical trial offering HCV treatment to MMT patients with chronic HCV infection ([ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT00148031) Identifier NCT 00148031). Patients in the MMT group were evaluated for HCV treatment at an initial medical visit with a nurse practitioner or physician’s assistant trained in HCV disease management. These clinicians were supervised by a hepatologist affiliated with the SUNY Upstate Gastroenterology clinic. The evaluation followed the Association for the Study of Liver Diseases (AASLD) guidelines²⁹ for determining HCV treatment eligibility. Subjects were evaluated for HCV treatment during

the time period of July 2003 through May 2006. Participants from the parent study cohort were excluded from this analysis if they did not attend the initial HCV medical appointment. MMT patients could enter the study regardless of active drug or alcohol use or comorbid medical or psychiatric illness if they expressed willingness to consider HCV treatment and had Medicaid or other medical insurance. Patients were excluded if already receiving HCV treatment, pregnant, planning pregnancy, or unwilling to use contraception. After determination of HCV viral load and genotype, the MMT participants were randomly assigned through the parent study to receive their subsequent HCV medical care either at the MMT clinic or the SUNY Upstate GI clinic. All MMT participants attended an initial visit to begin the process of medical evaluation for eligibility for HCV treatment.

Non- MMT group—The non-MMT comparison cohort (the “non-MMT” group) consisted of 80 HCV infected patients from the SUNY Upstate Medical University Gastroenterology (GI) clinic. They were selected from a database of over 2000 medical records assembled from the University Hospital Patient Care Database in Syracuse, New York. These 80 non-MMT patients -- chosen as age, gender, and racial matches to the MMT cohort -- were diagnosed with chronic HCV (as coded by the International Classification of Diseases, 10th revision [ICD-10]) and evaluated for treatment during the same time period as the MMT group of July 2003 through November 2006. All participants in this cohort were referred to the GI clinic specifically for the evaluation of chronic HCV disease by a primary care provider (PCP). As determined by chart review, no subjects in this cohort were currently enrolled in methadone maintenance treatment nor diagnosed with opioid dependence or abuse. The non-MMT participants had to have attended an initial medical visit to begin HCV treatment evaluation according to AASLD guidelines at the SUNY Upstate GI Clinic.

The MMT and non-MMT cohorts were matched on three criteria in the following order: age, race, and gender because these demographic characteristics are known to be associated with differences in the course of chronic HCV infection.^{21,29} Age at the time of infection is inversely associated with HCV disease progression.^{29–31} and older age is associated with more severe liver fibrosis progression.³² Age was structured into four categories: 18 to 29, 30 to 39, 40 to 49, and 50 to 65 years. Male gender is associated with more rapid fibrosis progression in HCV infection.^{21, 29–31} Gender was designated as male or female. Attainment of sustained virological response (SVR) is significantly lower in African Americans with genotype 1 receiving standard HCV treatment.^{33–36} Race was designated as African American or not African American.

Procedures

Demographic, medical insurance, and primary care provider information was obtained for all subjects. Baseline HCV laboratory assessments included HCV genotype, quantitative HCV RNA level, HIV antibody, alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma glutamyl transferase (GGT), and liver biopsy results (if conducted). Baseline medications and comorbid medical diagnoses were documented at the initial HCV medical evaluation.

Hepatitis C treatment eligibility status was categorized as “eligible”, “not eligible”, “pending” (if at the time of review the medical evaluation for eligibility was incomplete and more than six months had elapsed since the last scheduled appointment) or “unknown/unclear” (if at the time of review inadequate information was available regarding the outcome of the evaluation; for example, if a MMT patient was terminated from the MMT clinic prior to completion of the evaluation). If a subject was determined to be ineligible for HCV treatment, the reason for ineligibility was documented.

Cumulative Illness Rating Scale (CIRS)

Comorbid disease severity was rated using a modified Cumulative Illness Rating Scale (CIRS). The CIRS was originally developed by Linn et al. and assesses medical problems for 13 organ systems, rating severity on the following scale: 0 (no impairment), 1 (current mild problem/past significant problem), 2 (moderate disability/requires “first line” therapy), 3 (severe significant disability/uncontrollable chronic problem) to 4 (extremely severe impairment/immediate treatment required).³⁷ The CIRS – Geriatric (G)³⁸ is a modification of the original CIRS designed to rate chronic illness burden in the geropsychiatric population from chart reviews and/or face to face patient interviews. Five different scores can be obtained: the total number of organ-specific categories endorsed, the total score, the severity index (the ratio of the total score divided by number of endorsed organ-specific categories), and number of categories endorsed with a 3 or a 4 rating. The CIRS (G) has been shown to be a valid and reliable measure of medical disease severity in medically and psychiatrically impaired elderly patients.^{38–40}

There are few available instruments designed specifically to measure medical illness burden in patients with substance use disorders. The CIRS (SA)⁴¹ was developed for this purpose by modifying the CIRS (G) to include diseases commonly associated with substance abuse, such as HIV infection and hepatitis B and C, and removing the psychiatric category in order to focus specifically on nonpsychiatric disease severity.

In order to capture comorbid chronic disease states seen in both the general medical patient population and in substance users, we modified the CIRS. The modified CIRS (CIRS-M) adapted measures from both the CIRS (G) and the CIRS (SA) by keeping all organ-specific categories from the CIRS (G), except for psychiatric disorders, and by adding the HIV category from the CIRS (SA). Because our goal was to evaluate the effects of chronic medical illness, no acute illnesses were included. Past surgical procedures were not included because they were inconsistently noted in the medical records reviewed. Laboratory tests other than liver function tests were not uniformly available in the medical records. Smoking status was inconsistently documented; therefore, it was not used when calculating respiratory scores. Only major impairments in vision, such as blindness or glaucoma were used to determine ophthalmic scores. BMI scores were not available for inclusion in the endocrine category.

Statistical Methods

Two-tailed Fisher's exact test of proportions were used to compare dichotomous outcomes of MMT vs. non-MMT subjects. Bonferroni alpha-corrections were used to correct for multiple comparisons based on genotype sub-cohorts.

Results

Demographic, Medical, and Comorbid Disease Characteristics

Patient characteristics are summarized in Table 1. The mean age for both groups was approximately 44 years and both groups were 61% male and 80% Caucasian. The MMT group had a significantly higher ($p = .05$) percentage of Medicaid patients (70%) than the non-MMT group (51%). A significantly higher percentage ($p = .01$) of non-MMT patients had a primary care provider. All MMT participants had a current diagnosis of opioid dependence, on agonist therapy, as compared to none in the non-MMT group. All MMT participants had lifetime diagnoses of one or more substance use disorders, as compared to 64 (80%) of the non-MMT participants. A significantly higher proportion of MMT patients, 88%, reported a lifetime history of injection drug use as compared to 51% in the non-MMT group ($p = 0.001$).

All participants had chronic HCV infection as determined by HCV RNA Quantitative PCR testing. Most patients in both groups had HCV genotype 1 HCV (MMT 81%, non-MMT 77%). Viral load levels were >2 million IU/ml in 38% of MMT and 45% of non-MMT patients and the median viral loads were similar in both groups; 1.2 – 1.3 million IU/ml. The median Knodell [Goodman, 2007] grade and stage of liver disease was 2 in both groups. Over 50% of participants from both groups had ALT, AST, and GGT levels above the upper limit of normal. A significantly higher proportion of non-MMT patients had ALT levels above the upper limit of the normal range ($p = .01$). There was a trend toward higher AST levels in the non-MMT group ($p = .06$). Five percent of the MMT group and 3% of the non-MMT group was co-infected with HIV.

Similar proportions in the MMT group (91%) and the non-MMT group (85%) had one or more comorbid chronic medical disorders in addition to HCV infection, with an average of 3 comorbid conditions per patient in each group. The most common organ-specific categories affected were gastrointestinal (MMT: 17%. non-MMT: 26%), cardiovascular (MMT: 19%, non-MMT: 14%), musculoskeletal (MMT: 16%. non-MMT: 16%), and endocrine/metabolic (MMT: 16%. non-MMT: 8%). None of these categories occurred at significantly different rates between the two groups, however, there was a trend ($p = .08$) toward higher prevalence of endocrine/metabolic disease in the MMT group. As noted in Table 2, the most common medical diagnoses were hypertension (MMT: 25%. non-MMT: 23%), gastroesophageal reflux disease (GERD) (MMT: 20%. non-MMT: 16%), osteoarthritis (MMT: 20%. non-MMT: 18%), and asthma (MMT: 14%. non-MMT: 19%). There were no significant differences between the two groups in rates of any comorbid disease. There was a higher rate of comorbid obesity in the MMT group with a trend toward statistical significance ($p = .08$).

CIRS Results

The average number of organ-specific categories affected in both groups was 2 ($\pm$ 1.6). Average total score was 4.7 for the MMT group and 4.4 for the non-MMT group. The mean severity index score for both groups was 1.6, indicating mild-moderate severity. There were no significant differences between the two groups in number of organ-specific categories, total score, or severity indices. There was no significant difference between the two groups in the number of affected organ categories that had a high comorbid disease severity level of 3 or 4. Roughly one third of both MMT and non-MMT patients had at least one organ category with severity level 3 or 4.

HCV Treatment Eligibility Results

We compared eligibility for HCV treatment between the MMT and matched non-MMT cohorts. Hepatitis C treatment eligibility was defined as medical clearance by the HCV treatment provider following completion of an assessment consisting of medical history, physical examination, and baseline laboratory tests, intended to detect medical or psychiatric contraindications to treatment as defined by the American Association for the Study of Liver Diseases (AASLD) guidelines.²⁹ Both groups were evaluated for HCV eligibility by the same team of hepatology clinicians in an effort to maintain uniformity in clinician perspective of eligibility criteria. HCV treatment eligibility was classified as eligible, ineligible, pending clearance, or unknown/uncertain. Patients were determined to be ineligible for HCV treatment if they were found to have a specific medical/psychiatric contraindication as delineated by the AASLD guidelines²⁹ and the evaluating hepatologist. Patients were also considered ineligible if they did not complete the required medical evaluation within 6 months following the last scheduled medical appointment. Because study limitations necessitated a finite time frame for assessments to be completed, six months was chosen as a reasonable time period for a patient to complete the HCV medical evaluation process. The “pending clearance” category was applied if, at the time of this chart review, the evaluation was incomplete but less than 6 months had elapsed since the last medical visit, leaving open the possibility of successful completion. The clearance status was considered “unknown or unclear” if there was inadequate information in the chart to provide clear indication from the medical provider as to whether or not HCV treatment was to be offered.

Table 3 summarizes the HCV treatment eligibility status of the MMT and non-MMT cohorts. Of the 80 MMT patients, 45 (56%) were eligible for HCV treatment and thirty-five (44%) were deemed ineligible. A statistically significantly ($p = 0.01$) greater proportion of MMT patients were found to be ineligible for HCV treatment for any reason than the non-MMT patient cohort. Twenty-nine (36%) were found to have a contraindication for HCV treatment due to a medical disorder, psychiatric disorder, substance use disorder, or failed to complete the evaluation process to determine eligibility. The eligibility status was unknown for six (8%) patients at the time of the analysis (the unknown status for five patients was due to discharge from the MMT clinic prior to completion of the medical evaluation). Of the 29 ineligible MMT patients, 14 (18% of the MMT cohort) had a defined contraindication to HCV treatment, of whom 10 had medical and 4 had psychiatric contraindications. None had substance use disorder contraindications. The majority of ineligible MMT patients (15, or

19% of the MMT cohort) were ineligible because they had failed to complete the necessary medical evaluation for clearance.

A significantly greater proportion ($p = 0.01$) of the non-MMT group (62 participants or 77%) were eligible for HCV treatment compared to the MMT group (45 participants or 56%). A defined contraindication was present in 11 (14%) in the non-MMT group, of whom 4 had a medical contraindication, 2 had a psychiatric contraindication, and 5 had a substance use contraindication. Four (5%) patients were pending clearance at the time of chart review and clearance status of 3 (4%) was unknown/unclear. Of note, ineligibility due to failure to complete the medical evaluation process was significantly greater (19% vs. 0%, $p = .01$) in the MMT cohort than non-MMT cohort.

The prevalence of specific medical and psychiatric contraindications was not statistically significantly different between the two groups. The most common single clinical contraindication for the MMT group was unstable Diabetes Mellitus Type II (4 patients) and decompensated liver disease (2 patients). The most common clinical contraindication in the non-MMT group was active substance use (4 patients with current alcohol use and 1 with current opioid use). Four patients in the MMT group had psychiatric contraindications, including two patients with unstable major depressive disorder, one unstable bipolar disorder, and one unstable psychotic disorder; as compared to 2 patients in the non-MMT group with unstable depression.

Discussion

Comparison of medical comorbidity between these matched cohorts revealed more similarities than differences. Both groups had a high percentage of comorbid medical disease (MMT: 91%, non-MMT: 85%) with similar numbers of medical conditions per patient (mean = 3). CIRS (M) severity index results also showed similar comorbid chronic illness burden [MMT group $1.6 (\pm 0.83)$, non-MMT group $1.6 (\pm 0.86)$]. Although comorbid conditions were common, the overall medical severity levels based on CIRS (M) scores were in the mild-moderate range in both groups. Moreover, there were no significant differences in the prevalence of specific diseases between the two cohorts, although there was a statistical trend toward a higher rate of obesity in the MMT group and a statistical trend toward a greater number of MMT patients with endocrine/metabolic disease. There was a higher incidence of unstable diabetes mellitus in the MMT group causing ineligibility for HCV treatment as compared to the non-MMT group.

Despite the overall similarity of the MMT and non-MMT samples in medical severity, of the rate of HCV treatment eligibility between these matched cohorts differed significantly. Only small and similar proportions of patients in either group were judged ineligible due to specific medical, psychiatric, or substance use contraindications. However, there was a significantly lower rate of HCV treatment eligibility in the MMT cohort -- primarily due to the lower rate of completion of the required medical evaluation process. This finding was particularly striking in light of the fact that, unlike the non-MMT group, the patients in the MMT cohort were all participants in a research study that provided attention and monitoring devoted to the completion of the evaluation process. Parenthetically, an interesting finding

was that 5% of the non-MMT patients were ineligible due to a substance use contraindication as compared to none in the MMT group, which reflects that GI Clinic providers may have applied a lower threshold for judging patients ineligible due to substance use than that used by providers in the research-based MMT clinic.

Strengths and Limitations

To our knowledge, this is the first report comparing medical comorbidity and HCV treatment eligibility between MMT and non-MMT chronic HCV populations matched for age, gender and race. Strengths of this study include its case-control design with a matched cohort of MMT and non-MMT chronic HCV patients evaluated for HCV treatment during the same time frame with attendance at an initial medical visit as the point of entry to HCV medical assessment for both groups. This study offers a unique examination of medical comorbidity and HCV treatment eligibility in HCV infected opioid-dependent MMT patients as compared to HCV infected patients who are not opioid dependent in MMT.

The study may have limited generalizability for a number of reasons. The non-MMT patient data was obtained from retrospective chart review which has the potential for interpretation bias. Data were obtained from one urban gastroenterology clinic and one MMT clinic, both located in Central New York. Only those participants from the larger MMT cohort who attended their initial medical visit were selected for comparison to the non-MMT group. Therefore, we can provide a comparison of comorbid disease and treatment eligibility only in those chronic HCV patients who at least began the process of medical evaluation for HCV treatment. A further limitation that may lead to selection bias is that the two groups came to the medical evaluation process via different routes: patients in the non-MMT group were all referred by primary care providers and the MMT participants were all invited to enroll in the parent study. Because of this, the non-MMT patients who came for their first medical visit may have had higher levels of motivation than the MMT patients who received research-related attention and support in coming to their first visit.

The MMT population was obtained from a larger parent study -- a prospective randomized trial of co-located HCV treatment at a MMT clinic or a standard urban GI clinic. Due to the realities inherent in a time-limited research study, a six-month time limit was allowed for engagement in the medical evaluation process. This constraint may have limited eligibility for those patients who may have chosen to seek evaluation at a later time. Because of the design requirements of the parent study, the medical evaluation process for patients in the MMT group was conducted at either the MMT clinic or the GI clinic, based on random assignment. Therefore, half of the MMT group had relatively easy access to the medical evaluation visits on-site at the MMT clinic. This should have reduced barriers to completion of the HCV treatment evaluation process, yet, overall, the MMT group completed the process at a significantly lower rate than the non-MMT group.

MMT patients' failure to complete the HCV medical evaluation process may also be a reflection of the vulnerability of MMT patients to discharge from the MMT clinic and the associated loss of their access to HCV care when it had been provided on-site through the MMT. Failure to complete the difficult evaluation process may also be influenced by possible differences between MMT and non-MMT patients in the degree of motivation and

commitment to HCV treatment, by cognitive functioning, or by other variables. The difficulties faced by patients with substance use disorders in adhering to medical treatment has been amply noted in studies of other chronic infectious diseases such as HIV and tuberculosis.^{42–48}

Conclusions

The majority of chronic HCV patients in our sample had chronic comorbid medical diseases of a mild to moderate degree of severity, regardless of MMT or non-MMT status. While the presence of comorbid medical illness in patients with chronic HCV has been found to be an important predictor of low health related quality of life scores,^{49–50} it appeared to be a relatively minor factor in determining HCV treatment eligibility in our sample. Moreover, there appears to be little difference in HCV treatment eligibility between MMT and non-MMT patients based on medical or other defined contraindications.

In this cohort, significantly fewer MMT patients with chronic HCV disease became eligible for HCV treatment as compared to a matched cohort of non-MMT patients. The most common reason for ineligibility in the MMT group was failure to follow through with the necessary medical evaluation process. This finding is in agreement with study samples with substantial rates of substance use, including urban, VA, and community-based studies,^{25–27} all of which noted problems with patient completion of the medical evaluation process for HCV treatment. Failure to complete the medical evaluation process by MMT patients may be due to a number of factors associated with substance use disorders, including problems with motivation, cognitive impairment, and psychosocial stressors that may serve as distractions that compete with the process of fully engaging in medical care.

In keeping with the investigators' hypothesis, HCV treatment eligibility was lower in MMT patients, but not because of excess medical comorbidity, as we had predicted. Poor adherence to the medical evaluation process necessary for HCV treatment eligibility was a significant barrier to HCV care in MMT patients in contrast to non-MMT patients with chronic HCV infection. Further research is needed to better understand factors leading to lower rates of completion of HCV treatment evaluation in MMT patients. Such research could lead to more effective interventions to increase the likelihood of HCV treatment eligibility and could ultimately lead to higher rates of HCV treatment for patients in MMT.

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Table 1

Demographic Characteristics, HCV Medical Characteristics, and Comorbid Disease Status of MMT and non-MMT Patients with Chronic HCV Infection

	MMT Group (N=80)	Non-MMT group (N=80)
Age (mean yrs $\pm$ SD)	43 ($\pm$ 10)	44 ($\pm$ 10)
Male	61%	61%
Race		
Caucasian	80%	80%
African-American	14%	14%
Native American or Hawaiian/Pacific Islander	3%	6%
Mixed	3%	0%
Ethnicity		
Hispanic	21%	16%
Medicaid*	70%	51%
Current PCP**	80%	94%
Reported Lifetime IV Drug Use***	88%	51%
Genotype 1	81%	77% (55/71 [†])
Viral Load > 2 million IU/ml	38%	45% (32/71 [†])
Viral Load - median (IU/ml)	1.2 million	1.3 million
Liver Biopsy – median grade (Knodell)	2 (n = 17)	2 (n = 45)
Liver Biopsy – median stage (Knodell)	2 (n = 17)	2 (n = 47)
Serum ALT - IU/ml (n, % > ULN ^o)**	40/79 [†] (51%)	54/76 [†] (71%)
Serum AST - IU/ml (n, % > ULN ^o)	46/79 [†] (58%)	56/76 [†] (74%)
Serum GGT - IU/ml (n, % > ULN ^o)	44/74 [†] (59%)	23/38 [†] (61%)
Co-infection with HIV	4/80 (5%)	2/80 (3%)
Any comorbid chronic medical diagnosis	73/80 (91%)	68/80 (85%)
Number of comorbid medical diagnoses (mean)	3	3
Lifetime diagnosis of one or more SUDs	80/80 (100%)	64/80 (80%)

* p = 0.05

** p = 0.01

*** p = 0.001

PCP = Primary Care Provider

^o Upper limit of normal

[†] Some patients in each group did not have available data for this variable, leading to an N < 80

ALT = alanine aminotransferase

SUDs = substance use disorders

AST = aspartate aminotransferase

HIV = Human Immunodeficiency Syndrome

Table 2

Frequency of Specific Comorbid Medical Diseases

Medical Disease	MMT Group (N=80)	Non-MMT Group (N=80)	Significance
Hypertension	20 (25%)	18 (23%)	NS
GERD	16 (20%)	13 (16%)	NS
Osteoarthritis	16 (20%)	14 (18%)	NS
Asthma	11 (14%)	15 (19%)	NS
Cirrhosis	11 (14%)	13 (16%)	NS
Pain, Chronic Low Back	11 (14%)	9 (11%)	NS
Diabetes Type II	11 (14%)	7 (9%)	NS
Obesity [†]	10 (13%)	3 (4%)	p= 0.08
Hyperlipidemia	9 (11%)	4 (5%)	NS
COPD	5 (6%)	9 (11%)	NS
None	7 (9%)	12 (15%)	NS

[†] = trend toward statistical significance

COPD = Chronic Obstructive Pulmonary Disease

Table 3

HCV Medical Clearance Status (N = 80 MMT, N = 80 non-MMT)

HCV Medical Clearance Status	No. (%) MMT Patients	No. (%) non-MMT Patients	Significance
Total Eligible for HCV treatment *	45 (56%)	62 (77%)	p 0.01
Total Ineligible for any reason *	35 (44%)	18 (23%)	p 0.01
Medical Contraindication	10 (13%)	4 (5%)	NS
Psychiatric Contraindication	4 (5%)	2 (3%)	NS
Substance Use Contraindication	0 (0%)	5 (6%)	NS
Failed to Complete Evaluation *	15 (19%)	0 (0%)	p 0.001
Eligibility Unknown/Unclear	6 (8%)	3 (3.8%)	NS
Pending Further Evaluation	0 (0%)	4 (5%)	NS

*
p 0.01