Outcomes and Barriers Associated with Telehealth-Based Hepatitis C Treatment During Early Phases of the COVID-19 Pandemic

Phillip Huang Chen, MD; Justin Truong, PharmD; Jenna Kawamoto, PharmD; Debika Bhattacharya, MD, MSc; Arpan Patel, MD, PhD

Introduction: The COVID-19 pandemic has presented challenges for hepatitis C virus (HCV) treatment given the need for thorough evaluation by specialists, treatment coordination, follow-up visits, laboratory monitoring, and potential health behavior impacts on patients. The objective of this study was to evaluate HCV treatment during the beginning of the COVID-19 pandemic, when care was conducted virtually, by examining patient demographics associated with treatment initiation and discontinuation rates.

Methods: This retrospective study included 73 patients with quantifiable HCV RNA evaluated by gastroenterologists and infectious disease clinicians and referred to an HCV clinical pharmacy team for treatment coordination from March 1, 2020, to September 30, 2020. Data collection included baseline demographics, clinical characteristics, and treatment characteristics. Patients were followed until June 15, 2021.

Results: Forty-three patients (59%) initiated HCV treatment while 30 patients (41%) did not. Patient demographics were not associated with HCV treatment initiation rates except for presence of alcohol use disorder within the past 6 months ($P = .003$). Of the 43 patients that initiated HCV treatment, 9 patients (21%) discontinued their treatment. Twenty-two of 25 patients (88%) with laboratory analysis achieved sustained virologic response. There were no demographic or geographic disparities between patients that initiated HCV treatment and those that did not during the study period.

Conclusions: Results of this study suggest that active alcohol use disorder diagnosis may be associated with HCV treatment noninitiation. This study emphasizes the need for further research to define the standards of care in assessing active alcohol use disorder during HCV treatment evaluation.
We retrospectively reviewed electronic health records of veterans referred to start treatment March 1, 2020, through September 30, 2020. The endpoint of the reviewed records was set because during this specific time frame, VAGLAHS used an exclusively telehealth-based model for HCV evaluation and treatment. Patients were followed until June 15, 2021. Due to evolving COVID-19 restrictions at the time, and despite requests received, treatment initiations by the pharmacy team were suspended in March 2020 but HCV treatments resumed in May. Data collected included baseline demographics (age, sex, race, ethnicity, housing status, distance to VAGLAHS), comorbidities (cirrhosis, hepatitis B virus coinfection, HIV coinfection), psychiatric conditions (mood or psychotic disorder, alcohol use disorder [AUD], opioid use disorder), and treatment characteristics (HCV genotype, HCV treatment regimen, baseline viral load). Distance from the patient's home to VAGLAHS was calculated using CDXZipStream software. Comorbidities and psychiatric conditions were identified by the presence of the appropriate diagnosis via International Statistical Classification of Diseases and Related Health Problems, Tenth Revision codes in the health record and confirmed by review of clinician notes. Active AUD was defined as: (1) the presence of AUD diagnosis code; (2) AUD Identification Test-Consumption (AUDIT-C) score of high or severe risk based on established cutoffs; and (3) active alcohol use noted in the electronic health record. All patients had an AUDIT-C score completed within 1 year of initiating treatment. Opioid use disorder was defined by the presence of diagnostic codes for opioid dependence or opioid abuse.

The reasons for treatment noninitiation and discontinuation were each captured. We calculated descriptive statistics to analyze the frequency distributions of all variables. Independent t tests were used to analyze continuous data and Pearson χ² test was used to analyze categorical data. Statistical significance was set as P < .05.

RESULTS
From March 1, 2020, through September 30, 2020, 73 veterans were referred to the HCV clinical pharmacist for treatment (Figure).

<table>
<thead>
<tr>
<th>TABLE 1 Baseline and Clinical Characteristics (N = 73)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>≥ 65 y</td>
</tr>
<tr>
<td>&lt; 65 y</td>
</tr>
<tr>
<td>Sex</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Race</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Black or African American</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
</tr>
<tr>
<td>Declined to answer</td>
</tr>
<tr>
<td>Housing status</td>
</tr>
<tr>
<td>Stable</td>
</tr>
<tr>
<td>Unhoused</td>
</tr>
<tr>
<td>Inpatient</td>
</tr>
<tr>
<td>Patient travel distance</td>
</tr>
<tr>
<td>&lt; 25 miles</td>
</tr>
<tr>
<td>≥ 25 miles</td>
</tr>
<tr>
<td>HIV coinfection</td>
</tr>
<tr>
<td>Mental health disorder</td>
</tr>
<tr>
<td>Cirrhosis</td>
</tr>
<tr>
<td>Not decompensated</td>
</tr>
<tr>
<td>Decompensated</td>
</tr>
<tr>
<td>Hepatocellular carcinoma</td>
</tr>
<tr>
<td>Opioid use disorder</td>
</tr>
<tr>
<td>Alcohol use disordera</td>
</tr>
<tr>
<td>Treatment naïve</td>
</tr>
<tr>
<td>Hepatitis C virus genotype</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

*Defined by presence of diagnosis, Alcohol Use Disorder Identification Test-Consumption score of high or severe, and active alcohol use.

Forty-three veterans (59%) initiated HCV treatment and 34 (79%) completed the full treatment course (Table 1). Twenty-five patients (65%) had their sustained virologic response at 12 weeks (SVR12) testing and 22 patients achieved SVR12 (88%; 30% of total sample). One patient did not achieve SVR, and 2 patients died (variceal hemorrhage and progression of cerebral amyloidosis/function decline) before the completion of laboratory testing. From March 2020 to May 2020, HCV treatments requests were paused as new COVID-19 policies were being introduced; 33 patients were referred during this time and 21 initiated treatment.
Veterans that did not start HCV treatment had a significantly higher rate of active AUD when compared with those that initiated treatment: 30% vs 9% (P = .02). Of the patients who started and discontinued treatment, none had active AUD. Other baseline demographics, clinical characteristics, and treatment characteristics were similar between the groups. No patient demographic characteristics were significantly associated with HCV treatment discontinuation. We did not observe any major health disparities in initiation or discontinuation by sex, race, ethnicity, or geography. Eleven patients (37%) could not be contacted, which was the most common reason veterans did not initiate treatment (Table 2). Of the 9 patients that did not complete SVR12, 5 patients could not be contacted for follow-up, which was the most common reason veterans discontinued treatment.

DISCUSSION
This study highlights the experience of treating patients with HCV with an exclusively telehealth model in the months following implementation of stay-at-home orders from March 19, 2020, to September 30, 2020, during the COVID-19 pandemic at VAGLAHS. We were able to successfully complete treatment for 34 veterans (47%) and achieved SVR rates of 88%. We found that AUD was associated with unsuccessful treatment initiation. There were no statistically significant patient characteristic
findings for treatment discontinuation in our study (Table 3). Unhealthy alcohol use and AUD are highly prevalent among veterans with HCV and prior to the pandemic, studies have demonstrated AUD as a barrier to HCV treatment.7

Since worse hepatic outcomes have been observed in veterans with HCV and AUD and increased harmful patterns of drinking occurred during the pandemic, a renewed interest in treating AUD in these veterans during the era of telehealth is critical.8 While we were unable to ascertain whether alcohol misuse in our cohort increased during the pandemic or whether changes in drinking patterns affected HCV treatment outcomes before and after the pandemic, such an association should reinforce the need for clinicians to expeditiously link patients to substance use care. It should also stimulate further considerations of addressing social determinants of health not captured in this study.

During the pandemic, veterans with post-traumatic stress disorder, a history of serving in combat roles, and experiencing related financial stressors had higher risk of AUD.9,10 For veterans with AUD who initiated HCV treatment, none discontinued their therapy, aligning with other studies showed that patients with AUD were able to achieve high rates of SVR and emphasizing that veterans should be treated irrespective of an AUD diagnosis.11 However, more innovative engagement initiatives for veterans with AUD should be explored as we continue to adapt more telehealth-based care for HCV direct-acting antiviral treatments. A more in-depth understanding of how alcohol use relates to treatment noninitiation is warranted, as this may stem from behavioral patterns that could not be captured in the present study.

The inability to reach veterans by telephone was a major reason for noninitiation and discontinuation of treatment. While the expansion of telehealth services has been noted across the VHA, there is still room for improving methods of engaging veterans in health care postpandemic.12 Prior studies in veteran populations that were successful in increasing uptake of HCV treatment have employed telehealth strategies that further emphasizes its integral role in HCV elimination.13 Although our study did not show mental health comorbidities and housing status as statistically significant, it is important to note that 20% of patients referred for HCV treatment had an incomplete evaluation which can lead to potentially unobserved indicators not captured by our study such as quality of linkage to care. It is imperative to stress the best practices for HCV initiation by integrating a multidisciplinary team to address patients’ psychosocial comorbidities.14 Finally, we did not observe any major disparities in treating veterans with HCV during the pandemic. This observation is reassuring and consistent with other VHA data given the heightened recognition of health disparities seen in health care sectors across the country, especially evident during the COVID-19 pandemic and the current era of increased adaptation of telehealth.

Limitations

Limitations to this study include its retrospective nature, small sample size, and short study time frame as a proportion of veterans have yet to complete HCV treatment which can potentially explain how larger studies were able to find other statistically significant results. However, the findings from this study underscore the importance of addressing AUD in veterans with HCV, especially during the era of telehealth.

### TABLE 2 Treatment Noninitiation (n = 30)

<table>
<thead>
<tr>
<th>Reason</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to contact</td>
<td>11 (37)</td>
</tr>
<tr>
<td>Patient declined</td>
<td>2 (7)</td>
</tr>
<tr>
<td>Patient moved</td>
<td>3 (10)</td>
</tr>
<tr>
<td>Comorbidities</td>
<td>7 (23)</td>
</tr>
<tr>
<td>Workup incomplete</td>
<td>6 (20)</td>
</tr>
<tr>
<td>Did not initiate contact yet</td>
<td>1 (3)</td>
</tr>
</tbody>
</table>

### TABLE 3 Study Participant Alcohol Use Risk Level

<table>
<thead>
<tr>
<th>Risk</th>
<th>Patients, No.</th>
<th>Diagnosis</th>
<th>Active drinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>39</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>High</td>
<td>10</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Severe</td>
<td>21</td>
<td>16</td>
<td>9</td>
</tr>
</tbody>
</table>

*aLow risk (male, ≥ 3 drinks; female, ≥ 2 drinks); moderate risk (male, 4-5 drinks; female, 3-5 drinks); high risk (6-7 drinks); severe (8-12 drinks).*
significant patient-related factors impacting treatment initiation compared to ours. Given the lack of universal standardized diagnostic criterion of AUD, this can limit how our study can be compared to others in similar populations. Additionally, this study was conducted at a single facility with a predominantly older male veteran population, which may not be generalizable to other populations.

**CONCLUSIONS**

Treating HCV during the COVID-19 pandemic with telehealth and mail-out medications was feasible and led to high SVR rates, but unhealthy alcohol use and an inability to contact veterans were predominant barriers to success. Future quality improvement efforts should focus on addressing these barriers and exploring the relationship between alcohol use and HCV treatment initiation.

**Author contributions**

*Main manuscript writer:* Phillip Chen. *Patient data collection:* Justin Truong. All other authors read, provided feedback, and approved the final manuscript.

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**Author disclosures**

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**Disclaimer**

The opinions expressed herein are those of the authors and do not necessarily reflect those of **Federal Practitioner**, Frontline Medical Communications Inc., the US Government, or any of its agencies.

**Ethics and consent**

The Veterans Affairs Greater Los Angeles Healthcare System institutional review board determined that this study was exempt. The datasets generated and/or analyzed during the current study are not publicly available but may be available from the corresponding author on reasonable request.

**References**