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Treatment of Hepatitis C Infection in an Internal Medicine Residency Continuity Clinic: Resident Perspectives and Patient Outcomes[☆]

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Abstract

Introduction: Studies have demonstrated that primary care clinicians can achieve the same excellent outcomes in treatment of hepatitis C (HCV) infection as specialist physicians but there is a dearth of literature on experiences and outcomes of treatment of HCV infection in residency clinics. We sought to describe the perspectives of internal medicine resident physicians in one community-based residency program toward treating HCV infection before and after launching treatment of HCV infection within the residency clinic. Further, this study examined outcomes of patients treated by the resident physicians.

Methods: Treatment of HCV infection was initiated in 2019. Residents were invited to complete a baseline survey. Residents who treated at least one patient with HCV infection were invited to complete a subsequent survey. Comparative analysis was performed using Fisher's Exact test. Sustained virologic response at least 12 weeks (SVR-12) after completion of treatment in patients initiated on therapy in the residency clinic was assessed.

Results: Residents (n = 12) who treated patients for HCV infection reported significantly greater knowledge in evaluating and treating patients with HCV infection and preparedness to provide this care after residency than residents (n = 34) who completed the baseline survey (p < 0.001). Twenty-six patients were initiated on direct-acting antiviral (DAA) therapy. All 21 patients who were tested achieved SVR-12.

Conclusions: Training resident physicians to evaluate and treat HCV infection can improve outcomes for underserved patients in residency clinics while preparing a pool of physicians to provide this care after residency.

Keywords: Hepatitis C infection, Residency education, Continuity clinic

1. Introduction

Chronic infection with hepatitis C virus (HCV) is a leading cause of cirrhosis, hepatocellular carcinoma, and the need for liver transplant in the United States and around the world.

Direct-acting antiviral (DAA) medications are highly effective, well tolerated, and have simplified treatment of HCV over the past decade. Treatment of hepatitis C prior to the direct-acting antiviral (DAA) era was almost exclusively the domain of gastroenterologists and infectious disease specialists due to the toxicity and challenges of treating with

interferon. However, in the DAA era studies have shown that the treatment of uncomplicated HCV infection by nonspecialist clinicians is as effective as treatment by specialist clinicians (as measured by sustained virologic response [SVR]).¹ Task shifting from specialist to generalist care is needed to expand capacity to treat the estimated 2.4 million Americans living with HCV infection.^{2–4}

Training internal medicine resident physicians to treat patients with HCV infection has potential benefits for the education of trainees and for the outcomes of the patients they serve but experiences in training resident physicians in this area has been understudied.⁵

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At our institution, we sought to provide training and experience for interested residents who then provided this care to the largely underserved patient population in their residency clinic. We hypothesized that internal medicine resident physicians who participated in the training and care of patients with HCV infection would report significantly greater knowledge and confidence in the care of patients with HCV infection than those who did not participate. We also hypothesized that patient outcomes would be similar to those of other published reports in disadvantaged populations (86% achieved SVR in the ASCEND trial).¹

2. Methods

Medical residents at the institution of the corresponding author complete the outpatient component of their training at a hospital-based clinic. Approximately 85% of the clinic population is insured through state or federally funded programs, including emergency Medicaid coverage, 12% have no coverage, and 3% are covered by other payers.

Patients in this clinic with untreated HCV infection were identified through a report from the electronic health record as well as direct referral from clinicians in the practice and from hospitalists and residents working in the affiliated hospital. Residents who were interested in serving as the primary provider of HCV care were asked to complete prescribed self-directed learning which included journal articles from a shared repository and/or two web-based training modules.^{6,7} Treatment of patients with HCV infection in the clinic was launched in November 2019 with two general internal medicine faculty serving as preceptors. The preceptors also pursued self-directed learning in order to prepare to precept. A gastroenterologist was available for consultation via phone or electronic health record for questions that arose. A clinical pharmacist assisted with

obtaining prior authorizations and medication counseling. Evaluation and management decisions made were based on American Association for the Study of Liver Diseases/Infectious Diseases Society of America (AASLD/IDSA) guidelines.⁸

All internal medicine residents were invited to complete an anonymous online survey developed by the authors that (using a 5-point Likert scale) assessed the resident's knowledge and confidence in providing HCV care and preparedness to treat this infection in independent practice. The participating residents were assigned one or more identified patients to evaluate and treat. The residents participating in the project were invited to complete another internally-developed anonymous online survey after the patient(s) completed treatment. Distribution of responses was compared between the aggregated pre-project surveys and post-treatment surveys using Fisher's Exact Test with p value < 0.05 representing statistical significance.

Patient outcomes assessed included completion of treatment in those who initiated therapy and the sustained virologic response at least 12 weeks after completion of therapy (SVR-12).

This study was approved by the St. Vincent Health Institutional Review Board.

3. Results

Thirty-four internal medicine residents completed a baseline survey (53% response rate). Twelve internal medicine residents expressed interest in and participated in providing HCV care. Training level and career plans of the surveyed residents are presented in [Table 1](#). Each resident who participated in the project completed a survey after at least one of their patients completed treatment. All 12 residents who treated at least one patient with HCV in their continuity clinic agreed or strongly agreed in the post-survey that they know how to initiate treatment

Table 1. Characteristics of internal medicine resident physicians surveyed.

	Pre-Project Survey (n = 34)	Post-Project Survey (n = 12) ^a
Residency Year^b		
PGY-1	12 (35.3%)	2 (16.7%)
PGY-2	11 (32.4%)	4 (33.3%)
PGY-3 or PGY-4	11 (32.4%)	6 (50%)
Career Plans^c		
Primary Care	1 (2.9%)	2 (16.7%)
Primary Care and Hospitalist	5 (14.7%)	2 (16.7%)
Hospitalist Medicine	11 (32.3%)	4 (33.3%)
Gastroenterology or Infectious Disease	2 (5.9%)	3 (25%)
All Other Subspecialties	15 (44.1%)	1 (8.3%)

^a Residency year when initiating first patient on therapy.

^b Fisher's Exact Test $p = 0.45$.

^c Fisher's Exact Test $p = 0.04$.

Table 2. Internal medicine resident survey results.

	Pre-Project Survey (n = 34)	Post-Project Survey (n = 12) ^a
I know how to evaluate patients with chronic hepatitis C for treatment with direct-acting antivirals (using history, exam, labs, and/or imaging)		
Strongly Disagree	3 (8.8%)	0 (0%)
Disagree	14 (41.2%)	0 (0%)
Neutral	9 (26.5%)	1 (8.3%)
Agree	8 (23.5%)	8 (66.7%)
Strongly Agree	0 (0%)	3 (25%)
Weighted Average Likert Scale Response ^b	2.6	4.2
I know how to initiate treatment with an appropriate direct-acting antiviral for chronic hepatitis C and how to monitor patients after treatment		
Strongly Disagree	9 (26.5%)	0 (0%)
Disagree	18 (52.9%)	0 (0%)
Neutral	5 (14.7%)	0 (0%)
Agree	2 (5.9%)	10 (88.3%)
Strongly Agree	0 (0%)	2 (16.7%)
Weighted Average Likert Scale Response ^b	2.0	4.2
I feel prepared to treat uncomplicated chronic hepatitis C with direct-acting antiviral medications in my future practice		
Strongly Disagree	4 (11.8%)	0 (0%)
Disagree	17 (50%)	0 (0%)
Neutral	8 (23.5%)	0 (0%)
Agree	5 (14.7%)	9 (75%)
Strongly Agree	0 (0%)	3 (25%)
Weighted Average Likert Scale Response ^b	2.4	4.3

^a $P < 0.001$ for the difference in distributions of responses between the Pre-Project Survey and Post-Treatment Survey using Fisher's Exact Test.

^b 5-point Likert scale where 1 = strongly disagree and 5 = strongly agree; used for descriptive purposes only.

with an appropriate direct-acting antiviral for chronic hepatitis C and how to monitor patients during and after treatment. Only 2 of the baseline survey respondents indicated agreement or strong agreement with the same statement ($p < 0.001$). All 12 residents who treated at least one patient with HCV in their continuity clinic agreed or strongly agreed in the post-treatment survey that they feel prepared to treat uncomplicated HCV infection after residency. Only 5 of the baseline survey respondents agreed or strongly agreed with the same statement ($p < 0.001$). Table 2 depicts survey results.

Treatment for HCV infection was initiated in 26 patients. Baseline characteristics are noted in Table 3. All 21 patients who were tested were confirmed to have attained SVR-12, indicating cure of the HCV infection. Three patients were eligible to be tested but had not yet completed testing and 1 patient was not yet eligible to be tested for SVR-12. One patient reported intolerance to therapy and stopped DAAs after 19 days.

4. Conclusion

Internal medicine residents who evaluated and treated patients with HCV infection in their continuity clinic in one community-based residency program reported significantly greater knowledge and confidence in evaluating and managing HCV

Table 3. Demographic and clinical characteristics of patients treated with DAAs.

Characteristic	26 Patients initiated therapy
Age - yr	48.6 ± 13.8
Male sex - no. (%)	15 (57.6)
White race - no. (%) ^a	18 (69.2)
Hispanic or Latino ethnicity - no. (%) ^a	4 (15.3)
Fibrosis score - no. (%) ^b	
F3 or F4	7 (26.9)
F1 or F2	9 (34.6)
F0	10 (38.4)
Insurance status - no. (%)	
Self-pay	5 (19.2)
Medicaid plan	15 (57.7)
Medicare plan	4 (15.3)
Commercial plan	1 (3.8)
Employer-based plan	1 (3.8)
Genotype 3 - no. (%)	6 (23)
Completed therapy - no. (%)	25 (96.2)
DAA completed - no. (%)	
glecaprevir/pibrentasvir	18/25 (72)
sofosbuvir/velpatasvir	7/25 (28)
SVR-12 achieved- no. (%) ^c	21/21 (100)

^a Race and ethnicity were reported by patients.

^b Metavir score determined by results of FibroTest™ and/or ultrasound elastography.

^c 21 patients completed HCV RNA polymerase chain reaction (PCR) testing 12 or more weeks after completion of therapy. 3 patients were due for HCV RNA PCR testing to assess for SVR-12 but had not yet completed laboratory testing. 1 patient was not yet due for HCV RNA PCR testing to assess for SVR-12.

infection compared to residents who had not evaluated and treated patients with HCV infection in their continuity clinic. The rate of completion of treatment by the patients who initiated DAA therapy was high (96.2%) and all 21 patients who completed post-treatment testing achieved SVR-12.

Study of experiences and outcomes in treating HCV infection in residency clinics and resident perspectives on providing this care has been limited. A 2016 publication indicated that 61.9% of 273 responding program directors in family medicine believed their program should take steps to build capacity to treat HCV infection.⁹ Couri et al. reported their experiences in training internal medicine residents to provide HCV treatment in their continuity clinic under the guidance of an ECHO (Extension for Community Healthcare Outcomes)-trained primary care physician and shared their process for resident-driven treatment. The 4 patients treated by their residents had all attained SVR-12.⁵ Another publication reported significant gains in resident knowledge after creation of a HCV curriculum and HCV clinic within a university-based internal medicine residency clinic.¹⁰

Our experience demonstrates that self-directed learning by interested resident physicians who provide HCV treatment within the residency clinic under the direction of general internal medicine faculty preceptors can be an effective and attainable strategy to train and prepare resident physicians to provide this care.

Limitations of our study include the small number of residents participating in the project (since the project was limited to those residents who expressed interest in providing this care) and the relatively small number of patients treated. Inability to pair responses precluded direct comparison of individual responses between the pre-project and post-treatment surveys. Also, surveys assessed residents' self-reported knowledge rather than an objective assessment of knowledge. Finally, the participating residents were more likely to be pursuing a fellowship in gastroenterology or infectious diseases, which could be associated with increased medical knowledge on this topic.

Further research is needed on the impact of dedicated HCV training and patient care on graduates who participated in this training during their residency.

In this observational cohort study in a single residency program, internal medicine residents who provided the primary HCV care for HCV-infected patients expressed significantly improved knowledge and confidence in management of HCV infection compared to residents who had not provided this care. Expansion of HCV care to internal medicine residency clinics can improve resident education and patient outcomes for under-resourced patients.

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None.

Conflict of interest

The authors report no conflict of interest.

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