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Using Community Paramedicine to Treat Hepatitis C Virus in Upstate South Carolina

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Objectives: Hepatitis C virus (HCV) is an infection of the liver that can lead to significant liver damage and hepatocellular carcinoma. Individuals born between 1945 and 1965 and individuals with intravenous drug use represent the largest HCV demographics and often experience barriers to treatment. In this case series, we discuss a novel partnership between community paramedics (CPs), HCV care coordinators, and an infectious disease physician to provide HCV treatment to individuals with barriers accessing care.

Methods: Three patients tested positive for HCV within a large hospital system in the upstate region of South Carolina. All of the patients were contacted to discuss their results and scheduled for treatment by the hospital's HCV care coordination team. Patients who expressed barriers to attending in-person appointments or were lost to follow-up were offered a telehealth appointment facilitated by CPs performing a home visit with the added ability to draw blood and perform a physical assessment guided by the infectious disease physician. All of the patients were eligible for and prescribed treatment. The CPs assisted with follow-up visits, blood draws, and other patient needs.

Results: Two of the three patients connected to care had an undetectable HCV viral load following 4 weeks of treatment, whereas the third was undetectable after 8 weeks. Only one patient reported a mild headache that was potentially linked to the medication, whereas the others did not report any adverse effects.

Conclusions: This case series highlights the barriers experienced by some HCV-positive patients and a distinctive plan to address impediments to access for HCV treatment.

Key Words: community paramedicine, hepatitis C, infectious disease, telehealth

Between 2013 and 2016, it is estimated that 2.4 million adults were living with hepatitis C virus (HCV) in the United States.[1] According to the Centers for Disease Control and Prevention, intravenous drug use (IDU), human immunodeficiency virus (HIV) infection, and engaging in unprotected sexual activity are risk factors for contracting HCV.[2] These patient groups also may be more difficult to connect to medical care.

Several studies comparing HCV linkage with care rates between individuals tested for HCV in the emergency department (ED), inpatient setting, or through various outpatient clinics have shown mixed results. One study in Boston reported lost to follow-up rates of 47.8% from the ED, 31.8% from inpatient admissions, and 53.5% from outpatient internal medicine clinics.[3] More disappointing was the lack of engagement in treatment for patients who actually attended a follow-up appointment, in which only 38.8% of patients screened in the ED, 37% patients screened in an inpatient setting, and 53.9% of patients screened at outpatient internal medicine clinics initiated therapy for HCV. Given the latent nature of HCV and the unfortunate expansion of known associated risk factors for infection, including the HIV epidemic and opioid crisis, with associated

Key Points

- Linkage-to-care coordinators follow up with patients to educate them on their hepatitis C virus (HCV) diagnosis and schedule them for an appointment.
- Community paramedics perform physician-guided physical examinations and venipuncture to facilitate telehealth visits for the infectious disease physician and circumvent patient barriers to treatment.
- HCV treatment is delivered to patients' homes and community paramedics return to perform follow-up bloodwork on patients.
- Preliminary results demonstrate an undetectable HCV viral load.

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S.C.R. has received compensation from the Gilead Sciences Frontline of Communities in the US program and ongoing institutional funding from the South Carolina Department of Health and Environmental Control. W.R.W. has received compensation from a joint partnership between Prisma Health and Clemson University. P.M. has received compensation from the South Carolina Department of Health and Environmental Control and Gilead Sciences Frontlines of Communities in the US. The remaining authors did not report any financial relationships or conflicts of interest.

Accepted August 9, 2022.

0038-4348/0–2000/116-321

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DOI: 10.14423/SMJ.0000000000001521

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rises in injection drug use, it is important that treatment be made more accessible to underserved populations, including but not limited to those who face barriers accessing transportation, those with medical impediments affecting their ability to seek care, and those living in poverty. These barriers exist for both rural and urban populations, with rural populations often facing increased barriers compared with urban populations.[4] Nationwide data from 2006–2012 revealed a higher HCV prevalence rate (13%) among individuals born as early as 1984 and living in rural areas, compared with urban areas (5%), with 75% of the individuals in rural areas also reporting IDU.[5]

Community paramedics (CPs) are specially trained in examining and treating patients with nonemergent conditions in the community.[6,7] CP programs have the potential to facilitate healthcare access for patients with financial, medical, and transportation barriers. Studies have found that CP programs significantly reduce ED visits and even decrease hospital readmissions.[8] Furthermore, studies also have observed improvements in self-care and reported self-reliance among patients engaged with CPs. Although systematic reviews have recognized CP programs' value in reducing ED visits and subsequently saving patients and healthcare systems large sums of money, no studies have investigated CP interventions that evaluate linkage to care efforts for patients with an infectious disease.[8,9]

In this case series, we report on a novel interdisciplinary collaboration between a CP program and infectious disease physicians to deliver treatment to three HCV-positive patients living in upstate South Carolina with various barriers to obtaining/initiating HCV treatment. We discuss their risk factors, barriers to implementing treatment, and preliminary treatment outcomes. Written consent was obtained from all of the patients as part of this case study. This case series was deemed nonhuman subjects research by the institutional review board of the hospital system.

Methods

Study Setting

Prisma Health is a not-for-profit healthcare company and the largest healthcare system in South Carolina, serving more than 1.2 million patients in their 21-county service area each year. Recruitment for this study took place primarily at Greenville Memorial Hospital, a 746-bed academic level I trauma center which serves more than 39,000 individuals each year.

The iLink Program

As part of a 4-year-long partnership with the Frontline of Communities in the US program, the Prisma Health hospital system has been performing ED-based opt-out screening for HIV and HCV. Patients who are positive for either HIV or HCV are provided with linkage to care to an appropriate follow-up clinic. This follow-up linkage-to-care program is known as the iLink program. iLink comprises full-time screening and linkage-to-care coordinators and community health workers who specialize in posttest counseling and linkage to care. During the past few years, the team has become the default consult team for HCV and HIV care coordination throughout the Prisma Heath system. When patients are found to be actively infected, the iLink team is consulted to connect the patients to outpatient HCV treatment. Coordinators subsequently reach out to patients by telephone to educate them regarding their positive lab results, methods of transmission, and schedule/refer individuals for treatment. They follow up with patients until their first appointment with an HCV-treating provider.

CP HCV iLink is run through the Prisma Health Community Paramedicine program and is a telemedicine-based collaboration among iLink coordinators, an infectious disease physician, and the CPs. iLink coordinators schedule patients for a virtual appointment using secure Vidyo video conferencing software (VidyoConnect; Hackensack, NJ) with an infectious disease physician and CP(s). On the day of appointments, CPs bring an iPad (Apple, Cupertino, CA) to conduct a virtual visit, check patient vital signs, perform a physician-guided physical examination, and perform venipuncture for necessary laboratory testing. Following appointments and medication prescription, patients have their medication delivered via United Parcel Service or CPs. CPs are then scheduled to return to patients' homes to perform follow-up blood work (at 4 and 12 weeks following treatment start dates) and laboratory values for sustained virologic response (SVR) 12 weeks following treatment completion.

Eligibility Criteria

Three patients were identified by members of the iLink team or other healthcare professionals and subsequently referred for assistance with linkage to care. iLink coordinators contacted the patients by telephone to assess their eligibility for CP HCV iLink. Patients are eligible if they expressed barriers in transportation in traveling to medical appointments or they were previously lost to follow-up for HCV treatment.

Results

Patient 1

A 58-year-old woman presented to the ED in June 2021 after a drug overdose. The patient reported taking 40 sertraline pills secondary to various stressors at home. Her medical history included traumatic brain injury, depression, diabetes mellitus, gastroesophageal reflux disease, hypertension, and HCV. The patient's substance use history included tobacco, alcohol, IDU, and methamphetamines. After evaluation in the ED, the patient was admitted as an inpatient to a local psychiatric hospital for suicidal ideation and attempt. During the patient's hospitalization, her HCV viral load was reassessed and significant for 375,000 IU/mL (reference range: nonreactive), suggesting an active HCV infection.

iLink was thus consulted to assist the patient with outpatient HCV treatment. After three failed contact attempts, the patient

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contacted the iLink team to discuss her current HCV laboratory results. The team provided education on the risk factors for contracting HCV, screened the patient for various social determinants of health, and discussed potential treatments with her. The patient reported an initial diagnosis of HCV in 2001 likely secondary to sharing needles. She was tested at another South Carolina healthcare facility in 2020 but did not initiate treatment. The patient expressed interest in initiating HCV treatment but reported significant barriers, including her lack of health insurance, employment, and a functioning vehicle. She lives more than 43 mi from the nearest treatment site for uninsured patients, making it prohibitively expensive to cover other transportation costs to and from healthcare appointments. A review of the public transit options on the South Carolina Department of Transportation's Web site also revealed no public transit in her county.

The iLink team coordinated a CP-assisted virtual appointment with an infectious disease physician. CPs visited the patient's home, obtained vital signs, and performed a focused physical assessment using an iPad via a Health Insurance Portability and Accountability Act–compliant virtual visit program called VidyoConnect. The visit included a discussion of her overall health in addition to HCV treatment. CPs then did blood work as ordered and required by the physician before initiation of the therapy. They also provided financial assistance paperwork for the patient to apply for hospital sponsorship. The patient was prescribed sofosbuvir 400 mg and velpatasvir 100 mg, 1 tablet daily for 24 weeks. An infectious disease nurse completed an online medication assistance application to help cover the cost of the medicine and coordinated with the patient for home delivery of all medication beginning in September 2021. The infectious disease nurse followed up with the patient by telephone 4 days after delivery to confirm medication receipt and to answer any questions. Follow-up in-person visits with the CPs were scheduled to test HCV viral load at 4 and 12 weeks after treatment initiation and at 12 weeks after treatment completion to assess for SVR. The patient's 4-week laboratory values already demonstrated an undetectable HCV viral load and further visits are pending.

Patient 2

A 39-year-old man presented to the ED in March 2019 for a suspected drug overdose. His medical history included traumatic brain injury and tibial fracture. His substance use history included opioids, alcohol, tobacco, and marijuana. The patient reported current use of Xanax and Suboxone for his opioid use disorder. The patient tested positive for HCV in the ED with a viral load of 7,410,000 IU/mL. The patient was discharged from the ED and lost to follow-up until he was admitted to the hospital on a subsequent encounter.

After discharge from this hospital admission in February 2021, the patient attended a telehealth appointment with Gastroenterology (GI) to initiate HCV treatment and was scheduled for an appointment to collect laboratory values before starting medication. He did not follow up for blood work. The GI clinic left the patient a voicemail and a message via the electronic health record (Epic, Verona, WI) MyChart function. The patient did not respond to either of these contact methods and he was considered lost to follow-up again. Following readmission to the hospital in May 2021, he was connected to the CP program postdischarge.

CPs who were already conducting weekly in-home visits to obtain vital signs, perform medical and safety assessments and facilitate various follow-up treatments coordinated with iLink to assist with connecting the patient to HCV treatment. When the CPs discussed HCV treatment with the patient, he was still interested in receiving treatment but reported that his inability to walk was a major barrier for attending appointments at locations other than his home. The patient was thus scheduled for a similar CP-assisted virtual appointment to address his HCV.

The patient was prescribed an 8-week treatment course of 100 mg glecaprevir and 40 mg pibrentasvir, 3 tablets daily for 8 weeks. With the help of the infectious disease nurse, the patient completed the necessary insurance prior authorization paperwork and was approved for the medication. He received the medication by home delivery and began treatment in September 2021. Four weeks following treatment initiation his HCV viral load had decreased to 150 IU/mL. Given his detectable 4-week viral load, the patient had an additional blood draw at 8 weeks following treatment initiation to assess his viral load, which was undetectable. He finished his 8-week treatment course and has reported no adverse effects from the medication. His blood will be drawn again at 12 weeks following treatment completion to assess for SVR. He stated that his mobility has improved since treatment initiation. The CPs continue to visit the patient's home weekly to provide ongoing general assessments and care.

Patient 3

A 65-year-old woman presented to the ED in January 2021 with a 1-week history of diffuse rash, lower extremity swelling, nausea, vomiting, and diarrhea. The patient's medical history included chronic obstructive pulmonary disorder and memory deficits. Her substance use history included tobacco; she denied IDU but reported that she had "tried everything" and was currently using methamphetamines. She was started on antibiotic therapy for presumed lower extremity bacterial cellulitis and discharged from the ED.

The patient was screened for HCV as part of our ED-based opt-out screening program. After discharge, her HCV viral load was 247,000 IU/mL, indicative of a positive infection.

An iLink coordinator contacted the patient to discuss her HCV results and to connect her to treatment. She initially expressed interest and the coordinator referred the patient to an outpatient GI clinic for treatment. She missed her initial appointment, reporting she had lost the information for the visit. She was rescheduled for another appointment but missed this as well.

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The patient was contacted by telephone twice after this missed appointment and also was trialed for this CP-assisted HCV treatment program in August 2021.

The patient reported several barriers to care, including tenuous access to transportation, fear and distrust of going to the hospital, intermittent cellular telephone service secondary to monetary problems, and overall issues obtaining her Social Security payments. She did not know her insurance status and whether she qualified for either Medicaid or Medicare and did not know that transportation to healthcare visits was possible using her insurance. She expressed resistance to the idea of establishing care with any primary care physician despite living only 8 to 10 mi from both a free clinic and a critical access hospital in Seneca, South Carolina. Although only 8 to 10 mi from various clinics, her home is located in a particularly low spot in the landscape, with extremely limited cellular/Internet service. No bus routes are available and rideshare companies almost never serve the area.

During her initial CP-assisted telehealth appointment in August, CPs were able to obtain blood work using ultrasound-guided phlebotomy, which was necessary because of her limited venous access. The initial virtual telehealth visit could not be completed because of the poor cellular service in her home; however, a telephone conversation between the patient and infectious disease physician using the CP's cellular telephone was successful. A subsequent CP visit was scheduled after portable Wi-Fi Cradlepoints (Cradlepoint [Boise, ID] manufactures Cloud-managed wireless edge networking equipment) were installed on the CP emergency medical services vehicle. This provided enough bandwidth to complete the patient's full telehealth visit. The patient was prescribed a 12-week course of sofosbuvir 400 mg and velpatasvir 100 mg, 1 tablet daily following this visit.

Because of the severe barriers of cellular service, the delivery of her medication was arranged using the CP's cellular telephone. The patient began her treatment course in November 2021 and her viral load was undetectable 4 weeks following treatment initiation. She reported some mild intermittent headaches possibly secondary to the sofosbuvir/velpatasvir, but she has continued her treatment course.

Discussion

This case series highlights a novel intervention combining the efforts of a care coordination team, an infectious disease physician, and CPs to deliver HCV treatment to patients who have difficulty accessing care. The three patients discussed here experienced significant delays in initiating HCV treatment, potentiating the risk of irrevocable liver damage and HCV-related complications. Although subsequent visits and final blood work are necessary to confirm SVR, our preliminary results showed an undetectable HCV viral load for all three patients, demonstrating the early success of this program.

Each patient experienced unique barriers that contributed to their overall inability to initiate treatment for HCV. The iLink coordinators and CPs were essential in overcoming these barriers. iLink coordinators are the first point of contact in deciphering patient needs and follow up with patients at least six times to assist with connecting them to HCV treatment. They also educate patients about their HCV diagnosis and treatment, which may help address any gaps in understanding that some patients experience surrounding this disease. The CPs in this program addressed the barriers with transportation and mobility that patients experience. They had in-person contact with patients and performed medical examinations and necessary blood work guided by the infectious disease physician to facilitate care in the comfort of patients' homes, which may create a less intimidating environment. CPs also resolved issues with Internet service by using the portable Wi-Fi Cradlepoints in their vehicles.

Telehealth visits became more mainstream during the coronavirus disease 2019 pandemic. They are often more convenient and save patient travel to appointments; however, there are some disadvantages, including the inability to perform comprehensive physical examinations and the potential for technical and/or Internet service difficulties.[10] Having a CP available to record vital signs, perform a physical examination guided by a physician, and assist with onsite phlebotomy/venipuncture provides a more complete medical assessment and saves time and travel for the patient to obtain blood work. This is essential in situations in which a patient has transportation barriers with respect to access or distance. CPs from the program discussed are trained in ultrasound-guided venipuncture/phlebotomy, which facilitated successful venipuncture in this study for the patient with known difficult venous access. This may become a necessary adjunct training for additional CP programs seeking to initiate similar HCV linkage to care because patients who have a history of IDU often have difficult venous access. The CPs are available to bring patients paperwork to assist with overall medical costs and provide additional services such as influenza and coronavirus disease 2019 vaccinations, HCV medication dropoff, and resources for substance use disorders. iLink coordinators assist with resources for patients facing eviction, housing needs, and other financial challenges. We believe that these combined services significantly improved the initial health outcomes of these individuals.

Some limitations with this CP-assisted HCV treatment program were found. With any virtual service, there is a potential for technical difficulties and limited cellular service bandwidth, especially in rural areas. In the present study, the cellular service barriers for the third patient were not identified until her initial telehealth visit. CPs overcame this by taking advantage of the mobile Wi-Fi hotspot within their vehicles. Long travel times for CPs, cost of specialized equipment, and procuring trained CPs also are potential limitations for the widespread implementation of this program. Allocating CPs to specific areas and obtaining clearance to use equipment that is not being used by other departments in the healthcare system to account for long travel times have been discussed. More recently, portable lab

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label printers were purchased for CPs as a quality improvement effort. In addition, the research on costs and savings from implementing CP programs is limited.[8] Some programs have reported significant savings, whereas others have reported high costs to implement with little return. Performing a cost–benefit analysis that considers the impact of the program on various aspects of the healthcare system would be beneficial to inform future studies and is part of our ongoing expansion and assessment of this program.

Conclusions

This case series demonstrates the initial success of this novel intervention to make HCV treatment accessible for patients with significant barriers to accessing health care. The collaborative intervention discussed has the potential to bridge gaps in access to HCV care for vulnerable populations and further improve the provision of telehealth care.

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