Evaluating the Impact of a Community Health Worker on Hepatitis C Care in an Urban Emergency Department

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of a community health worker in the ED on linkage to HCV care with program data from one calendar year prior to the addition of the community health position and one calendar year post. Additionally, we seek to identify risk factors associated with failure to access HCV care among ED patients.

test result on the EMR and a medical appointment on record at which HCV treatment was discussed or initiated.

We compared both HCV RNA test rates and LTC rates pre and post incorporation of the CHW using Chi-Square analysis. Only RNA positive patients were considered for the analysis of LTC rates, as RNA negative and RNA untested patients are ineligible for LTC services. We also conducted multivariate logistic regression models to determine factors associated with successful receipt of HCV RNA testing as well as successful LTC after controlling for risk and demographic factors. Demographic data included age at time of HCV Ab test, gender, race, ethnicity, and HIV status. Risk factors included history of injection drug use, history of alcohol abuse, history of other (non-alcohol, non-injection) drug use, history of incarceration, sexually transmitted infection diagnosis, cirrhosis, and hepatocellular carcinoma. All demographic and risk factor data was pulled directly from the EMR at the time of the positive antibody test result. Patients with missing data were removed from this analysis. All analyses were conducted using STATA 15.1.

Results

In the ED testing program, 780 patients tested HCV Ab positive between 5/1/2016 and 5/1/2018. The mean age was 7.8±13.3, 65.4% were male, 67.8% identified as white, 28.5% identified as Black, and 3.3% identified as other (Table 1). In the calendar year prior to the introduction of the CHW, the JHBMC ED recorded 372 HCV antibody positive patients, of which 125 (33.6%) were RNA tested. In the calendar year after the introduction of the CHW, the JHBMC ED recorded 408 antibody positive patients, of which 202 (49.5%) were RNA tested, a statistically significant increase in the year after adding the CHW (*p*<.01). Statistically significant increases in linkage to care were also noted after introducing a CHW. In the calendar year prior to the introduction of the CHW, the JHBMC ED recorded 72 HCV antibody positive, HCV RNA positive patients, of which 14 (19.4%) were linked to care, whereas in the calendar year after the introduction of the CHW, the JHBMC ED recorded 124 HCV RNA positive patients, of which 42 (33.9%) were linked to care (*p*<.05).

Logistic regression analysis to assess the relationship between RNA testing and HCV risk factors and demographics within all HCV antibody positive patients were conducted. After removing 7 patients for incomplete data, 773 patients were used for this analysis. Both a prior positive antibody test on the medical record and a diagnosis of cirrhosis were associated with increased odds of being HCV RNA tested (n=773, OR=1.49, *p*<.05; OR=2.24, *p*<.05, respectively) (Table 2). An additional logistic regression analysis of linkage to care was performed for risk factors and demographics within HCV RNA positive patients (Table 2). Among patients who were RNA positive, self-identified Hispanic patients were more likely to be linked (OR=8.71, *p*<.05). Age was also associated with a small, but significant increase in linkage odds (OR=1.04, *p*<.05).

Characteristic	Total N=780 n (%)	HCV Ab+ Year Prior to CHW N=372 n (%)	HCV Ab+ Year Post CHW N=408 n (%)	p-value
Age, median years (IQR)	50 (36, 58)	51 (38.5, 58)	49.5 (35, 57)	0.046
Sex				
Female	269 (34)	130 (35)	139 (34)	0.617
Male	510 (65)	242 (65)	268 (66)	
Transsexual	1 (<1)	0 (0)	1 (0)	
Race				
Black	222 (28)	99 (27)	123 (30)	0.378
Other	29 (4)	14 (3)	15 (4)	
White	529 (68)	259 (70)	270 (66)	
Ethnicity				
Hispanic	24 (3)	11 (3)	13 (3)	0.61
Non-Hispanic	756 (97)	361 (97)	395 (97)	
Previous HCV Antibody				
Negat2(1 (<1))Tj16.043 0 Td(0 (0))Tj20.562 0 Tdngat2T				

Characteristic	RNA Testing		Linkage within RNA+	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Constant	0.46 (0.23, 0.96)	0.038	0.09 (0.01, 0.69)	0.02
Black	0.82 (0.58, 1.15)	0.25	1.85 (0.82, 4.18)	0.138
Hispanic	2.02 (0.74, 5.50)	0.168	8.71 (1.56, 48.78)	0.014
Other	2.12 (0.85, 5.30)	0.105	0.48 (0.08, 2.78)	0.415
Female	1.25 (0.91, 1.71)	0.176	0.96 (0.44, 2.1)	0.919
Age	1.01 (1.00, 1.02)	0.182	1.04 (1.00, 1.07)	0.033
Prev. Negative HCV Ab	1.20 (0.43, 3.32)	0.729	-	-
Prev. Positive HCV Ab - Medical Record	1.49 (1.03, 2.15)	0.035	0.50 (0.20, 1.27)	0.144
Prev. Positive HCV Ab - Self Report	0.93 (0.58, 1.51)	0.78	0.77 (0.27, 2.22)	0.627
History of Injection Drug Use	0.84 (0.59, 1.19)	0.328	1.20 (0.51, 2.82)	0.682
History of Alcohol Abuse	0.86 (0.62, 1.19)	0.372	0.61 (0.28, 1.32)	0.211
History of other Drug Use	0.94 (0.66, 1.34)	0.727	0.78 (0.33, 1.85)	0.57
HIV Infection	2.02 (0.82, 4.97)	0.127	-	-
STI Diagnosis	1.04 (0.63, 1.71)	0.881	0.14 (0.02, 1.26)	0.079
History of Homelessness	1.01 (0.70, 1.45)	0.973	0.52 (0.20, 1.33)	0.17
History of Incarceration	1.02 (0.69, 1.50)	0.933	2.27 (0.83, 6.21)	0.11
Cirrhosis Diagnosis	2.24 (1.21, 4.14)	0.01	1.71 (0.57, 5.14)	0.335
HCC Diagnosis	-	-	1.69 (0.19, 14.98)	0.637

Table 2: Multivariate Logistic Regression Model for RNA Testing and Linkage to Care within RNA Positive.

Discussion

In this ED HCV testing and linkage to care program, we found support for our hypothesis that the introduction of a community health worker specializing in HCV LTC procedures could improve progression through the HCV care continuum for HCV Ab+ patients. Both RNA testing and linkage to care rates increased significantly after the introduction of the CHW. These findings highlight the value of the CHW not only in terms of this specific ED testing program, but also in terms of ED-based HCV testing programs in general. Relative to similar ED-based HCV testing programs, we observed higher linkage rates after the introduction of the CHW than seen in literature [9-11].

We found additionally that a previous, EMR-confirmed positive HCV antibody test and prior diagnosis of cirrhosis were associated with an increase in the likelihood of being RNA tested. This makes sense in the ED setting where the main barrier to receiving RNA testing in the ED was the delay in resulting the HCV antibody test, which often occurred after the patient's discharge from the ED. As patients with cirrhosis and previous positive antibody tests are understood to be of potential concern for chronic HCV infection and morbidity, RNA tests for these patients could be ordered and blood could be drawn early into their stay in the ED. This finding underscores the value of widespread HCV testing and the ED's unique role in the HCV epidemic; for individuals that do not regularly interact with the healthcare system, the ED represents a rare opportunity to receive HCV follow up care.

In HCV RNA positive patients, identifying as Hispanic and older age was associated with increased odds of linkage. The association between age and LTC is consistent with other ED-based studies on HCV care, and may be due to older patients having more engagement with and positive perceptions of the health care sector and greater access to health insurance programs such as Medicare [11-14]. The association between Hispanic ethnicity and higher LTC may be a result of the culturally-competent focused care of the CHW but further research is necessary to fully understand this association. Regardless, EDs will need to continue to develop ways to reach marginalized populations, younger populations, and populations with substance use that have historically difficult to engage. Indeed, this program has been effective at reaching many high risk and hard to reach patients; specifically, patients who struggle with homelessness, drug use, and low levels of engagement with healthcare. 56 of 196 (28.6%) RNA positive ED patients were successfully linked between the two years, and linkage attempts are ongoing for the remainder of RNA positive patients. It is also important to note that frequently, patients are unaware of their HCV status when they are tested, and that 453 of the 773 (58.6%) patients considered in this study had a history of IDU notated in the EMR. These unlinked patients who continue to engage in IDU represent a significant potential source of continued HCV transmission. These findings underscore not only the value of the ED as a general safety net for underserved, high-risk populations, but more specifically the extent to which HCV-infected individuals at high risk for HCV transmission can be identified within the ED setting.

Several limitations exists in this study and dataset. One significant concern is the inability of staff to identify and document when patients engaged in external healthcare appointments. Appointments that could not be confirmed were not considered for linkage, and a number of patients endorsed attending appointments of which no documentation could be obtained. Similarly, many patients could not be reached following their ED visit, and were therefore coded as not linked as there was no record of a linkage appointment. Of these patients who were coded as not linked, it is unclear what proportion, if any, sought or received care in an external health system. It is therefore possible that our data underrepresents the actual rates of linkage and RNA testing to some degree. Additionally, abstracted EMR data was used for this analysis. EMR data can be heavily reliant on the patient willingness to provide information about themselves. For individuals who are not inclined to disclose drug use, homelessness, mental health diagnoses, or prior criminal history to ED staff, the EMR may not be accurate.

Despite these limitations, our data suggests that the incorporation of a CHW into our testing program was helpful in increasing patient engagement and linkage to care. Prior to the introduction of the CHW into the ED LTC team, LTC attempts focused almost exclusively on HCV status disclosure, appointment scheduling, and patient education. The CHW took a less rigidly HCV-focused approach to follow-up, instead engaging patients more broadly on a spectrum of healthcare concerns. The CHW assisted in issues with substance abuse,

mental health, familial and relationship conflicts, referrals to outside healthcare systems, and occasionally issues with insurance or other financial barriers. This change in LTC approach seemed to positively affect the way patients perceived the LTC process, with patients being generally more amenable to appointments and more responsive to requests for follow up on their part, as evidenced by the corresponding increase in LTC success between the year before and after the CHW's presence. Future research into patient response to different types of outreach in the context of HCV infection could help clarify exactly which procedures are most successful, and which patients could be most amenable to HCV treatment in specific healthcare settings.

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