Title

Risk factors for hepatitis C virus infection at a large urban emergency department

Authors

Ford, James S
Hollywood, Erika
Steuble, Bradley
et al.

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1 **Title: Risk Factors for Hepatitis C Virus Infection at a Large Urban Emergency**
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4 **Running Title: Risk Factors for HCV Infection in the ED**
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6 **Authors:** James S. Ford, MD[1], Erika Hollywood[2], Bradley Steuble[3], Zichun Meng, MS[4],
7 Stephanie Voong, MPH[5], Tasleem Chechi, MPH[5], Nam Tran, PhD[6], Larissa May, MD, MSPH[5]
8
9 **Author Affiliations:**
10 1. Department of Emergency Medicine, University of California, San Francisco. San Francisco,
11 CA, USA.
12 2. A.T. Still University School of Osteopathic Medicine in Arizona. Mesa, AZ, USA.
13 3. Touro University of California, College of Osteopathic Medicine. Vallejo, CA, USA.
14 4. Department of Statistics, Graduate Group of Biostatistics, University of California Davis
15 Health, Sacramento, CA, USA.
16 5. Department of Emergency Medicine, University of California, Davis Health. Sacramento,
17 CA, USA.
18 6. Department of Pathology and Laboratory Medicine, University of California Davis Health,
19 Sacramento, CA, USA.
20

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22
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30 **Corresponding Author**
31 Larissa May
32 2315 Stockton Blvd
33 Sacramento, CA 95817
34 916-734-5010
35 lsmay@ucdavis.edu
36

37 **Article Summary:** Independent risk factors for active hepatitis C virus infection in the
38 emergency department included increasing age, male sex, undomiciled housing status, history of
39 tobacco use, history of illicit drug use, Medicaid insurance status and Medicare insurance status.
40

41 **Key Words:** HCV, screening, public health, risk factors

1   **Data Availability:** The data that support the findings are available from the corresponding

2   author upon reasonable request.

1 **ABSTRACT**

2

3 **Background:** In 2020, Centers for Disease Control and Prevention (CDC) released guidelines

4 recommending HCV screening in all adults 18 years and older. In the current study, we aimed to

5 identify risk factors for HCV infection in an ED population.

6 **Methods:** We performed a retrospective analysis of ED patients ≥ 18 years who were screened

7 for HCV between November 28, 2018, and November 27, 2019, at a single urban, quaternary

8 referral academic hospital. An HCV-antibody immunoassay (HCV-Ab) was used for screening;

9 positive results were confirmed by measuring HCV ribonucleic acid (RNA). The outcome of

10 interest was the number of new HCV diagnoses (presence of viremia by HCV RNA testing).

11 Multiple logistic regression models were used to identify risk factors associated with a new HCV

12 diagnosis.

13 **Results:** 16,722 adult patients were screened for HCV (mean age: 46 ± 15 years; 51% female).

14 HCV seroprevalence was 5%. Independent risk factors for HCV included increasing age [10-

15 year aOR 1.26 (95% CI 1.23, 1.30)], male sex [aOR 1.25 (95% CI 1.03, 1.51)], undomiciled

16 housing status [aOR 2.8 (95% CI 2.3, 3.5)], history of tobacco use [aOR 3.0 (95% CI 2.3, 3.9)],

17 history of illicit drug use [aOR 3.6 (95% CI 2.9, 4.5)], Medicaid insurance status [aOR 4.0 (95%

18 CI 2.9, 5.5)] and Medicare insurance status [aOR 1.6 (95% CI 1.1, 2.2)].

19 **Conclusions:** The ED services a high-risk population with regards to HCV infection. These data

20 support universal screening of ED patients for HCV. Risk factor profiles could improve targeted

21 screening at institutions without universal testing protocols.

22

1 **INTRODUCTION**
2
3

4 **Background**

5 There are an estimated 184 million people that have been infected hepatitis C virus (HCV) in the

6 world[1]. In the United States (U.S.), HCV is the most common and deadliest blood borne

7 infection in the country, and the number of new acute HCV infections almost tripled between

8 2011 and 2019 (17,100 to 50,300)[2,3]. As many as 85% of individuals with acute HCV will

9 become chronically infected, predisposing them to the life-threatening consequences of cirrhosis

10 and hepatocellular carcinoma[3]. The World Health Organization (WHO) has targeted an 80%

11 global reduction in new chronic HCV infections by 2030[4]. To meet this goal, population-level

12 HCV screening initiatives are needed. In 2019, the U.S. Preventative Service Task Force

13 (USPSTF) released guidelines recommending HCV screening in all adults aged 18-79 years, and

14 in 2020, the Centers for Disease Control and Prevention (CDC) released guidelines

15 recommending HCV screening in all adults 18 years and older[5,6].

16

17 **Importance**

18 The Emergency Department (ED) is an important safety net for underserved, high-risk

19 populations, making it a vital setting to deliver healthcare services to patients without access to

20 primary care[7,8]. Compelling evidence continues to emerge on the utility of ED-based infectious

21 diseases screening programs, including those for Human Immunodeficiency Virus (HIV),

22 Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV)[8-13]. Indeed, our group recently published

23 a study that found high HCV antibody (Ab) and HCV RNA seropositivity in ED patients in a

24 high-volume quaternary care academic center with a large urban and rural catchment area[14].

1   Additionally, we demonstrated that a universal HCV screening protocol led to a large increase in

2   HCV testing and new diagnoses[14]. While the results of these studies are encouraging and provide

3   evidence that the ED setting services a high-risk population, the relatively low prevalence of

4   HCV in the U.S. (Estimated prevalence: 1%), compared to high-endemic regions such as Central

5   Asia (Estimated prevalence: 5.8%) and Central Sub-Saharan Africa (Estimated prevalence:

6   6.0%), makes population-level infection surveillance more difficult and more nuanced[15,16]. There

7   is evidence to suggest that targeted and birth-cohort based ED-based screening programs may

8   miss 25% of previously undiagnosed HCV cases, when compared to universal HCV screening[17].

9   However, in settings where universal screening programs are unfeasible, tailoring testing

10 strategies to target high-risk individuals has the potential to improve testing efficiency and reduce

11 cost. One previous ED-based study examined risk factors for HCV Ab seropositivity, and

12 another ED-based study examined risk factors for HCV RNA positivity in the 1945-1965 birth

13 cohort, but to our knowledge, no ED-based studies have examined risk factors for chronic HCV

14 in a non-targeted adult population[10,11].

15

16 **Goals of This Investigation**

17 In 2018, the study institution implemented an ED-based, universal HCV screening protocol. In

18 the current study, we aimed to identify risk factors for confirmed HCV infection in an ED

19 population, with the overall goal of tailoring future screening protocols to the risk profile of the

20 local community.

21

22 **METHODS**

23

1 **Study Design and Setting**

2 *Overview*

3 The study institution is an academic quaternary referral health system in northern California. The

4 study ED is a level-1 trauma center in a region with a mixed urban and rural population, and

5 services more than 80,000 patient visits annually. The study institution implemented an ED-

6 based HCV screening program on November 27th, 2018. We performed a retrospective cohort

7 analysis of patients who were screened in the ED of the study institution. The overall goal of this

8 study is to identify risk factors for HCV infection, so that we may better identify high-risk

9 individuals who are likely to benefit from screening. This study was determined not to be human

10 subjects research by the study site's Institutional Review Board (IRB) Quality Improvement

11 Self-Certification Tool.

12

13 *Brief Summary of ED-Based HCV Screening Program*

14 All ED patients ≥ 18 years who were having blood drawn for any clinical purpose, and who did

15 not have a positive HCV RNA test result in the electronic medical record (EMR), were eligible

16 for opt-out HCV screening. Upon entering any blood-based laboratory order into the EMR, a

17 best practice alert (BPA) notified the ED provider that the patient met screening criteria, at which

18 point, providers were required to respond to continue with the order entry. If a patient requested

19 that their insurance not be charged, or they did not have insurance, testing was paid for by the

20 program grant. Program staff, including two patient navigators (PNs), contacted the patients with

21 results via telephone or in person, depending on a patient's disposition. Complete details of the

22 ED-based program have been previously described[18].

23

1   *HCV Laboratory Testing Protocol*

2   An HCV-antibody chemiluminescent immunoassay (HCV-Ab) (Architect i1000, Abbott

3   Laboratories, Abbott Park, IL) was used to screen patients for HCV. Positive HCV-Ab tests were

4   confirmed by measuring HCV RNA viral load (Cobas AmpliPrep/TaqMan, Roche Diagnostics,

5   Basel, Switzerland). HCV-Ab testing typically yielded results within 1-3 days and viral

6   load testing typically yielded results within 4 days.

7

8   **Selection of Participants**

9   We included all adult patients $\geq$ 18 years who were screened for HCV in the ED in the first 12-

10   months following program implementation (November 28th, 2018 to November 27th, 2019).

11

12   **Measurements**

13   Automated computer-generated reports were used to abstract data directly from the EMR. Data

14   abstracted included demographic variables, ED visit date, chief complaint, past medical history,

15   insurance status, and results of HCV testing. Transfusion history was not available. History of

16   interleukin 28 (IL-28) polymorphism was not available. Each patient was given a unique

17   identifier to maintain patient confidentiality, and data was stored in de-identified datasets. Only a

18   patient's first ED visit where they received HCV testing was included in our analysis, to prevent

19   duplicate data.

20

21   **Outcomes**

1 The primary outcomes were the number of new chronic HCV diagnoses (defined as a presence of

2 viremia by HCV RNA testing) and risk factors for chronic HCV. HCV viremia was used to

3 define the primary outcome because RNA positive individuals represent the population that can

4 benefit from linkage-to-treatment. These individuals are also important from a public health

5 infection control perspective as they are capable of transmitting the virus to others if they are

6 unaware of their HCV status, and if treated, this can greatly mitigate the transmission of HCV in

7 the community.

8

9 **Analysis**

10 Data were described with simple descriptive statistics. Categorical variables were expressed as

11 percentages and proportions and continuous variables were expressed as means (± SD). Simple

12 logistic regression models were used to explore factors trending with new HCV diagnoses

13 (p<0.1); these factors were then imputed into multiple logistic regression models to assess for

14 independent association. Factors included in our exploratory analysis included age, sex, race,

15 ethnicity (Hispanic/non-Hispanic), lesbian-gay-bi-trans-queer (LGBTQ) status, un-domiciled

16 status, history of HIV, history of tobacco use, history alcohol use, history of illicit drug use and

17 insurance type (Private/Medicare/Medicaid). Regression outputs were reported as adjusted odds

18 ratios (aOR) and 95% CIs. Age was analyzed as a continuous variable, and regression outputs

19 were reported as a ten-year OR. An additional sub-analysis of HCV RNA seroprevalence,

20 stratified by birth cohort (born 1945-1965, inclusive) and non-birth cohort (born <1945 and

21 >1965) was performed using the Fisher's Exact test. All analyses were conducted under the

22 supervision and guidance of a trained biostatistician. Data processing was performed using R

1   4.0.3 (R Core Team, 2020). Statistical analyses were performed using Stata 15.1 (College

2   Station, TX, USA) and Statistical Analysis Software 9.4M6 (SAS, Institute, Cary, NC).

3

4   **RESULTS**

5   **Characteristics of Study Subjects**

6   A total of 59,084 adult patients were seen in the ED during the study period, and 46,746 (79%)

7   underwent phlebotomy for blood-based laboratory studies and were eligible for HCV screening.

8   A total of 16,722 (36% of eligible patients) adult patients were screened for HCV during the

9   study period. The mean age of patients was 46 ± 15 years, and most patients were female (51%,

10 n=8,578). Race data was available in 99% (n=16,531) of patients and ethnicity data was

11 available in 99.3% (n=16,616) of patients. The most common race was White (42%, n=6,925),

12 followed by Mixed/Other (32%, n=5,335), Black (20%, n=3,267) and Asian (6%, n=1,004). The

13 Hispanic ethnicity comprised 22% (n=3,634) of the population. Housing status was known in

14 88% (n=14,754) and eight percent of patients were un-domiciled (n=1,184). Three percent of

15 patients had a known history of HIV (471/16,722). Insurance status was known in all but one

16 patient. Medicaid insurance was most common (50%, n=8,327), followed by Private insurance

17 (27%, n=4,546), Medicare (20%, n=3,285), and self-insured/uninsured (3%, n=563). Patients

18 with new diagnoses were older than those with negative HCV testing (mean age: 54 ± 12 years

19 vs. 46 ± 16). Most new HCV diagnoses were male (66%), White (50%), undomiciled (30%), and

20 had Medicaid insurance (68%). Full patient characteristics, stratified by HCV infection status,

21 are described in **Table 1.**

22

HCV Testing Results

Nine percent (1,519/16,722, 95% CI 8.7, 9.5) of patients tested positive for HCV-Ab. All

patients with positive HCV-Ab testing received reflex HCV RNA testing. Confirmatory HCV

RNA testing was reactive in 54% (814/1,519, 95% CI 51, 56) of patients who initially screened

positive for HCV, yielding 814 new HCV diagnoses (overall prevalence: 5%). The

seroprevalence of confirmed HCV was 6.6% in males and 3.3% in females. The seroprevalence

of confirmed HCV by race was 5.9% in Whites, 5.5% in blacks, 4% in Other/mixed and 1% in

Asians. A table with full HCV Ab and RNA seroprevalence data in sub-groups, is available in

the **Supplemental Table**.

HCV Risk Factor Analysis

In our simple logistic regression model age, sex, race, ethnicity, housing status, history of

tobacco use, history of alcohol use, history of illicit drug use and insurance type all met the *a*

priori cutoff level for significance (p<0.1) and were included in our multivariate model (Table 2).

In our multiple logistic regression model, independent risk factors for an HCV positive status

included increasing age [10-year aOR 1.26 (95% CI 1.23, 1.30)], male sex [aOR 1.25 (95% CI

1.03, 1.51)], undomiciled housing status [aOR 2.8 (95% CI 2.3, 3.5)], history of tobacco use

[aOR 3.0 (95% CI 2.3, 3.9)], history of illicit drug use [aOR 3.6 (95% CI 2.9, 4.5)], Medicaid

insurance status [aOR 4.0 (95% CI 2.9, 5.5)] and Medicare insurance status [aOR 1.6 (95% CI

1.1, 2.2)]. Relative to the white race, the Black and Asian races were independent protective

factors for an HCV positive status [Black race, aOR 0.78 (95% CI 0.62, 0.98); Asian race, aOR

0.3 (0.1, 0.6].

1

2 **Birth Cohort Sub-Analysis**

3 HCV diagnoses increased with each decade of age, peaking at 58-67 years, before declining

4 again (Figure 1). HCV diagnoses were more common in the 1945-1965 birth cohort compared to

5 the non-birth cohort (7.8% vs. 3%, p<0.001).

6

7 **DISCUSSION**

8

9 To our knowledge, the current study provides the largest cohort of ED-based HCV screening to

10 date. In the US, an estimated 1.7% of individuals are HCV-Ab positive and 1% of individuals

11 have confirmed HCV[15]. In the current study, 9% of individuals tested positive for HCV-Ab, and

12 5% of individuals had RNA-confirmed HCV, which is similar to that reported by other large,

13 non-targeted, ED-based HCV screening studies (HCV-Ab+: 6-13.2%; HCV RNA+: 1.2-7.7%)[11-

14 13,19]. These data suggest that, compared to the general population, the ED services a high-risk

15 population with regards to HCV exposure and seroconversion.

16

17 In 2020, the CDC updated its previous HCV screening guidelines from targeted screening in the

18 birth cohort 1945-1965, to universal screening of all adults 18 years and older[5,20]. In our study,

19 the 1945-1965 birth cohort (which corresponds to an approximate age of 53-73 in our study) had

20 a much higher rate of confirmed HCV, than those who were born either before 1945 or after

21 1965. It is estimated that 2.6% of birth-cohort patients in the US have chronic HCV[20]. In one

22 recent ED-based study of an HCV birth-cohort screening program, approximately 2.3% of

23 patients had confirmed HCV, whereas in our birth cohort sub-analysis, 7.8% of patients had

1 RNA-confirmed HCV[10]. Given the results of our birth-cohort sub-analysis, it was not surprising

2 that increasing age was an independent predictor of HCV positivity. However, it was notable that

3 the prevalence of confirmed HCV was high even in patients born after 1965 (3.1% for patients

4 28-47 years), which was 3-fold higher than the overall US HCV prevalence (~1%)[15]. These data

5 support the current CDC recommendation to screen non-birth cohort individuals.

6

7 Although increasing age was associated with an increased risk of HCV, peaking in the 58-67

8 year-old sub-group, the prevalence fell in the 68-77 year-old sub-group. Thus, it was surprising

9 that Medicare insurance was an independent risk factor for HCV positivity. The estimated

10 prevalence of HCV in the Medicare population ranges between 1.2-3.2%, compared to 5.4% in

11 our study[21,22]. In the Medicare population, HCV is associated with increased all-cause mortality

12 and increased healthcare resource utilization[21,23]. As the baby boomer generation ages,

13 downstream clinical sequelae of HCV are likely to have substantive epidemiologic and economic

14 repercussions, highlighting the need for continued screening and treatment initiatives within this

15 age group.

16

17 US national data demonstrates that Medicaid patients have the highest prevalence of HCV

18 (2.6%), compared to other insurance groups (private, self-insured, Medicare etc.)[22]. In our study,

19 patients with a Medicaid insurance status had a prevalence of 7.2%, which was nearly 2.5-fold

20 higher than those with private insurance. Unsurprisingly, Medicaid status, a crude approximation

21 for low socioeconomic status (SES) was independently associated with having confirmed HCV.

22 These data are particularly concerning, given that adjusted survival analyses demonstrate that

23 among patients with HCV, those with Medicaid have much higher mortality[22]. Given the

1   accessibility of curative treatment and the high-risk nature of HCV in this population, more

2   robust screening efforts must be established in order to connect these patients to appropriate

3   outpatient care.

4

5   In pooled national data, males account for the majority of HCV infections in the U.S., with a

6   male to female HCV prevalence ratio of 2.3 (prevalence: males: 1.31%, females: 0.57%)[24]. In our

7   study, the male sex had an HCV prevalence over twice that of the female sex (6.6% vs. 3.2%),

8   and was an independent risk factor for confirmed HCV infection. This is consistent with one

9   previous ED-based study that explored HCV risk factors in a 1945-1965 birth cohort[10]. The

10   Black race has been previously identified as a risk factor for HCV, with national data

11   demonstrating a prevalence that is 2-3 fold times higher than other racial groups[10,24]. A recent

12   study of four urban emergency departments showed that anti-HCV positivity was higher in

13   Whites than Blacks, although the analysis did not adjust for other important co-variates, so it is

14   unclear if this association was linked to race alone[25]. In our study, HCV prevalence was similar

15   between Whites (5.9%) and Blacks (5.5%). Interestingly, compared to the white race in our

16   multivariate risk analysis, the black race actually appeared to be predictive of a decreased risk of

17   HCV. The Asian race was also independently associated with a decreased risk of HCV and had

18   the lowest seroprevalence of anti-HCV antibody (1.9%) and HCV RNA (1%) among all racial

19   sub-groups. While published HCV data on Asian-American populations are sparse, in one

20   community-based study of Asian-Americans in California, anti-HCV-Ab seroprevalence was

21   5.5%, compared to 2.3% for non-Asians (HCV RNA seroprevalence was not reported)[26]. There

22   are many possible explanations for the discrepancy between previously published reports and our

23   data, but one possibility is that Asian-Americans seem to make up a disproportionate minority of

1   ED visits (5%), relative to the proportion of Asian-Americans living in the local county (17%),

2   resulting in a sampling bias[27]. Alternatively, local HCV prevalence of Asian Americans may be

3   influenced by the ethnic makeup of this subpopulation, as evidence exists that HCV

4   seroprevalence differs drastically by country of origin, and is particularly high in those of

5   Vietnamese heritage, which makes up just 10% of the Asian-American population in the local

6   county[26,28,29]. Alternatively, there may be unexplored lifestyle or socioeconomic factors within

7   this racial group that are confounding this finding. Future studies should explore race as an effect

8   modifier for HCV risk factors in the ED setting.

9

10 In 2020, over half a million Americans were undomiciled, a figure that is expected to rise over

11 the coming decade[30]. California comprises 12% of the U.S. population but accounts for 27% of

12 the nation's homeless population[31]. One previous ED-based study found that homelessness was a

13 risk factor for HCV-Ab seropositivity, but did not explore its relationship with confirmed HCV

14 (detectable HCV RNA)[11]. The seroprevalence of anti-HCV Ab in the homeless population in the

15 US ranges from 19-69%, but few studies report viral-load confirmed HCV[32]. However, one study

16 of five health centers that serviced predominantly homeless populations, found a confirmed HCV

17 prevalence of 8.4% in this population, which was over 50% less than the HCV prevalence

18 reported in our undomiciled sub-group (18.9%)[33]. In our study, an undomiciled status was an

19 independent risk factor for RNA-confirmed HCV, and undomiciled individuals were almost 5-

20 fold more likely to have a new HCV diagnosis compared to domiciled individuals. Homelessness

21 has a well-documented two-way association with illicit and injection drug use, with some studies

22 suggesting that homelessness is a risk factor for future injection drug use, and others suggesting

23 that injection drug use increases the likelihood of future homelessness[34-37]. Interestingly, both an

1   undomiciled status and history of illicit drug use were independently associated with HCV

2   infection, suggesting that there may additional unmeasured behavioral factors in the undomiciled

3   population. A US-based study found that a history of illicit drug use (including IV drug use) was

4   independently associated with chronic HCV, and the prevalence of HCV in this cohort was

5   5.6%[38]. A cross-sectional study in the ED found that patients who injected drugs were almost 16-

6   fold time likely to have HCV[39]. In our study, the prevalence of confirmed HCV in those who

7   used illicit drugs was 10.4%, indicating that a substance use epidemic may be contributing to

8   rising local HCV infections.

9

10   While ED-based, non-targeted HCV screening programs have been shown to be successful in

11   both academic and community settings, many emergency departments may not the resources

12   necessary to conduct universal screening[14,40]. However, targeted screening interventions are

13   likely to be feasible even in EDs with fewer resources. Thus, we believe that our methodology

14   may be used as a model for developing local HCV risk factor profiles, which can be used to

15   target high-risk ED patients in settings without universal screening protocols.

16

17   Our study must be interpreted in light of its limitations. This was a single-center study at a large,

18   academic center with a mixed urban and rural population, thus, our findings may not be

19   generalizable to all settings. This study is limited by its retrospective design, which affected the

20   completeness of certain variables. Finally, data related to certain well-documented HCV risk

21   factors, such as blood transfusion history and sexual history, were not available and were not

22   explored in this ED-based analysis[5]. IL-28 polymorphisms have been associated with

23   spontaneous clearance of HCV; we did not have data on the presence of this polymorphism, and

1 thus could not include it in our model[41]. We do not explore long-term, patient-centered outcomes

2 in this study. Future studies could examine an estimation in the gain in quality-adjusted life years

3 (QALYs) from early HCV diagnosis in the ED setting.

4

5 In summary, the study institution's ED services a high-risk population with regards to HCV

6 positivity. Increasing age, male sex, undomiciled housing status, history of tobacco use, history

7 of illicit drug use, and Medicaid and Medicare insurance were all independent risk factors for

8 HCV positivity. The Black and Asian races had a lower risk of HCV, compared to the White

9 race. Overall, HCV seroprevalence was high in all sub-groups, which supports universal testing

10 in this population. However, risk factor profiles could improve targeted screening at institutions

11 without universal HCV testing protocols.

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1 **CONFLICTS OF INTEREST**
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3 **Conflict of Interest Disclosure:** The authors have no conflicts of interest to disclose.
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1 **Figure Legends**

2 **Figure 1.** A. Hepatitis C Virus (HCV) antibody (Ab) and RNA viral load (VL) seroprevalence

3 by age group. B. HCV Ab and HCV RNA VL seroprevalence by birth cohort (BC, born 1945-

4 1965) and non-BC cohort (born <1945 and >1965).

Table 1. Patient characteristics stratified by HCV infection status

Characteristic	New HCV Diagnosis[1] (n=814)	HCV Negative (n=15,908)	P
Age (years)[2]	54 (± 12)	46 (± 16)	<0.001
Male sex	66% (541/814)	48% (7,601/15,906)	<0.001
Race			
White	50% (407/809)	41% (6,518/15,722)	<0.001
African American	22% (179/809)	20% (3,088/15,722)	0.4
Asian	1% (10/809)	6% (994/15,722)	<0.001
Mixed/Other	26% (213/809)	33% (5,122/15,722)	<0.001
Hispanic Ethnicity	17% (138/810)	22% (3,496/15,752)	<0.001
LGBTQ	4% (2/52)	5% (177/3,428)	1.0
Un-domiciled Status	30% (221/741)	7% (963/14,013)	<0.001
History of HIV	3% (26/814)	3% (445/15,908)	0.5
History of Tobacco Use	76% (608/799)	42% (6,554/15,462)	<0.001
History of Alcohol Use	65% (431/667)	53% (6,666/12,614)	<0.001
History of Illicit Drug Use	73% (499/681)	34% (4,277/12,639)	<0.001
Insurance Type			
Private	8% (68/814)	28% (4,478 /15,907)	<0.001
Medicare	22% (176/814)	20% (3,109/15,907)	0.001
Medicaid	68% (551/814)	49% (7,776/15,907)	<0.001
Self/Uninsured	2% (19/814)	3% (544/15,907)	0.001

[1] Defined as positive HCV antibody *and* HCV viral load.

[2] Reported as mean ± standard deviation

HCV, hepatitis C virus; HIV, human immunodeficiency virus; LGBTQ, lesbian-gay-bisexual-trans-queer;

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Table 2. Simple and multiple logistic regression models identifying risk factors for new HCV diagnoses

Predictive Factor	Bivariate Model		Multivariate Model	
	aOR (95% CI)	P	aOR (95% CI)	P
Age (10 years)[1]	1.02 (1.01, 1.02)	<0.001	1.26 (1.23, 1.30)	<0.001
Male sex	2.2 (1.9, 2.5)	<0.001	1.25 (1.03, 1.51)	0.02
Race				
White (Ref)	-	-		
Black	0.9 (0.8, 1.1)	0.4	0.78 (0.62, 0.98)	0.03
Asian	0.2 (0.1, 0.3)	<0.001	0.3 (0.1, 0.6)	0.002
Mixed/Other	0.7 (0.6, 0.8)	<0.001	0.9 (0.7, 1.2)	0.4
Hispanic	0.7 (0.6, 0.9)	0.001	1.0 (0.8, 1.4)	0.9
Undomiciled Status	5.8 (4.9, 6.8)	<0.001	2.8 (2.3, 3.5)	<0.001
History of HIV	1.1 (0.8, 1.7)	0.5	-	-
History of Tobacco Use	4.3 (3.7, 5.1)	<0.001	3.0 (2.3, 3.9)	<0.001
History of Alcohol Use	1.6 (1.4, 1.9)	<0.001	0.9 (0.8, 1.1)	0.4
History of Illicit Drug Use	5.4 (4.5, 6.4)	<0.001	3.6 (2.9, 4.5)	<0.001
Insurance Type				
Private (Ref)	-	-	-	-
Medicare	3.7 (2.8, 5.0)	<0.001	1.6 (1.1, 2.2)	0.01
Medicaid	4.7 (3.6, 6.0)	<0.001	4.0 (2.9, 5.5)	<0.001
Self/Uninsured	2.3 (1.4, 3.9)	0.002	2.0 (0.9, 4.5)	0.08

Factors trending with the outcome of interest (new HCV diagnosis) in the simple logistic regression (p<0.1) were included in the multiple logistic regression model to assess for independent association.
[1]Age analyzed as continuous variable with output reported as 10-year ORs

aOR, adjusted odds ratio. HIV, human immunodeficiency virus. Ref, reference variable.
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