

# PERSISTENT INEQUITIES IN HCV OUTCOMES FOR PEOPLE WITH HIV WHO INJECT DRUGS ENGAGED IN HIV CARE

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## Introduction

- Oral direct acting antivirals (DAA) with proven effectiveness for HCV cure make it possible to eliminate hepatitis C virus (HCV) at the individual level and also potentially at the population level
- People with HIV (PWH) are at increased risk of HCV infection due to shared modes of transmission
- Once infected with HCV, PWH are at increased risk for chronicity and accelerated liver disease progression to liver failure, liver cancer and death
- Existing infrastructure for HIV care linkage and engagement on which HCV care and treatment can be layered has contributed to enthusiasm for HCV micro-elimination among PWH.
- Data on progress towards HCV micro-elimination in PWH in some regions of the world is encouraging
- There is less data on populations from the United States where black populations are disproportionately impacted by HIV and HCV.

### Objective

- We sought to understand changes in HCV viremia prevalence and associated sociodemographic characteristics of PWH in the oral DAA era compared to the pre-DAA era in a cohort of PWH in an urban setting in the United States

## Methods

### Study Setting

- The Johns Hopkins HIV Clinical Cohort includes PWH receiving care at the John G. Bartlett Specialty Practice in Baltimore, Maryland, U.S who provide written consent to share their medical data.
- The clinic serves a predominantly minority, urban population
- The Johns Hopkins HIV care model provides comprehensive HCV care within an HIV infrastructure using care teams consisting of a clinician, nurse, pharmacist and social worker to ensure continuity of care
- The co-located viral hepatitis clinic provides comprehensive care, including evaluation, treatment, pharmacy prior authorization, and support for patient assistance program (PAP) applications for patients denied insurance coverage for treatment
- Oral DAA regimens became available to patients in routine care (i.e. outside of clinical trials) in late 2014

### Study Sample

- All PWH in care (attending at least 1 HIV primary care visit) in at least one calendar year from 2009 to 2021.

### Primary Outcome

- HCV viremia, defined as HCV RNA >43 IU/ml (selected for concordance with the limit of detection for pre DAA era clinical HCV RNA test results) using the last available HCV RNA test result in each given year
- For years with missing HCV RNA test results, the following assumptions about HCV viremia values were made
  - 1) Patients with a negative HCV antibody test in a year or no HCV test ever were assumed to not have HCV viremia
  - 2) HCV RNA test results from the first available year were backfilled to previous years (<3% of observations)
  - 3) HCV viremia status for years with no updated HCV RNA test we carried forward until evaluation for HCV treatment
- Additional HCV RNA testing was performed on a random sample of stored research samples to validate assumptions,

### Statistical analyses

- The study population in each year was characterized with respect to sociodemographic and biomedical characteristics, and according to prevalence of viremia based on clinical test results, results of HCV RNA testing of stored research samples and using a measurement error correction called Multiple Imputation for Measurement Error (MIME)
- Logistic regression models were fit on study samples from 2009 and 2021 to assess factors associated with HCV viremia in the pre-DAA (2009) and DAA era (2021) periods and tested for whether the association between covariates and HCV viremia changed between the two periods.

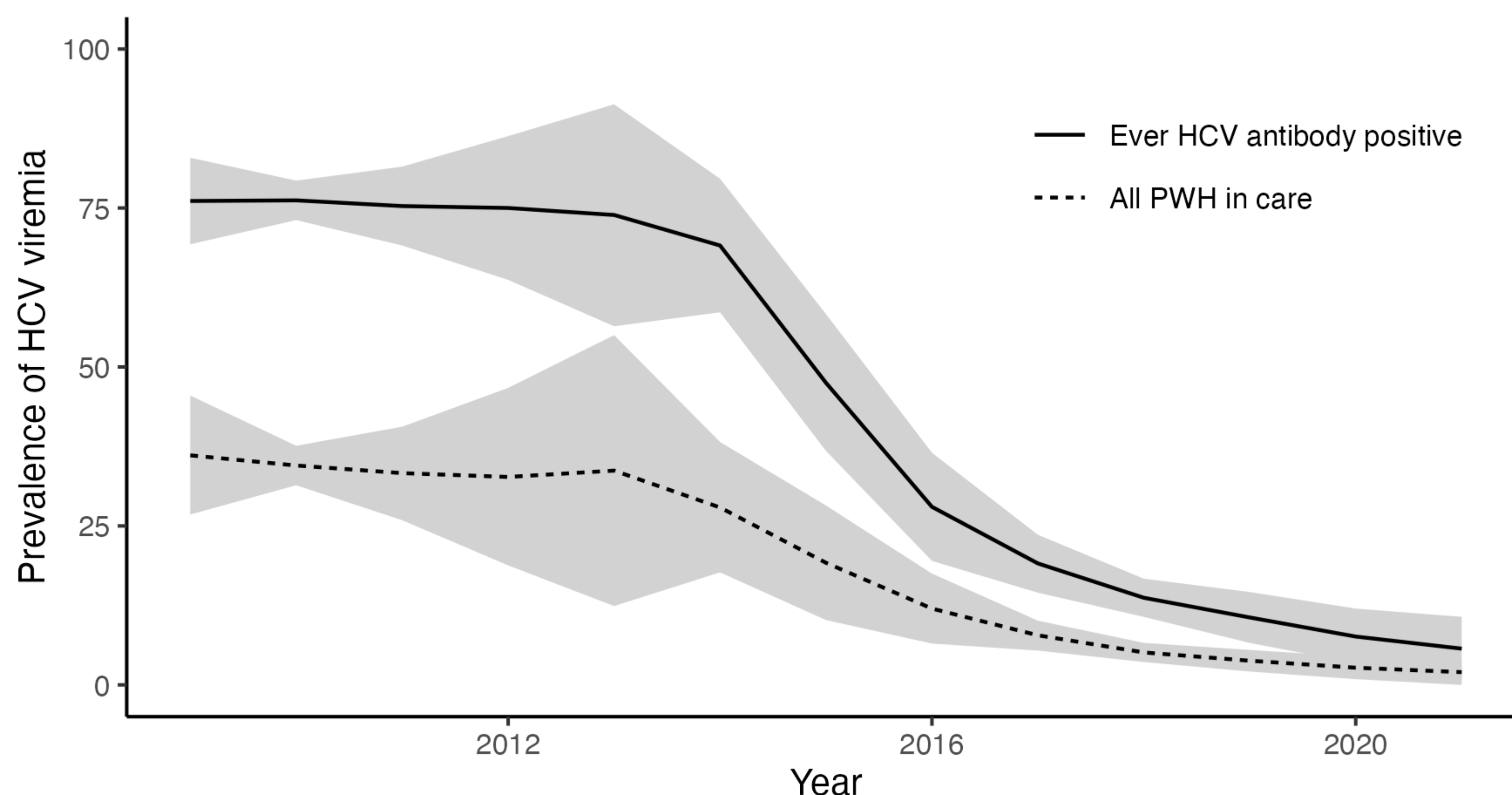
## Results

**Table 1: Characteristics of people with HIV who attended ≥1 HIV primary care visit by calendar year, 2009-2021**

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
N	1767	1833	1863	1869	1656	1784	1783	2036	2127	2098	2057	1997	1925
HCV ab positive	657	681	665	639	580	581	561	641	640	590	565	532	491
New patients	208	173	179	129	74	114	114	102	99	84	94	38	39
Male	1156 (65)	1190 (65)	1208 (65)	1209 (65)	1073 (65)	1145 (64)	1143 (64)	1310 (64)	1367 (64)	1334 (64)	1304 (63)	1273 (64)	1217 (63)
Age	47 (41,53)	48 (41,54)	49 (42,54)	49 (42,55)	50 (43,56)	51 (44,57)	52 (44,58)	53 (46,59)	54 (46,60)	55 (46,61)	56 (47,62)	56 (47,62)	57 (48,63)
Race													
Black	1317 (75)	1371 (75)	1401 (75)	1422 (76)	1303 (79)	1359 (76)	1353 (76)	1550 (76)	1614 (76)	1591 (76)	1587 (77)	1533 (77)	1484 (77)
Hispanic	41 (2)	37 (2)	43 (2)	42 (2)	35 (2)	44 (2)	50 (3)	52 (3)	61 (3)	61 (3)	57 (3)	57 (3)	54 (3)
HIV infection risk factor <sup>a</sup>													
MSM	481 (27)	518 (28)	526 (28)	523 (28)	444 (27)	515 (29)	513 (29)	590 (29)	638 (30)	649 (31)	645 (31)	641 (32)	618 (32)
IDU	521 (29)	545 (30)	531 (29)	515 (28)	472 (29)	476 (27)	445 (25)	546 (27)	563 (26)	513 (24)	489 (24)	450 (22)	424 (22)
Hetero	982 (56)	1009 (55)	1023 (55)	1039 (56)	933 (56)	995 (56)	1000 (56)	1108 (54)	1137 (53)	1115 (53)	1089 (53)	1056 (53)	1022 (53)
On ART	1624 (92)	1713 (93)	1766 (95)	1796 (96)	1605 (97)	1745 (98)	1757 (99)	1996 (98)	2068 (97)	2039 (97)	2017 (98)	1971 (99)	1896 (98)
CD4	373 (211, 493)	392 (237,511)	398 (237, 512)	395 (240,505)	401 (260,510)	409 (266,514)	411 (252, 515)	405 (260, 516)	416 (280, 525)	415 (277, 519)	423 (285, 527)	427 (293, 526)	422 (287, 521)
Years in care	5 (2,9)	6 (2,10)	6 (2,10)	6 (3,11)	7 (3,12)	8 (4,13)	8 (4,14)	10 (5,16)	11 (6,18)	11 (6,18)	12 (6,19)	13 (7,20)	14 (7,21)
HIV RNA <400 c/ml	1169 (66)	1318 (72)	1380 (74)	1437 (77)	1300 (79)	1422 (80)	1424 (80)	1403 (69)	1804 (85)	1813 (86)	1795 (87)	1799 (90)	1727 (90)
Recent substance use													
Cocaine	187 (13)	181 (11)	179 (11)	176 (11)	144 (10)	134 (8)	146 (9)	169 (9)	188 (10)	193 (10)	193 (11)	190 (10)	149 (9)
Opioids	114 (8)	137 (9)	110 (7)	97 (6)	80 (5)	80 (5)	79 (5)	95 (5)	120 (6)	132 (7)	114 (6)	118 (6)	88 (5)
Hazardous alcohol	160 (11)	177 (11)	198 (12)	195 (12)	189 (13)	204 (13)	188 (12)	207 (12)	214 (11)	216 (12)	217 (12)	251 (14)	226 (13)

Data presented as n (%) or median (IQR) <sup>a</sup>Risk groups are not mutually exclusive; Abbreviations: MSM-Men who have sex with men, IDU-Injection drug use, Hetero-Heterosexual, ART- Antiretroviral therapy

**Figure 1: Estimated proportion of each study population (all people with HIV in care or subset who ever tested HCV antibody positive) who had HCV viremia each year in the Cohort with pointwise 95% confidence intervals, 2009-2021**



**Table 2: Correlates of HCV viremia in the pre-DAA (2009) and DAA (2021) eras**

	HCV viremic patients		Odds Ratios for HCV viremia		p <sup>a</sup>
	2009	2021	2009	2021	
N	499	50			
Male	350 (70)	30 (60)	<b>2.31 (1.00, 5.31)</b>	0.71 (0.37, 1.35)	0.02
Age, years	50 (46, 55)	59 (53, 65)	<b>1.28 (1.11, 1.49)</b>	1.06 (0.88, 1.26)	0.08
Black race	428 (86)	42 (84)	<b>2.50 (1.28, 4.90)</b>	0.94 (0.42, 2.13)	0.06
HIV infection risk factor <sup>b</sup>					
MSM	54 (11)	4 (8)	-	-	-
IDU	370 (74)	42 (84)	<b>17.1 (6.83, 42.9)</b>	<b>23.9 (9.63, 59.3)</b>	0.60
Hetero	264 (53)	25 (50)	0.80 (0.41, 1.56)	1.00 (0.55, 1.80)	0.62
On ART	455 (91)	50 (100)	-	-	-
Years in HIV care	6 (2, 9)	14 (11, 19)	1.00 (0.90, 1.11)	0.96 (0.93, 1.00)	0.48
missed ≥50% visits	146 (29)	10 (20)	1.61 (0.56, 4.66)	0.83 (0.39, 1.77)	0.32
HIV RNA <400 cop/ml	308 (62)	40 (80)	1.06 (0.56, 1.99)	0.47 (0.21, 1.03)	0.11
Recent substance use					
Cocaine	95 (19)	12 (24)	1.78 (0.59, 5.35)	1.62 (0.65, 4.05)	0.88
Opioids	71 (14)	7 (14)	1.16 (0.42, 3.25)	0.80 (0.29, 2.19)	0.60
Hazardous alcohol	66 (13)	8 (16)	<b>2.47 (1.06, 5.78)</b>	1.77 (0.73, 4.27)	0.60

<sup>a</sup> p for test of the null hypothesis that OR in 2009 and in 2021 are the same  
<sup>b</sup> Risk groups are not mutually exclusive; Abbreviations: MSM-Men who have sex with men, IDU-Injection drug use, Hetero- Heterosexual ART- Antiretroviral therapy. Age (OR per 5 years)  
 Statistically significant associations highlighted in bold

## Summary

- In this large urban cohort of PWH, there was a 94% reduction in HCV viremia prevalence from 36% in 2009 to 2% in 2021
- The prevalence of HCV Viremia among anti-HCV positive PWH declined 92% from 76% to 6% consistent with HCV cure from oral DAA
- In 2021 (DAA era) there were no differences in HCV viremia prevalence by sex, age or race in contrast to the pre-DAA era.
- In both the pre-DAA and DAA era, history of IDU was the strongest correlate of HCV viremia
- This persistent disparity in HCV outcomes for people who use drugs is a barrier to HCV elimination
- These data provide support for HCV elimination programs that provide access to DAAs and government funded comprehensive programs such as those funded by the Ryan White act in the United states
- Targeted efforts are needed to meet the HCV prevention and treatment needs of people who use drugs

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