

## Abstract

**Background:** Chronic hepatitis C virus (HCV) infection is a prevalent disease among veterans with 3,210 Veterans in our local HCV Clinical Case Registry (CCR) in 2012 (1). Approximately 40% of HIV-infected patients in the Veterans Aging Cohort Study were found to have HCV co-infection (2). HCV co-infection with HIV leads to a higher risk of progression to cirrhosis than those with HCV mono-infection, but direct comparison data between these two groups have been limited. We describe and compare the characteristics of patients who have HCV mono-infection and HIV co-infection at our Washington DC VA Medical Center.

**Methods:** A retrospective review of the HCV CCR at our VA Medical Center was performed for 2008-2013 comparing patients with hepatitis C mono-infection and HIV co-infection. Summary information was collected for age, gender, race, BMI, HCV genotype, fibrosis scores using APRI and FIB-4, MELD scores, cirrhosis diagnosis, those who received treatment, those with viral suppression, hepatocellular carcinoma (HCC) diagnosis, and all-cause mortality. We also compared rates of treatment for the periods 2008-2013 and 2014-3/31/2015.

**Results:** Based on data 2008-2013, there was no statistical difference in MELD scores, cirrhosis diagnosis, treatment received, HCV suppression, HCC diagnosis, and mortality between those with HCV mono-infection and HIV co-infection; but more HIV co-infected patients had a FIB-4 score > 3.25 compared to those with mono-infection (p=0.0061). Compared with 2008-2013, treatment rates for mono-infected, co-infected and all patients increased significantly during 2014-3/31/2015 (p<0.005).

**Conclusion:** HCV patients with mono-infection and HIV co-infection during 2008-2013 were similar in fibrosis and MELD scores, cirrhosis and HCC diagnoses, and mortality with only significantly greater number of HIV co-infected persons having FIB-4 fibrosis score > 3.25. Compared with 2008-2013, treatment rates significantly increased during 2014-3/31/2015.

## Introduction

Chronic hepatitis C virus (HCV) infection is a prevalent disease among Veterans with 225,955 Veterans in the national HCV clinical case registry (CCR) and 3,210 Veterans in our local HCV CCR in 2012 (1). Approximately 40% of HIV-infected patients in the Veterans Aging Cohort Study were found to have HCV co-infection (2). It has been well established that HCV co-infection with HIV leads to a higher risk of progression to cirrhosis than those with HCV mono-infection (3) as well as an increase in HCV-related mortality (4-6), however, with more contraindications to treatment it has been demonstrated that they are less likely to receive therapy compared to those with mono-infection (7, 8). Despite the above data, there are a limited amount of studies with direct comparison data of HCV mono-infected patients with those with HIV co-infection. We describe a large cohort of veterans in our Washington, DC VAMC with hepatitis C mono-infection and compare demographic data, fibrosis scores, comorbid outcomes, and mortality to those with HIV co-infection.

## Methods

A retrospective review of the HCV CCR at our VA Medical Center was performed for the study period 1/1/2008 through 12/31/2013 comparing patients with hepatitis C mono-infection and HIV co-infection. Summary information was collected for age, gender, race, body mass index (BMI), HCV genotype, fibrosis scores using APRI  $[(AST/ULN\ AST)/Platelet] \times 100$ , and FIB-4  $[Age(in\ years) \times AST/(Platelets \times ALT^{1/2})]$ , MELD scores  $[10 * ((0.957 * \ln(Creatinine)) + (0.378 * \ln(Bilirubin)) + (1.12 * \ln(INR))) + 6.43]$ , cirrhosis and hepatocellular carcinoma (HCC) diagnoses, those who received any HCV treatment, those with HCV RNA suppression, and all-cause mortality. Data for comorbid conditions by ICD-9 codes were also collected. Data for HCV genotype and those treated were calculated based on patients with genotype results. HCV treatment was also collected for 2008-2013 and 1/1/2014-3/31/2015. Comparisons were made using Fisher's exact test or chi square for categorical data and t-test assuming unequal sample variances for continuous variables.

## Results

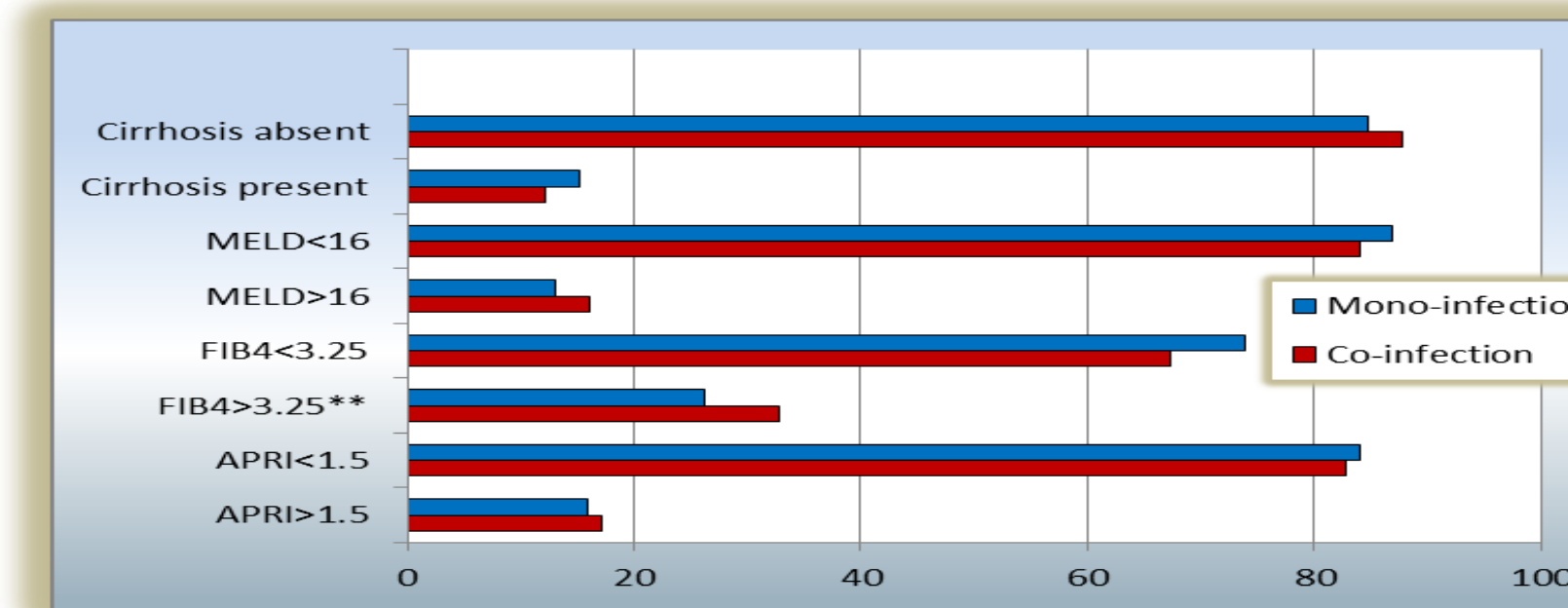
**Table 1: Summary of Patient Characteristics**

CHARACTERISTICS	Mono-infection n=4327	Co-infection n=402
<b>Age, n (%)</b>		
20-29	19 (0.4)	3 (0.74)
30-39	27 (0.6)	4 (1.0)
40-49	168 (3.8)	41 (10.2)
50-59	2246 (51.9)	225 (56.0)
60-69	1605 (37.1)	119 (29.6)
70-79	188 (4.3)	8 (2.0)
80+	74 (1.7)	2 (0.5)
<b>Gender, n (%)</b>		
Male	4160 (96.1)	398 (99.0)
<b>Race, n (%)</b>		
Black or African American	3082 (71.2)	326 (81.1)
White	594 (13.7)	31 (7.7)
Other/Unknown	651 (15.3)	45 (11.2)
<b>Ethnicity, n (%)</b>		
Hispanic	35 (0.8)	4 (1.0)
Not Hispanic	3929 (90.8)	379 (94)
Other/Unknown	363 (8.4)	19 (4.7)
<b>BMI, n (%)</b>	n=4218	n=394
Underweight (<18.5)	153 (3.6)	27 (6.9)
Normal weight (18.5-25)	1354 (32.1)	166 (42.1)
Overweight (25-29.9)	1508 (35.8)	137 (34.8)
Obese (>30)	1203 (28.5)	64 (16.2)

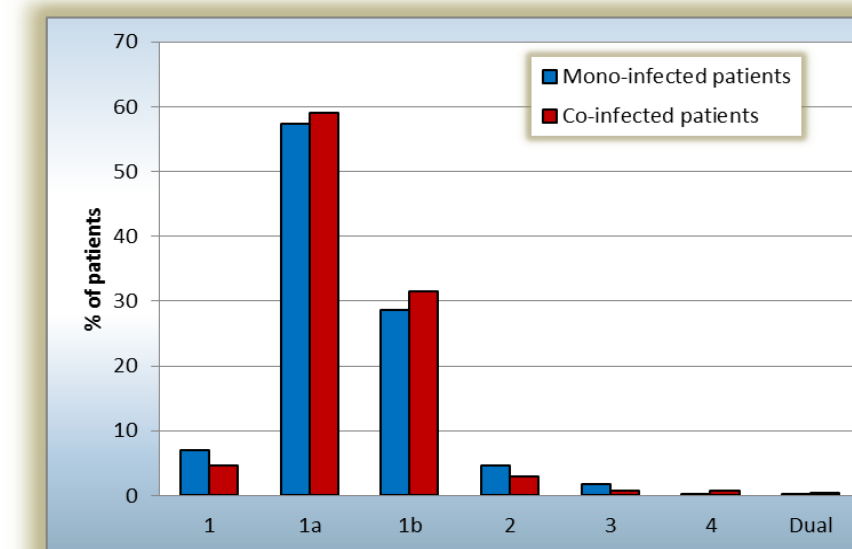
**Table 2. Summary of Comorbid Conditions for HCV Patients**

COMORBID CONDITIONS	Mono-infection n=4327	Co-infection n=402	P value
Hepatitis B (%)	241 (5.6)	34 (8.5)	0.0251
Alcoholic liver disease (%)	200 (4.6)	6 (1.5)	0.0019
Diabetes mellitus	1343 (31.0)	102 (25.3)	0.0202
Substance Abuse	2672 (61.8)	261 (64.9)	0.2170
Any Renal Disease	576 (13.3)	69 (17.2)	0.0335
End Stage Renal Disease	235 (5.4)	33 (8.2)	0.0312
<b>HIV status</b>		n=356	
Median CD4 (IQR)	----	472 (295-677)	----
Suppressed VL (%)	----	246 (69.1)	----

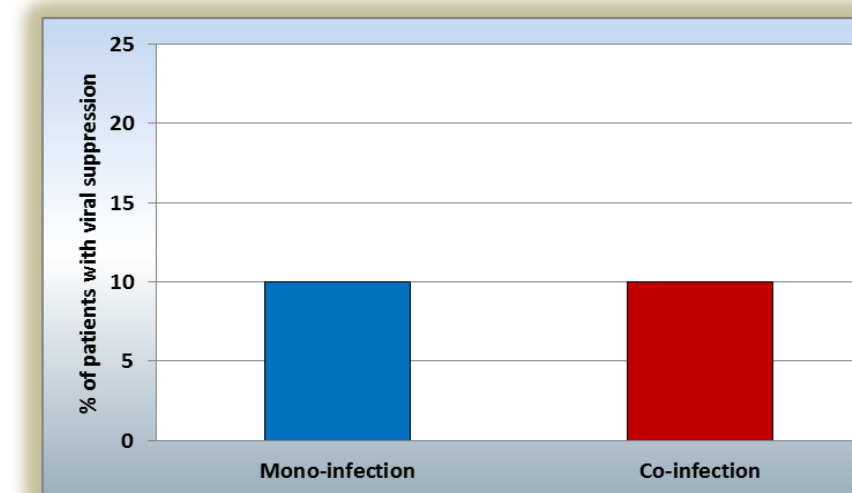
**Figure 1. Cirrhosis and Fibrosis Scores for HCV Patients**



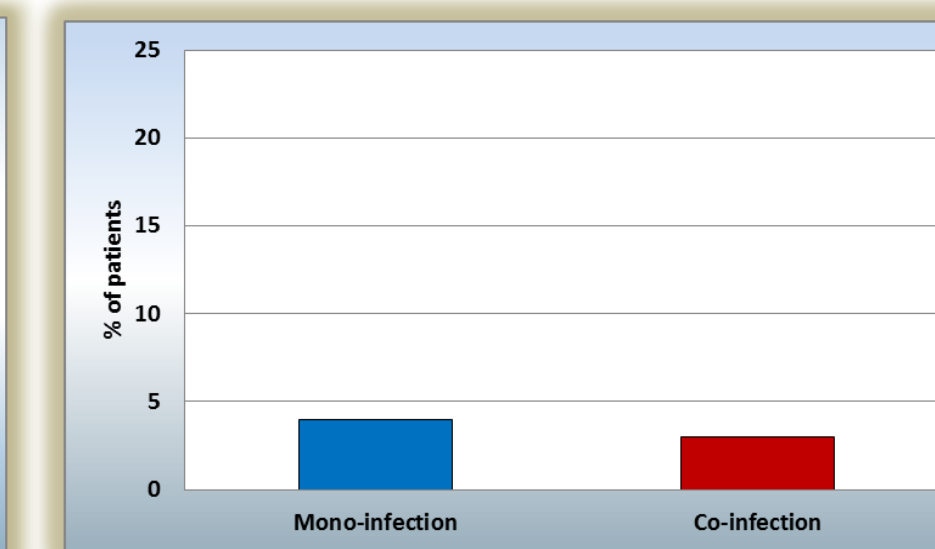
**Figure 2. HCV Genotype Distribution**



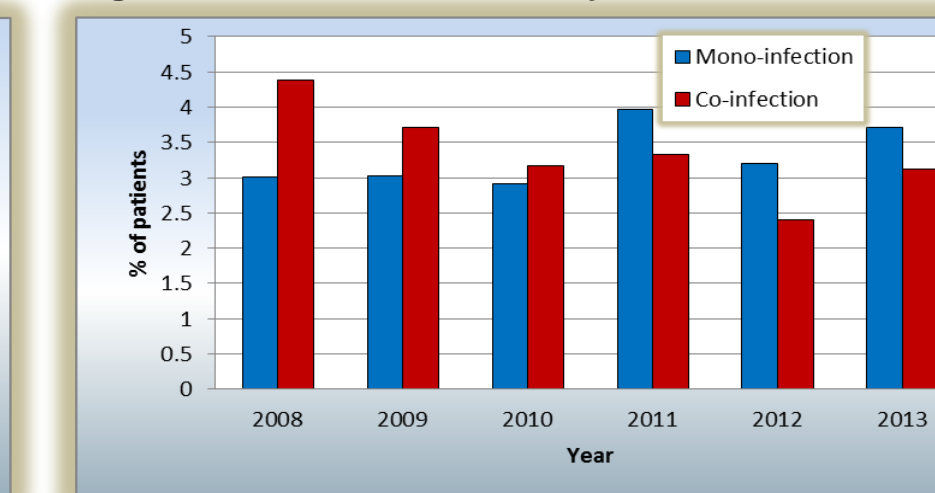
**Figure 4. Patients with HCV Suppression**



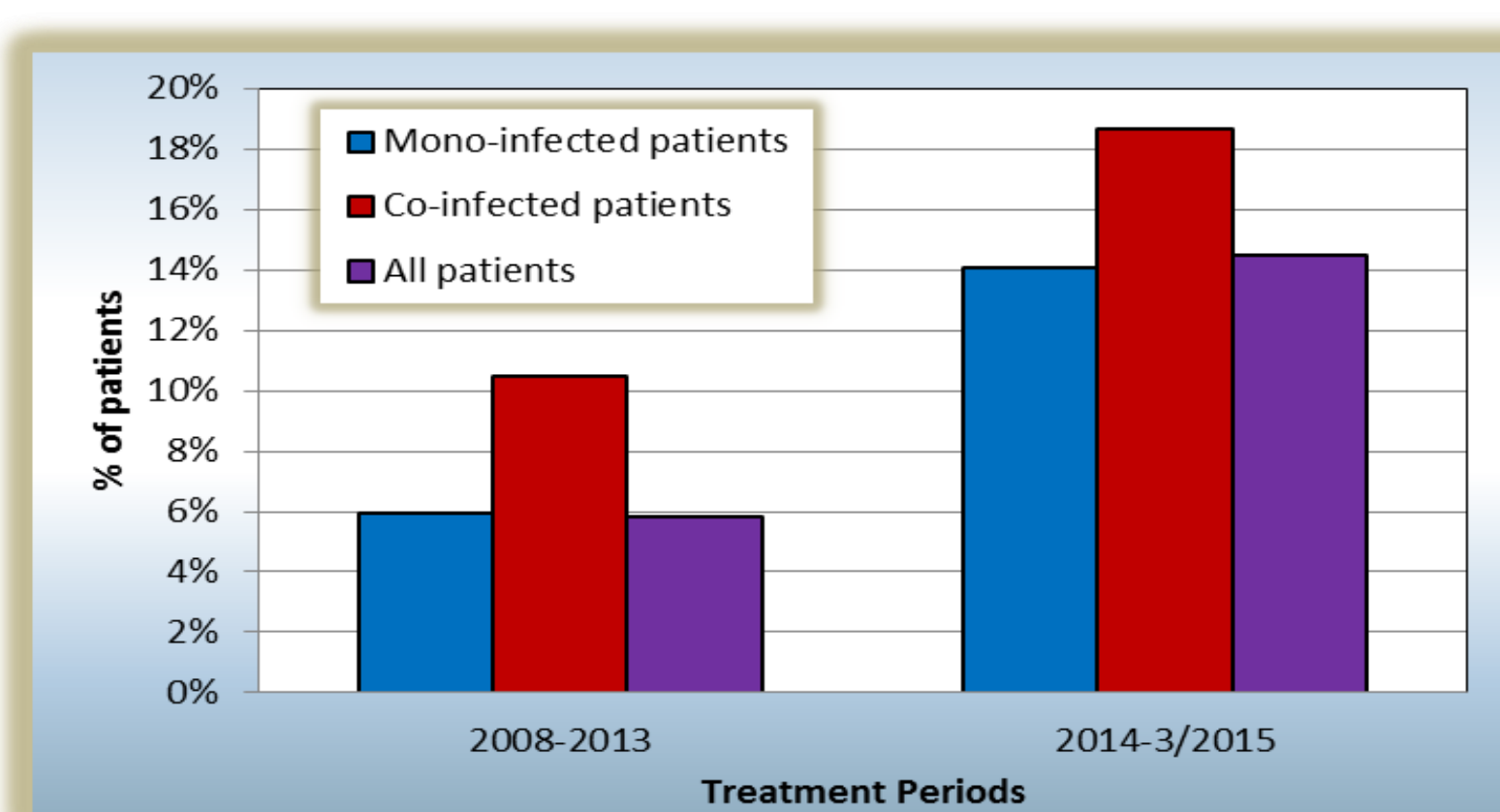
**Figure 3. Hepatocellular Carcinoma Patients**



**Figure 5. All-Cause Mortality for HCV Patients**



**Figure 6. Patients with HCV Treatment during 2008-2013 versus 2014-3/31/2015**



## Conclusions

We found similar rates between HCV patients with mono-infection and HIV co-infection during 2008-2013 for APRI scores > 1.5, HCV treatment, HCV suppression, HCC and cirrhosis diagnoses, and all-cause mortality. Significantly greater numbers of HIV co-infected patients had hepatitis B, renal disease, and FIB-4 scores > 3.25 compared with mono-infected patients, while mono-infected patients had more alcoholic liver disease and diabetes mellitus than co-infected patients. Our findings contrast with prior reports for patients with HCV and HIV co-infection (3-6) but may in part be explained by our patients' stable HIV status and successful HIV suppression (9). With recent availability of new effective HCV therapy, our treatment rates significantly increased during 2014-3/31/2015.

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