

The Impact of Chronic Kidney Disease on Hepatic and Extrahepatic Outcomes Among Patients With Hepatitis C Infection



Kaiser Permanente
Research

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Introduction

Chronic kidney disease (CKD) is an important comorbidity among patients with hepatitis C infection (HCV) and may exacerbate outcomes. We compared anemia, hyperbilirubinemia, end-stage liver disease (ESLD), cryoglobulinemia, hepatocellular carcinoma (HCC), and death between patients with HCV + CKD and those with HCV alone.

Methods

- Study population:** KPSC or KPMAS patients ≥18 years of age with incident HCV or HCV + CKD diagnoses from 1/1/2004 to 12/31/2014. HCV was defined by at least one of: positive HCV RNA, detectable HCV genotype, ≥2 refills of anti-HCV drugs within 1 year, or positive HCV antibody test plus ≥1 HCV-coded visit
- Definition of CKD:** Identified by 2 occasions of eGFR (estimated glomerular filtration rate based on CKD-EPI definition) <60 mL/min/1.73 m² and >90 days apart, with eGFR never returning ≥60
- Definition of baseline:** The year prior to the index date. For HCV patients, index date = HCV diagnosis date. For HCV + CKD patients, index date = the latter of HCV or CKD diagnosis
- Outcomes of interest:** Diagnosis of anemia (defined from laboratory records as hemoglobin <8.5 g/dL); Hyperbilirubinemia and cryoglobulinemia (defined as 1 inpatient or 2 outpatient ICD-9 diagnosis codes); hepatocellular carcinoma and end-stage liver disease (defined from ICD-9 codes as described by Goldberg, 2013 and 2012, respectively, 1,2); and death (defined from administrative data)
- Analytic approach:** Adjusted incidence rates (aIR) and rate ratios (aRR) comparing the HCV-only and HCV + CKD cohorts were estimated using Poisson models (Figure 2). Each outcome was modeled separately
- Follow-up time:** Censored at the earliest of death, disenrollment from KP health plan, or 12/31/2014

References

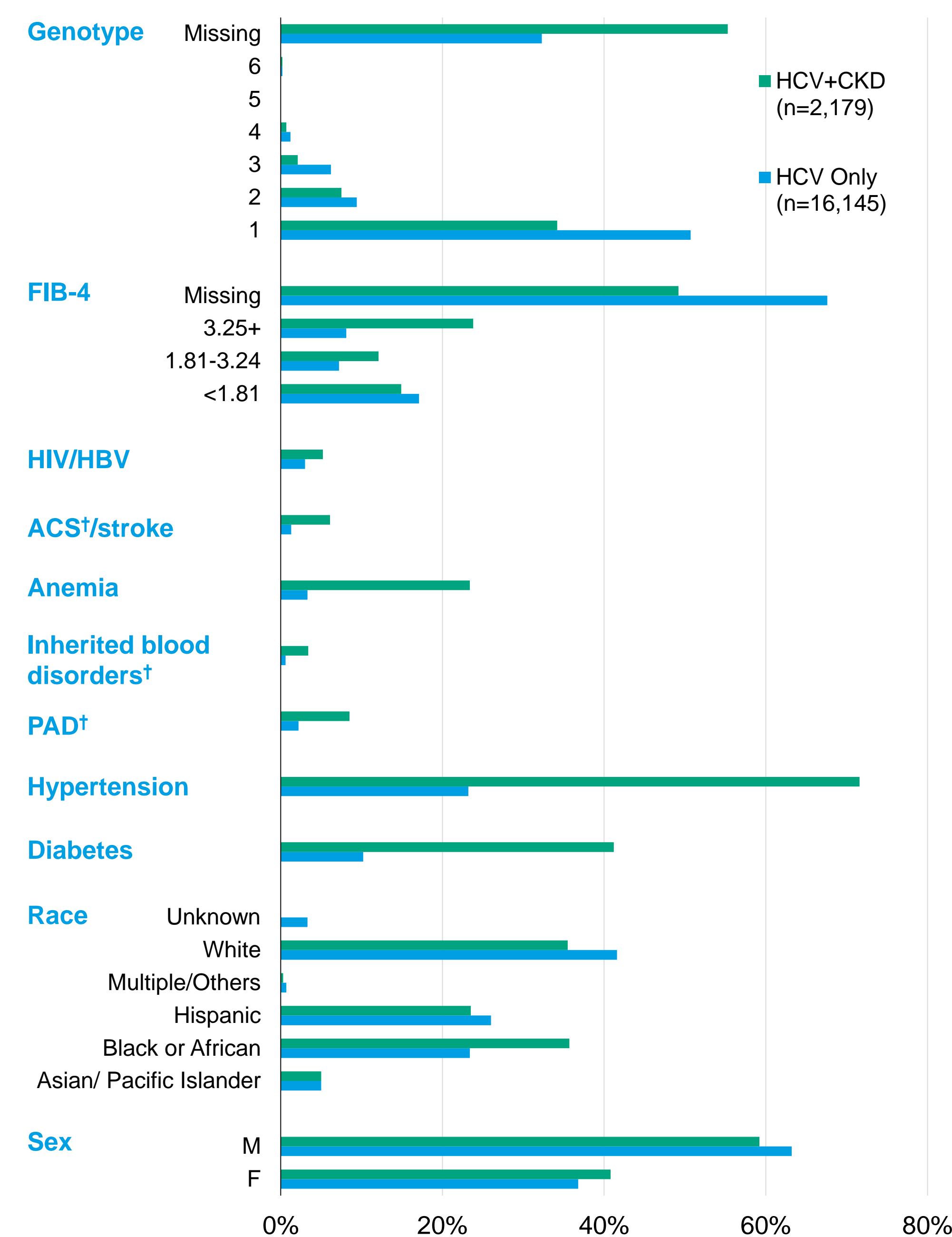
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Funding: Study was funded by Merck & Co., Inc.

Conflicts of interest: JM Arduino is an employee and stockholder of Merck & Co., Inc.

Results

Figure 1. Baseline characteristics of HCV patients by CKD status



[†]ACS=acute coronary syndrome; inherited blood disorders=Thalassemia, Von Willebrand, coagulation defects, sickle cell, hemochromatosis; PAD=peripheral arterial disease.

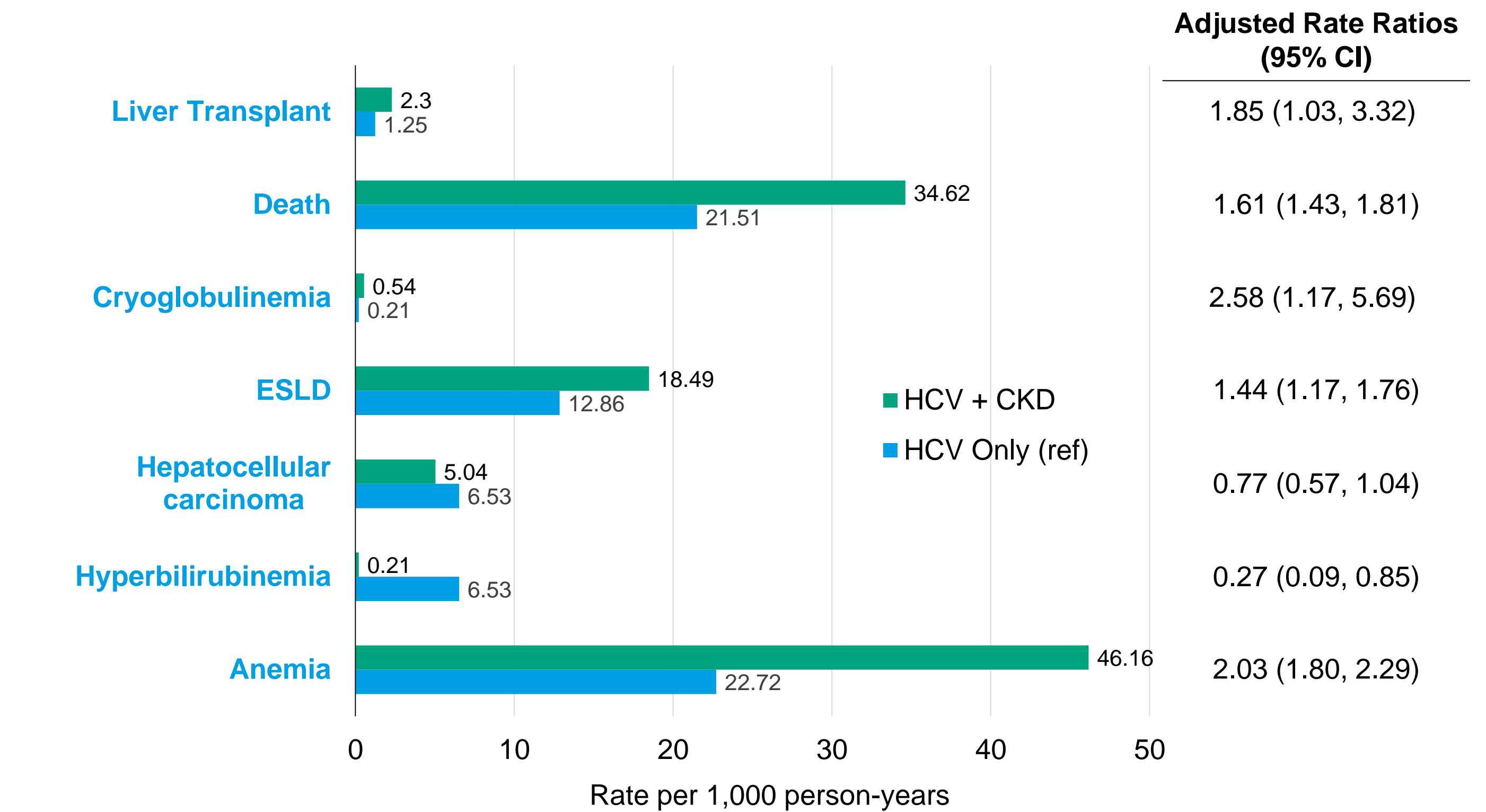
Table 1. Baseline age and healthcare utilization of HCV patients by CKD status

	HCV Only	HCV + CKD
Age at index date		
Mean (SD)	51.9 (10.75)	64.6 (10.77)
Median	52	64
Q1, Q3	46.0, 58.0	57.0, 72.0
Range	(18.0-96.0)	(22.0-97.0)
Baseline outpatient visits		
Mean (SD)	9.1 (12.43)	19.0 (22.29)
Median	5	13
Q1, Q3	2.0, 11.0	6.0, 24.0
Range	(0.0-199.0)	(0.0-181.0)
Baseline inpatient visits		
Mean (SD)	0.3 (1.23)	1.1 (3.46)
Median	0	0
Q1, Q3	0.0, 0.0	0.0, 1.0
Range	(0.0-41.0)	(0.0-114.0)
Baseline emergency visits		
Mean (SD)	0.5 (1.42)	1.3 (2.31)
Median	0	0
Q1, Q3	0.0, 1.0	0.0, 2.0
Range	(0.0-29.0)	(0.0-22.0)

Discussion

- CKD has an independent effect on ESLD, need for liver transplant, anemia, cryoglobulinemia, and death among patients with HCV
- Addressing CKD in HCV-infected populations is important to reduce morbidity and mortality in this population
- Future studies are needed to determine whether “cure” from direct-acting HCV antivirals can slow renal decline and reduce risk of hepatic and extrahepatic outcomes in patients with HCV + CKD comorbidity

Figure 2. Adjusted[†] incidence rates by CKD status and rate ratios for the effect of CKD on hepatic and extrahepatic outcomes in patients with HCV



[†]Adjusted for baseline age; sex; race; HCV genotype; number of inpatient, outpatient, or ED visits; and history of cirrhosis, HIV/HBV, anemia, cardiovascular disease (hypertension, ACS/stroke, PAD), diabetes, or inherited blood disorder.

- We identified 16,145 patients with HCV only and 2,179 patients with HCV + CKD. The clinical and demographic characteristics of these patients at baseline are illustrated in Figure 1 and Table 1
- In adjusted analyses, CKD was associated with a 61% higher death rate, 44% higher rate of ESLD, >2-fold higher rate of anemia, and >2.5-fold higher rate of cryoglobulinemia among patients with HCV (Figure 2)
- We did not observe any association between CKD and HCC
- CKD was associated with a lower rate of hyperbilirubinemia

Limitations

- HCV and CKD are defined by clinical diagnosis as a proxy for true disease onset; thus, there may be some misclassification of exposure status
- We did not adjust for HCV therapy, which may affect generalizability of results. We plan to include this covariate in future work