The Association Between HCV And Comorbid Conditions In 2 Large Patient Cohorts

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Background

- Hepatitis C (HCV) is an increasingly common cause of morbidity and mortality
- An understanding of the populations most affected by HCV and an examination of current institutional care continua may help health care systems to increase their capacity to care for the growing numbers of individuals living with HCV
- While the association between HCV and liver disease is well described, knowledge of the impact of HCV on other clinical conditions is more limited

Objectives

- To utilize electronic medical record (EMR) systems to identify and characterize the populations of individuals living with chronic HCV in two large, integrated health care systems
- To use EMR data to characterize the associations between HCV and other comorbid conditions
- To construct testing and care continua for individuals initiating care at each institution

Methods

- Retrospective analysis utilizing data extracted from EMR systems at Kaiser Permanente Colorado (KP) and Denver Health (DH) and supplemented with chart review
- EMR queries for evidence of HCV antibody testing at KP or DH 2008-2014, RNA testing and HCV treatment 2008-2015, and evidence of sustained virologic response (SVR) through 2016
- Stratification of cohorts by evidence of chronic HCV infection (detectable RNA) versus no chronic HCV infection (HCV antibody negative or HCV antibody positive and HCV RNA negative), demographic variables and clinical characteristics. Continuous variables were compared using T-tests and categorical variables were compared by Chi-squared tests
- Comorbid conditions defined by Elixhauser ICD-9 codes and associated ICD-10 codes
- Associations between comorbid conditions and chronic HCV analyzed through multivariate logistic regression using a stepwise selection criteria. Models were adjusted for age, gender, race, insurance type, tobacco and alcohol use and obesity
- Second cohort developed to analyze testing and care continua for individuals initiating care at KPCO or DHHA 2008-2014
- CDC prevalence estimates of individuals living with chronic HCV used to derive estimates of adults living with chronic HCV at each institution

Results

Table 1. Comparison of Demographic and Substance Use Characteristics Among Individuals Tested for HCV antibody 2008-2014

	Kaiser Permanente Colorado			Denver Health		
	Chronic HCV			Chronic HCV		
	No n=78,178	Yes n=1620	p-value	No n=26,831	Yes n= 1,859	p-value
Age						
Age, Median (IQR)	41 (29, 55)	54 (47, 59)	<.0001	40 (28, 51)	47 (41, 53)	<.0001
Born 1945-1965	26,908 (34%)	1,218 (75%)	<.0001	26,831 (42%)	1,351 (73%)	<.0001
Gender						
Male	35,147 (45%)	983 (61%)	<.0001	13,351 (50%)	1,244 (67%)	<.0001
Female	43,031 (55%)	637 (39%)		13,480 (50%)	615 (33%)	
Race/Ethnicity						
White, Non-Hispanic	35,430 (45%)	591 (37%)	<.0001	8,962 (33%)	757 (41%)	<.0001
Black	5,204 (7%)	161 (10%)		5,246 (20%)	421 (23%)	
Hispanic	13,336 (17%)	326 (20%)		10,311 (38%)	620 (33%)	
Other	24,208 (31%)	542 (33%)		2,312 (9%)	61 (3%)	
Insurance						
Commercial	71,053 (91%)	1,300 (80%)	<.0001	3,216 (12%)	83 (5%)	<.0001
Public	13,895 (18%)	434 (27%)		8,539 (32%)	394 (21%)	
None	NA	NA		15,076 (56%)	1,382 (75%)	
Substance Use						
Alcohol Abuse	695 (1%)	91 (6%)	<.0001	8,092 (30%)	1,221 (66%)	<.0001
Current Tobacco	12,569 (16%)	643 (40%)	<.0001	11,448 (43%)	1,395 (75%)	<.0001
History of Tobacco	17,117 (22%)	453 (28%)	<.0001	7,266 (27%)	889 (48%)	<.0001
Illicit Drug Use	3,055 (4%)	127 (8%)	<.0001	5,920 (22%)	1,079 (58%)	<.0001

Figure 1. Association Between HCV and Comorbid Conditions at Kaiser Permanente Colorado and Denver Health

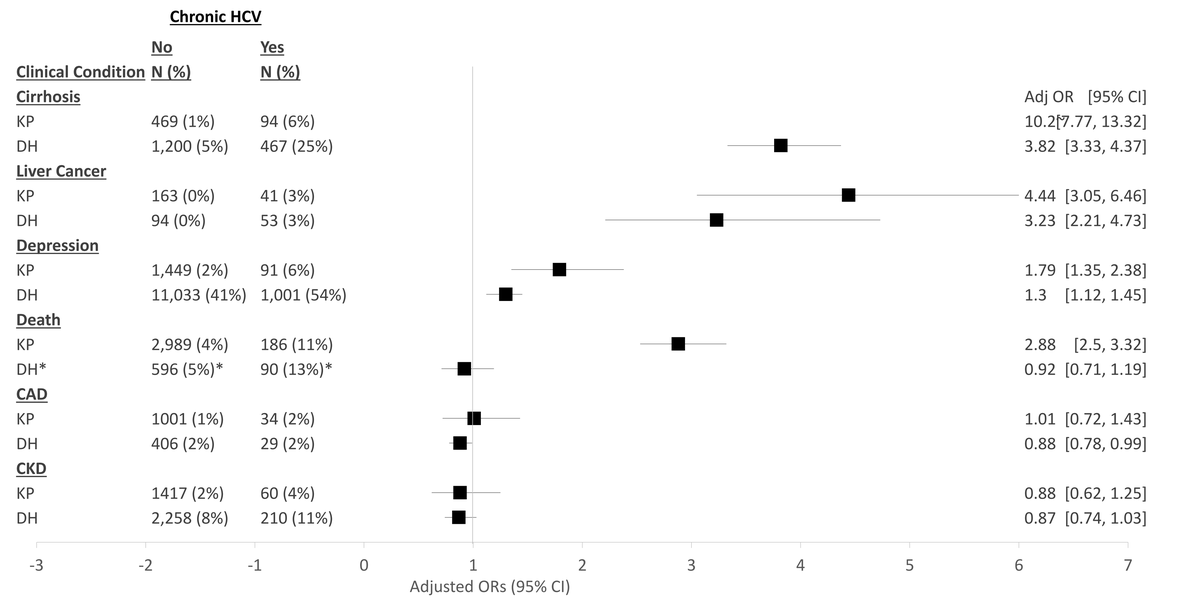


Figure 1. Prevalence of comorbid conditions and death among individuals without and with detectable HCV RNA. Adjusted odds ratios and 95% confidence intervals for each condition indicate the association between HCV and the condition when controlling for demographic variables and relevant clinical characteristics. KP=Kaiser Permanente Colorado, DH=Denver Health, CAD=Coronary Artery Disease, CKD=Chronic Kidney Disease. *Death data for individuals in the DH cohort was only available for individuals who initiated medical care at DH from 2008-2014. ~The adjusted odds ratio for cirrhosis among individuals with HCV RNA in the KP cohort is outside of the scale of the graph thus not depicted.

Figure 2. HCV Care Continuum for New KP Members 2008-2015

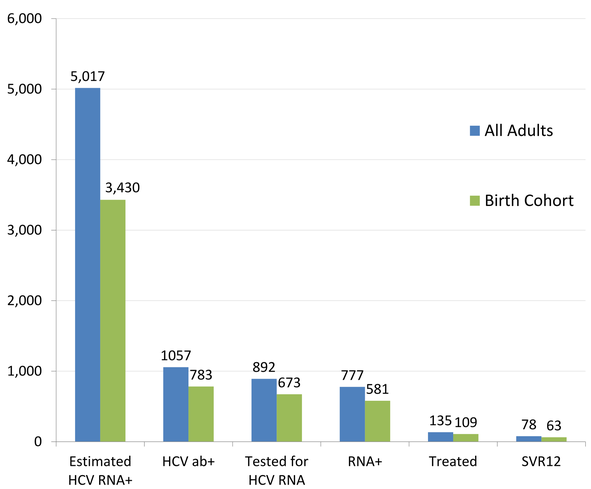
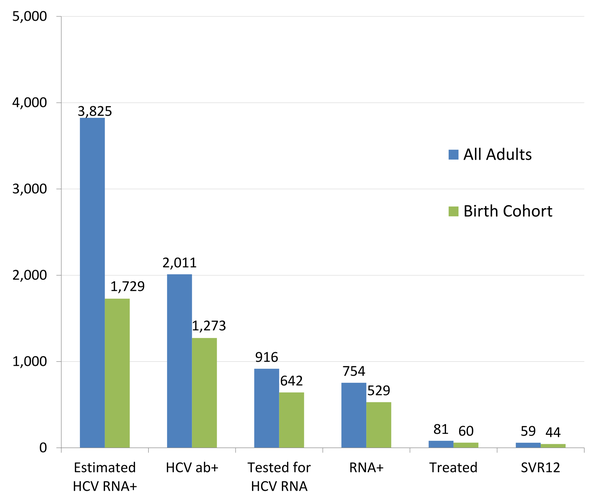


Figure 3. HCV Care Continuum for New DH Patients 2008-2015



Figures 2 and 3. Of the 358,329 adults who enrolled in care at KP from 2008-2014, 25,696 (7.2%) were tested for HCV. Of the 273,244 adults newly initiating care at DH during the same time frame, 14,968 (5.5%) were tested for HCV. Estimates of numbers of individuals living with chronic HCV were derived by applying U.S. prevalence data to the cohorts of individuals newly enrolling in care at each institution. Percentages of individuals with positive HCV RNA tests among those estimated to be HCV RNA+ ranged from 16% to 31%. Continua from both institutions revealed large gaps between HCV RNA+ diagnoses and HCV treatment.

Conclusions

- Extraction of data from EMRs allowed for institution-specific analyses of HCV among enrolled patients
- Compared to patients who tested negative for HCV antibody or RNA, individuals who tested positive for HCV RNA were more often older and male, were more likely to use tobacco or illicit drugs and to abuse alcohol
- In addition to cirrhosis and liver cancer, depression, coronary artery disease, chronic kidney disease and death were more common among individuals with chronic HCV
- Adjusted ORs for associations between HCV RNA and cirrhosis, liver cancer and depression were significant. The adjusted OR for death was significant among the KP cohort only, and the adjusted ORs for coronary artery disease and chronic kidney disease were not significant.
- Care continua analyses suggest wide variability in screening and follow up testing between institutions and populations, though both institutions treated fewer than 5% of the estimated numbers of patients living with chronic HCV who were newly enrolled in care from 2008-2014

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