

302. HCV Care in Federally Qualified Health Centers During the Opioid Epidemic: A Retrospective Cohort Study

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Background. Federally qualified health centers (FQHCs) serve diverse communities in the United States (US) and could function as important venues to manage hepatitis C virus (HCV) infections. Little is known on HCV outcomes in underserved communities as most of the current data are derived from clinical trials, commercially insured patients, or small health center samples. We aimed to determine the proportion of HCV testing, factors associated with treatment initiation, and real-world treatment outcomes in a large, national diverse sample of US FQHCs during the opioid epidemic.

Methods. We created a retrospective cohort of adults seen at 341 participating FQHCs in 19 US states. Inclusion criteria were: (1) clinical visit between January 01, 2012 and June 30, 2017; (2) ≥18 years of age. Outcomes included HCV testing proportion, stratified by diagnosis of opioid use disorder (OUD); treatment initiation rates; and sustained virologic response (SVR), defined as undetectable HCV RNA 3 months after treatment completion. We identified factors associated with testing, treatment initiation, and SVR using logistic regression.

Results. Of the 1,508,525 patients meeting inclusion criteria, 88,384 (5.9%) were tested for HCV, and 8,694 (9.8%) of individuals tested had reactive results. Of the 6,357 with HCV RNA testing, 4,092 (64.4%) had detectable RNA. Twelve percent of individuals with chronic HCV and evaluable data initiated treatment. Of those, 86% reached SVR. Having commercial insurance (aOR, 2.10, 95% CI, 1.45–3.02), older age (aOR, 1.07, 95% CI, 1.06–1.09) and being Hispanic/Latino (aOR, 1.35, 95% CI, 1.33–1.38) or Asian/Pacific Islander (aOR, 1.84, 95% CI, 1.79–1.90) were independently associated with higher odds of treatment initiation after multivariable adjustment. Only 8% of individuals with chronic HCV were tested for HIV, and 15% of individuals with identified OUD were tested for HCV.

Conclusion. During the opioid epidemic, fewer than 20% of individuals with identified OUD were tested for HCV at evaluated FQHCs. In addition, approximately 10% of patients initiated treatment and SVR was lower than expected. Expansion of HCV management into community clinics must consider measures to monitor and evaluate treatment effectiveness, and to improve outcomes if cure rates are low.

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303. A Surrogate Rodent Model for Studying Hepatitis C Virus-specific CD8 T-cell Impairment and Vaccine Prevention

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Background. Virus-specific CD8 T cells are essential for control of acute hepatitis C virus (HCV) infections, yet spontaneously fail in most patients leading to lifelong chronicity and increased risk for severe liver diseases. Efforts to study HCV-specific CD8 T-cell impairment have been hampered by a lack of small animal models. Recently, we established a rat model of chronic HCV-like infection using a hepatitis C virus homolog identified in *Rattus norvegicus*. The nature of virus-specific CD8 T-cell immunity in this model has yet to be determined.

Methods. Using two MHC class I tetramers against epitopes located in the E1 and NS5B proteins, we tracked the induction and phenotype of virus-specific CD8 T cells during chronic infection. Responses to infection were similarly analyzed in immune rats that had been vaccinated against the NS3-5B proteins, a strategy that is effective in this experimental setting.

Results. Virus-specific CD8 T cells expanded vigorously in liver shortly after infection but did not develop into functional effectors based upon failure to produce cytokines (IFN γ , TNF α , IL-2, IL-4, IL-10, IL-17A) following peptide stimulation. Notably, subversion of responses was not due to viral escape from T-cell recognition, but rather an intrinsic defect in the antiviral response. Indeed, these populations expressed the inhibitory receptor programmed cell death-1 and other markers consistent with an arrested effector-like state precluded from long-term memory formation (CD127^{CD27}CD28^{CD62L}GranzymeB⁺). In contrast, adenoviral immunization of naïve rats protected virus-specific T cells from functional impairment after infection and supported memory response development, including against the E1 epitope not encoded by vaccine.

Conclusion. Together, our findings reveal a spontaneous failure of virus-specific CD8 T cells following rat hepatitis C challenge that is highly reminiscent of human HCV infections. Furthermore, these results highlight the utility and significance of this model for understanding mechanisms of HCV persistence and protective immunity necessary for the development of effective vaccines and immune interventions.

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304. Hepatocellular Carcinoma Occurs Frequently and Early After Treatment in HCV Genotype 3 Infected Persons Treated with DAA Regimens

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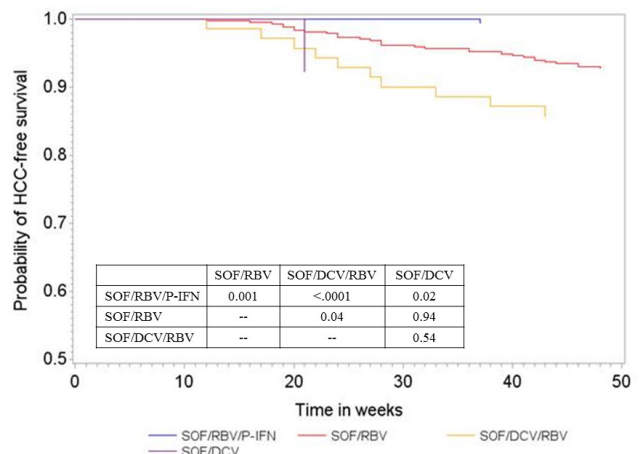
Background. Treatment of HCV with directly acting antiviral agents (DAAs) is associated with a significant reduction in cardiovascular, metabolic and cancer risk. However, there are conflicting data regarding the risk of hepatocellular carcinoma (HCC) after DAA treatment. Risk of HCC in HCV genotype 3 infected persons after DAA therapy is not well known.

Methods. We prospectively studied HCV-infected persons initiated on treatment between October 2014 and March 2017 at two centers in Pakistan. All persons were free of HCC at study initiation. The occurrence of HCC was confirmed based on radiologic findings on a triphasic CT on 64 slice MDCT scanner. The treatment regimen was at the discretion of clinical care providers, taking into account the national guidelines and patient preferences. Patients were followed for 24 weeks after the completion of therapy. Informed consent was obtained from all participants.

Results. A total of 662 persons were initiated on treatment. Median age (IQR) was 50 (41, 57) years and 48.8% were male. At baseline, 49.4% were cirrhotic with 90% of cirrhotics having compensated cirrhosis. 91% were genotype 3 and SVR was attained in 91.9%. Treatment regimens used were: Sofosbuvir (SOF)/ribavirin (RBV)/pegylated interferon (PEG-IFN), 25.2%; SOF/RBV, 62.4%; SOF/RBV/daclatasvir (DCL), 10.6%; SOF/DCL, 2.0%. Incident HCC was detected in 42 patients (12.8%) in the six month period after treatment completion, and was exclusively observed in those with cirrhosis. In multivariable Cox regression analysis, SVR was associated with a reduction in HCC risk (HR, 95% CI: 0.35, 0.14, 0.85) while SOF/RBV/DCL regimen (compared with SOF/RBV/PEG-IFN) was associated with an increased risk of HCC (HR, 95% CI: 17.32, 2.14, 140.36). In K-M plots by treatment regimen, those treated with SOF/RBV, SOF/RBV/DCL, or SOF/DCL regimens had shorter HCC-free survival compared with those treated with a SOF/RBV/PEG-IFN regimen. (See figure)

Conclusion. In a predominantly genotype 3 cohort, incident HCC occurs commonly and early after treatment completion, and exclusively in those with pretreatment cirrhosis. SVR reduces but does not completely eliminate the risk of HCC. Treating HCV-infected persons before the development of cirrhosis may reduce future risk of HCC.

Figure. Hepatocellular carcinoma free survival, by treatment regimen



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305. Using Big Data to Re-Engage Hepatitis C-infected Persons: A UK Operational Delivery Network's Experience

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Background. The prevalence of hepatitis C (HCV) varies across different risk groups in the UK. In England, responsibility for the co-ordination and administration of DAAs (direct-acting antivirals) to HCV PCR positive patients is with 22 regional

“Operational Delivery Networks” (ODNs). To attempt to eliminate Hepatitis C before 2030, Public Health England (PHE) and NHS England (NHSE) are attempting to re-engage previously diagnosed infected persons. To this end, ODNs have been supplied with historical antibody result data to target and reengage individuals for PCR testing and intervention if required. A study was designed to evaluate these data to help with informing ODN decisions. This study aimed to ensure that the data accurately identified patients that were PCR positive for HCV and thus fit the current criteria for receiving DAAs.

Methods. The regional ODN for the West Midlands was provided with 4540 patients with historical positive HCV antibody results, collected by a PHE surveillance system, to target for DAA intervention. DAA-treated patients had been excluded. Patient details were cross-referenced with all PCR results from January 1, 1996 up to January 1, 2019 at several regional laboratories (Public Health England Birmingham, the Queen Elizabeth Hospital, City and Sandwell Hospital) and national treatment data.

Results. PCR data were found for 988, 276 (28%) of whom had received treatment. Of the 712 persons untreated, 347 (49%) were PCR negative and thus would not fit the criteria for receiving DAAs. 365 (51%) had a positive PCR result without a record of treatment would be eligible for DAAs (see Figure 1).

Conclusion. Our study suggests approximately one-third of patients identified by cross-referencing NHSE treatment and PHE epidemiological HCV antibody databases will be PCR-positive and suitable for re-engagement. Epidemiological data needs to be accurately curated when implementing public health control measures. Using “Big Data” to target interventions has several limitations but can be useful. DAAs for HCV are not without risk and administration should be clinically justified. Re-testing individuals prior to intervention is essential and other methods of elimination, for example “test and treat,” may be more efficient and accurate.

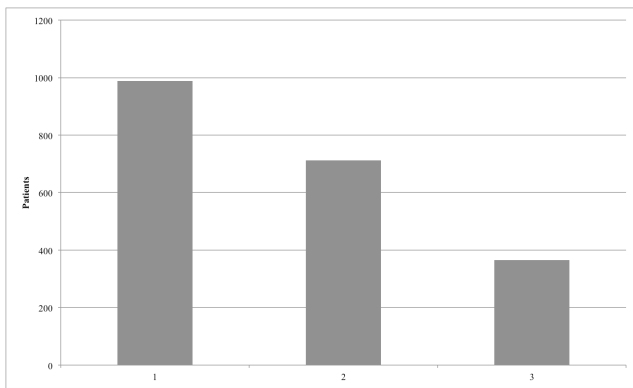


Figure 1: Breakdown of historical Hepatitis C antibody results. (1) Those with PCR result identified. (2) PCR result identified but excluding prior successful antiviral treatment. (3) Those with previous PCR result with no evidence of prior antiviral treatment who are PCR positive.

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306. CD8+ T-Cell Responses to Chronic Hepatitis C in Pregnancy

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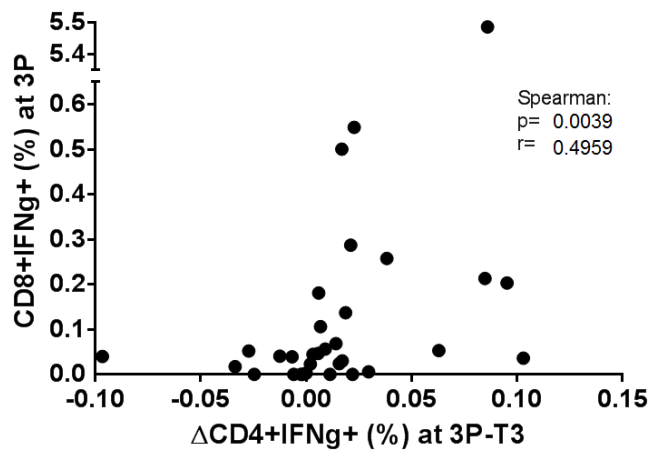
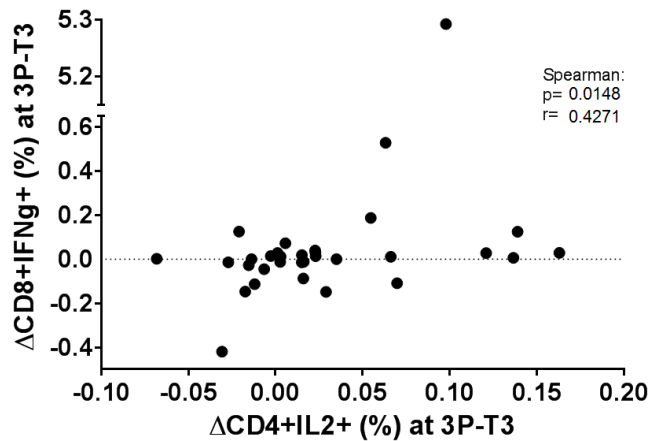
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Background. Chronic hepatitis C virus (HCV) infection is marked by stable, high -level viremia and a failed T-cell response. HCV-specific CD4+ helper T cells are rare, and CD8+ cytotoxic T cells are functionally exhausted or ineffective due to viral escape mutations. Postpartum, a subset of infected women experience a substantial drop in viremia. Preliminary data indicate that this unusual viral decline may be linked to a resurgence of HCV-specific CD4+ T cells producing Th1 cytokines. How improved CD4+ helper T-cell function might affect viral replication in this scenario is not established. Here we tested the hypothesis that improved CD4+ T cell help mediates control of chronic HCV replication through enhanced CD8+ T-cell function.

Methods. We examined plasma HCV RNA viral load (VL) and HCV-specific T-cell responses in 33 women with chronic HCV during the third trimester (T3) and at 3 months postpartum (3P). HCV-specific CD4+ and CD8+ T-cell IL2 and IFN γ responses were measured by intracellular cytokine staining following stimulation of peripheral blood mononuclear cells with peptide pools corresponding to the HCV proteins NS3, NS4a, and NS4B.

Results. Median VL dropped from 5.87 log₁₀ at T3 to 5.25 log₁₀ at 3P ($P < 0.0001$, Wilcoxon signed rank), with a wide range from +0.4 log₁₀ to -4.2 log₁₀. The degree of decline correlated significantly with improved frequencies of HCV-specific CD4+ T cells producing IFN γ ($P = 0.015$ Spearman) but did not correlate with CD8+ T-cell changes. Nevertheless, improved T helper function correlated with increased HCV-specific CD8+ T-cell function (Δ CD4+IL2+ vs. Δ CD8+IFN γ +, $P = 0.015$ Spearman, graph 1; Δ CD4+IFN γ + vs. CD8+IFN γ + at 3P, $P = 0.004$ Spearman, graph 2).

Conclusion. Despite no significant association between virus-specific CD8+ T-cell Tc1 cytokine production and postpartum viral control, our data suggest that recovery of CD4+ T-cell help may augment CD8+ T-cell function. Further study incorporating viral genomic sequences to focus on intact class I epitopes is needed to clarify the relationship of improved CD8+ function and viral control in this unique model of immune restoration.



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307. Overcoming Hepatitis C Elimination Challenges in the Coachella Valley through the Collaboration of Linkage to Care, a Managed Care Organization, and a Federally Qualified Health Center

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Background. Per the Centers for Disease Control and Prevention, 2.4 million Americans have the hepatitis C virus (HCV). New cases increased by 14% from 2014 to 2016 in California with 400,000 infections, 4,000 infections in the Coachella Valley and about 50% unaware of their diagnosis. A barrier to elimination is the lack of rapid screenings and linkage to care (LTC) of infected individuals into an integrated system. Thus, we developed a program at the Hepatitis Center of Excellence (HCE) where pharmacists in a managed care organization (MCO) provide opportunities to overcome these boundaries. The partnership of the MCO and federally qualified health center (FQHC) was established in 2017 to expand access to care to the HCV community. We anticipate that our program will eliminate HCV in the Coachella Valley by modeling past success in human immunodeficiency virus (HIV) testing and LTC at the FQHC through an interdisciplinary approach.

Methods. A single-center, retrospective analysis from January 2017 to December 2018 of HCV individuals was conducted at the pharmacist-led HCE in Palm Springs, California. The LTC team approached barriers through prompt free screenings and major advocacy. Pharmacists and specialty physicians collaborated to ensure rapid assessment, treatment initiation and completion, and sustained virologic response (SVR). The HCE has adapted the HIV testing and LTC model in hopes of achieving similar feats. From 2014 to 2018, 92,947 total HIV tests were performed with 90.2% of