

# HIV/HCV Co-infection

BY NEIL FISHER, MD, CCHP

## New guidelines, opportunities & challenges with the incarcerated population in the U.S.

**AT YEAR-END 2015, THE INCARCERATED POPULATION IN THE UNITED STATES WAS 2,173,800**, according to the Bureau of Justice Statistics, approximately 0.68% of the U.S. population. According to the Institute for Criminal Policy Research, the United States has the largest prison population in the world and its per-capita incarceration rate is second only to the small island nation of the Seychelles. No other Western country comes close to the U.S. incarceration numbers.

The infectious disease burden in corrections is higher than in the general population, with increased rates of HIV, hepatitis C (HCV), sexually transmitted diseases and tuberculosis. The prevalence of HIV infection is approximately five times greater than in the population at large.

The prevalence of HCV in corrections is staggering. An article by Varan and colleagues in the *Public Health Report* (2014) reviewed data from 12 state prison systems performing routine HCV antibody testing from 2001 to 2012, and sero-prevalences of HCV ranged from 9.6% to 41.1%. This same group estimated the national state prisoner seroprevalence to be 17.4%.

## HIV/HCV co-infection

HCV and HIV share common routes of transmission, and in the correctional population, this is most commonly injection drug use. The interaction between HIV and HCV in a co-infected patient affects the transmission, as well as the natural history of HCV infection. People with HIV not on antiretroviral treatment (ART) are less likely to spontaneously clear HCV infection and have higher HCV viral loads as the transmission efficiency of HCV increases in the presence of HIV infection and the perinatal transmission risk is doubled in HIV-infected mothers. It is well established that liver fibrosis associated with HCV progresses more rapidly in individuals with HIV even if they receive effective ART.

## New generation antivirals

Understanding the known complications of HCV and HIV/HCV, few working in the medical field would argue that we have seen remarkable progress in HCV treatment over the past four years with the FDA approval of multiple new drugs to treat this virus.

It was only in 1989 HCV was identified (it was previously known as non-A/non-B hepatitis) and the first tests for HCV antibodies became available in 1992. In 2013, the first of the new generation, direct-acting antivirals (DAAs) for HCV were approved and studies supported their safety and efficacy in co-infected patients. We are now seeing rates of sustained viral response (SVR) utilizing these new anti-HCV medications exceeding 90%. The expectation is these

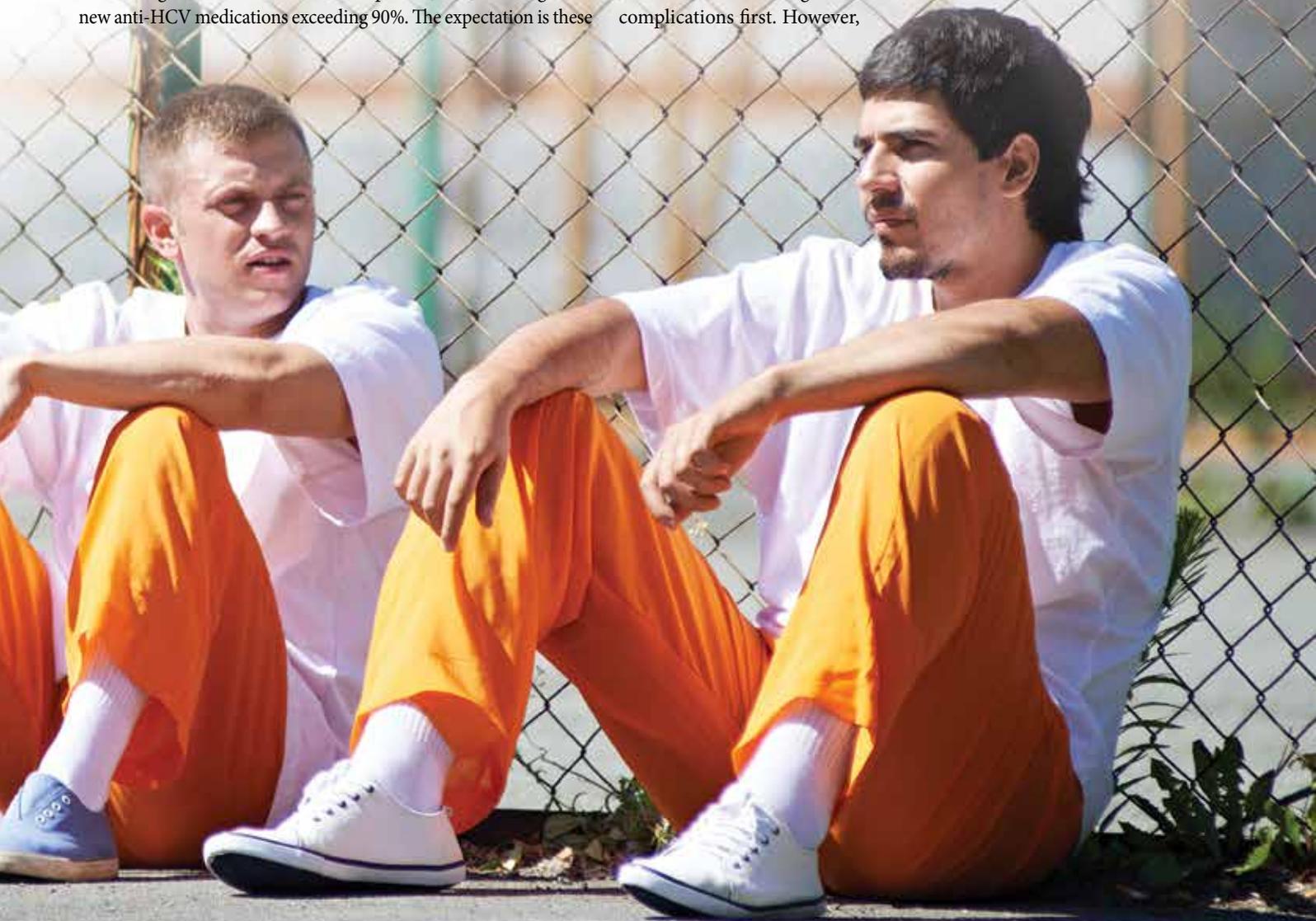
patients are cured of HCV—usually after just 12 weeks of therapy.

It has been shown that curing HCV leads to improved clinical outcomes and improved liver histology. Hill and colleagues (2014) showed in a meta-analysis of 129 studies that patients with an SVR have dramatic reductions in liver decompensation, hepatocellular carcinoma, and all-cause mortality. These reductions in HCV complications included patients who were cirrhotic and patients co-infected with HIV.

These new generation medications are usually given once a day and are very well tolerated. In most cases they have limited side effects with few drug-drug interactions for patients on ART. They do, however, have a very high acquisition cost. The 12 to 24 weeks of therapy for an individual patient ranges from \$50,000 to \$150,000. The price of these new medications has been problematic in the correctional setting, as the health care budgets are unable to match the high burden of HCV disease in this population.

## Treatment Guidance

The American Association for the Study of Liver Diseases (AASLD) and the Infectious Diseases Society of America (IDSA) have issued guidance on the treatment of HCV (available at [HCVguidelines.org](http://HCVguidelines.org)). Earlier versions of the AASLD/IDSA guidance called for prioritization of HCV treatment, treating those with the most advanced disease or highest risk of complications first. However,



the latest guidance stresses the importance of treating *all* patients with HCV and eliminates the call for prioritization based on liver disease staging.

Due to the burden of disease within corrections and the high cost of a cure, most correctional professionals view this clinical ideal of treating all HCV patients to be financially unrealistic. Many systems have developed prioritization protocols which recognize that patients with the greatest risks of complications related to HCV-associated liver disease should be treated first.

Many of these systems have referenced the Federal Bureau of Prisons' clinical guidance *Evaluation and Management of Chronic Hepatitis C Virus (HCV) Infection* from April 2016. This guidance lists liver transplant recipients or candidates, cirrhotic patients and those with HIV/HCV co-infection within the top levels of prioritization.

As people live longer with HIV, HCV-related liver disease in co-infected patients has become a major cause of morbidity and mortality. Although ART improves outcomes in co-infected patients with decreased HCV-related mortality, treatment of only HIV disease alone cannot be viewed as treatment for HCV.

The AASLD/IDSA guidance from July 2016 has a separate section related to HCV/HIV. It highlights the unique challenges presented by co-infection and stresses the importance of treating co-infected patients due to the known interactions between these two viruses. The guidance also addresses HCV medication choices for co-infection. With the new DAAs, there are six treatment regimens for co-infected patients with HCV genotype 1 virus without cirrhosis. For co-infected patients with

genotype 1 and compensated cirrhosis, the guidelines include two recommended regimens and three alternative regimens.

Equivalent rates of sustained virologic response (typically > 90%) are expected in the co-infected patient. There are, however, some significant drug-drug interactions between ART and HCV treatment regimens that are addressed in the guidelines. They also state that treatment regimens of less than 12 weeks are not recommended for the co-infected patient. They also do NOT recommend HIV treatment interruption to complete HCV therapy as a means to avoid drug-drug interactions. In some cases, the ART regimen may need to be adjusted if drug-drug interactions are a concern. (Resources for HIV and HCV medication interactions are found at [HCVguidelines.org](http://HCVguidelines.org), [aidsinfo.nih.gov](http://aidsinfo.nih.gov), and [hep-druginteractions.org](http://hep-druginteractions.org).)

### Correctional considerations: Cost and more

We now have HCV medication combinations with SVR rates > 90%, low toxicity, high tolerability, and low pill burdens, and they work well in the co-infected patient. The question remains—how does a correctional system pay for them?

Although some states are treating large numbers of HCV patients, in many systems the budgets cannot accommodate the need for widespread treatment. The good news is that costs are coming down through competition as more HCV medications and manufacturers enter into the marketplace. The pharmaceutical companies also are willing to negotiate prices, especially for correctional customers wanting to treat a larger number of patients. Nevertheless, these prices remain quite high.

## Correctional Setting Abstracts CROI 2017—Seattle, WA

### Improved Care Outcomes for Inmates Referred to Community Programs in Philadelphia (#911)

Prison inmates with HIV constitute a vulnerable population for which information regarding long-term health outcomes after they are released is lacking. This study aimed to characterize predictors of care for inmates diagnosed with HIV post-release from the Philadelphia Prison System (PPS). The study used data from the PPS, Community Referral Programs (CRP), and HIV surveillance to identify persons diagnosed with HIV within the prison system from 2009-2013. The CRPs provide advocacy, support, education, and linkages to medical care for HIV-infected inmates upon release. Outcomes of the study included: linkage to care 90 days post-release; retention in care one year post-release and viral suppression at one year (VL <200 copies/ml at last measure). All models were adjusted for gender, age at release, race/ethnicity, mode of transmission, length of diagnosis, length of incarceration pre-release and CRP status.

• **Results:** There were 410 HIV-positive inmates within the Philadelphia system. Forty one percent

were linked to care within 90 days after release, 35% were retained in care and only 10% were virally suppressed at one year after release. Forty percent of those diagnosed while in the PPS were linked to a CRP. Those diagnosed with HIV for > 5 years were 3.2 times as likely as those diagnosed ≤ 6 months to be linked to and retained in care. Race significantly predicted retention with blacks 49% less likely than whites to be retained one year after release. Individuals that were connected to a CRP for post-release follow up were 2.4 times as likely to be linked to care, and were 2.5 times as likely to be retained in care, as those not referred to a program. No significant predictors of viral suppression were identified.

• **Conclusion:** HIV-infected inmates have very low rates of linkage to care, retention in care and viral suppression post-release. Those connected to CRPs that work with newly diagnosed HIV patients were more likely to link to care within 90 days of release, and to be retained in care at one year compared to inmates that did not access such programs. These data support the need to increase referral of soon-to-be discharged inmates to CRPs. These programs are a

valuable resource for improving health outcomes for this high-risk incarcerated HIV-positive population  
Makeda C. et al. CROI 2017, Seattle WA. Abstract # 911

### Opt-Out HIV and HCV Testing among Jail Inmates (# 957)

Incarceration provides an opportunity for HIV and HCV screening in high-risk and hard-to-reach persons. The CDC recommends routine opt-out HIV screening in jails and prisons, but only 19% of prisons and 35% of jails offer this service. HCV testing is recommended for those born between 1945-1965 or with risk factors including injection drug use and incarceration. The aim of this study was to describe the results of an opt-out combined HIV and HCV testing program in a criminal justice setting in Texas. Opt-out HIV/HCV testing was offered to all individuals entering the Dallas County Jail between October 2015 and July 2016. Demographics were collected on all participants. For those who tested HIV positive, risk factors, prior engagement in care (seen by an HIV provider within 6 months before incarceration), and re-engagement in care (receipt of HIV care during incarceration) were assessed.

The costs to a correctional health care system for treating HCV was calculated in Rhode Island. The study, published in the *Journal of Urban Health*, found that chronic HCV prevalence was estimated at 17% of the total prison population. Treating all sentenced inmates with at least 6 months remaining of their sentence would cost about \$34 million—13 times the annual pharmacy budget and almost twice the overall annual healthcare budget. Treating only inmates with advanced fibrosis would cost about \$15 million, which remains nearly 8 times the annual pharmacy budget.<sup>1</sup>

One concern is, if corrections treats those with HCV, will released patients revert to injection drug use and become re-infected? While re-infection does occur, a study published in *Clinical Infectious Diseases* by Simmons and colleagues examined the five-year recurrence risk among a high-risk population of injection drug users. They found that 10.7% had recurrence of HCV after a cure.<sup>2</sup> The study revealed that an SVR is durable in most patients, including these high-risk patients, although re-infection remains a possibility.

Correctional systems without HCV treatment protocols are encouraged to have discussions about HCV treatment and to develop processes for assigning clinical priority. These processes are best made within a clinical practice guideline that the correctional system has committed to and can realistically support financially.

The complete cost of care related to HCV and HCV/HIV co-infection is not just medications. Corrections should factor in the high costs of treating the complications of non-treatment—specifically end-stage liver disease and hepatocellular carcinoma. These costs related to complications

of HCV are projected to continue to rise and will be amplified in corrections due to the high burden of HCV disease. Health care professionals are aware that these costs can be mitigated by earlier treatment of HCV. There is a pressing need to educate administrators and other non-clinicians who are making financial decisions for our correctional systems to not focus solely on the price of anti-HCV medications, but also look at the disease in its entirety when developing the system's budget priorities and plan of care.

HIV

## REFERENCES

1. *A Budget Impact Analysis of Newly Available Hepatitis C Therapeutics and the Financial Burden on a State Correctional System*, Nguyen, J.T., Rich, J.D., Brockmann, B.W. et al. *J Urban Health* (2015) 92: 635.
2. *Risk of Late Relapse or Reinfection With Hepatitis C Virus After Achieving a Sustained Virological Response: A Systematic Review and Meta-analysis*, Simmons et al; *Clin Infect Dis* 2016; 62:683–694



### ABOUT THE AUTHOR

**Dr. Neil Fisher** has been involved in the health care of incarcerated offenders for over 18 years. He is a proud graduate of Albany Medical College in Albany, New York. In correctional health care Dr. Fisher is best known for educating/guiding correctional health care staff on the care of the incarcerated prisoner especially those that are HIV positive and/or hepatitis C positive. Dr. Fisher is also a vocal advocate of the uniqueness of correctional healthcare as a career option. He is presently Wexford Health Sources' Corporate Medical Director for Quality Management and Pharmacy and is based at Wexford's Regional Office in Phoenix, Arizona.

■ **Results:** Eighty percent of this population was male. The mean age was 49 years of whom 43% were white, 42% Black, and 15% Hispanic. Forty-one (1.3%) of 3,155 inmates had a positive HIV screening test. Of these, 24% were false positives (4<sup>th</sup> generation test). Of those remaining, 16% were newly diagnosed and 100% were linked to care. Among those previously known to be HIV-positive, one-third were not engaged in care before incarceration although 88% were linked back to HIV care in jail. Regarding HCV antibody testing, 16% (500/3042) had a positive test. One-third of inmates self-reported to be HCV positive before being tested. Only 52% of the HCV-positive were born between 1945 and 1965. Racial disparity was observed within this "baby boomer" group as 74% of blacks vs. 35% of whites belonging to this cohort.

■ **Conclusion:** Routine opt-out HIV/HCV testing in a jail setting identified many HIV and HCV infections. New HIV diagnoses were infrequent but linkage to care and re-engagement in HIV care was excellent. There was a high rate of HCV positive tests but one-third were aware of this diagnosis. Testing only those in the baby boomer cohort would have missed approximately half of HCV infections, primarily among whites. Opt-out HIV/HCV screening in the criminal justice system is a unique opportunity to reach

underserved individuals, who may otherwise not seek testing and treatment and are at risk of transmitting these infections both while incarcerated and after release.

De La Flor, C. CROI 2017 Seattle, WA Abstract # 957

### Improving the Prison Care Continuum Reduces Racial Disparities: A Modeling Study (#1044)

Prisons provide an opportunity for HIV screening and delivery of antiretroviral therapy (ART). However, many individuals fail to re-engage with care after they are released, thus increasing HIV transmission risk in their respective community. This modeling study sought to determine how improved HIV diagnosis and ART initiation while incarcerated in prison—and continued ART and medical care post-release—could reduce HIV transmission and also address racial HIV disparities in the non-incarcerated community. The researchers used Atlanta, GA as the case city. They developed an agent-based model to simulate HIV transmission in a dynamic, population-based sexual and drug-injecting network. The model was parameterized using city- and race-specific inputs for population characteristics, incarceration rates, sentencing lengths, and ART coverage. The model was

calibrated to race-specific HIV incidence estimates for the Atlanta population in 2012. In an "idealized" prison HIV care continuum scenario, all incarcerated individuals are tested for HIV, initiated ART if testing positive and continued on ART post-release. The study then compared projected community incidence of HIV at 10 years after implementation of the "idealized" correctional care continuum to that of the base case model.

■ **Results:** Compared to the base case model, the idealized care continuum scenario would reduce 10-year community HIV incidence by 23.7% (from 48.8 to 37.3 per 100,000 by 2022). The percentage reduction would be greater among blacks (25.4%) than among whites (16.7%). The overall reduction in community HIV incidence was larger (30.7%) by a sensitivity analysis in which HIV risk was doubled for 6 months post-release.

■ **Conclusion:** Universal HIV testing and treatment with ART in prisons, coupled with programs to ensure retention in care post-release, can reduce HIV incidence in non-incarcerated populations. An optimized HIV care continuum in the prison setting and post-release could considerably reduce new infections and racial HIV disparities.

Marshall, BD. CROI 2017, Seattle, WA. Abstract # 1044