Increasing Hepatitis C Prevalence and Associated Risk Behaviors among Incarcerated Young Adults

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ABSTRACT *This study sought to assess the rate of hepatitis C virus (HCV) infection and associated risk factors in young adults 18–28 years of age who were incarcerated in the Rhode Island Department of Corrections. The majority of participants reported injection drug use and engaged in high-risk behaviors such as needle sharing. Despite having these risk factors and believing themselves to be at risk, the majority of youths reported no prior HCV testing. Correctional facilities present a unique opportunity to detect HCV infection and provide risk reduction education to young adults, the population with the highest rates of new infections in the US. Seventy-two incarcerated individuals with a history of drug use were approached to participate in the study; 68 completed the screening and interview. The rate of HCV infection among adults <30 years of age and incarcerated at the Rhode Island Department of Corrections in 2011 was high (24 %). In 1998, the rate of HCV among inmates <30 years of age at the same facility was only 11.4 %. These data follow the same increase in HCV infection rates among young adults observed in non-incarcerated young adults across the nation. HCV is the leading cause of liver failure and hepatocellular carcinoma in the US. Despite a decline and leveling in HCV incidence nationwide, alarming increases in HCV rates among adolescents and young adults have been reported during the period between the years 1992 and 2005. This disquieting epidemic is attributable to injection drug use amongst young adults.*

KEYWORDS *Hepatitis C, Incarceration, Rhode Island, Young adult, Injection drug use*

INTRODUCTION

Hepatitis C (HCV) is the most common blood-borne pathogen in the US: 2.7 to 3.9 million persons are currently infected.¹ Morbidity and premature death attributable to HCV in Americans under 65 years of age is expected to increase over the next decade at a societal cost exceeding \$55 billion.² HCV is acquired through the transmission of infected blood or bodily fluids. Today in the US, the risk of HCV transmission via blood and blood products is negligible; those at highest risk of acquiring HCV are injection drug users. While 2 % of the overall population is chronically infected, only 25 to 35 % of individuals with HCV are aware of their

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infection.³ Screening and education to detect cases and prevent further transmission are a public health priority.

HCV infection and disease disproportionately impact incarcerated Americans. The US' "War on Drugs" significantly increased drug related arrests.^{4,5} Reported rates of injection drug use (IDU) among the incarcerated population in the US are estimated to be around 18 %.⁶ Correctional facilities report rates of HCV infection as high as 27–49 %.⁷ It is possible that as many as 1.0 million persons with undiagnosed HCV infection come in contact with the correctional system each year.⁸ In 2003, the Centers for Disease Control published guidelines that encouraged HCV screening for all inmates who report a history of IDU. As of 2009, however, only ten states offer routine, system-wide HCV testing for all inmates with risk factors; only four states offer HCV testing to high-risk inmates.⁴

Despite an overall decline in HCV infection during the past 20 years, increased rates of infection among individuals between 15 and 24 years of age have been noted across the nation, particularly in Wisconsin, Massachusetts, New York, and Pennsylvania.⁹ These increases have been attributed to a rise in IDU among adolescents and young adults.¹⁰ Although recent incarceration is associated with higher rates of HCV infection among young, injection drug users, no systematic study of incarcerated youths in correctional facilities has been conducted.¹¹ As such, we evaluated the rate of HCV infection and associated risk behaviors among young adults incarcerated at Rhode Island Department of Corrections (RIDOC) prison facility.

METHODS

The state of Rhode Island has a single correctional institution, the RIDOC, which serves as both a jail and prison for men and women inmates. Participants in the study were recruited from the men's minimum-security facility and the women's facility. Approximately every 2 weeks, inmates who had not been approached previously and who had replied, "yes" to the question "Do you use Drugs?" on the nurse intake form were identified; up to five eligible candidates on a single day were called to the clinic. Identified candidates were informed of the study protocols when they presented in clinic, at which time they were approached about taking part in the study. Reasons for which eligible inmates were not able to present to clinic included: a lockdown in their unit prohibiting transport, outside work detail, or involvement in concurrent programming within the facility. Attempts were made on subsequent days to approach any candidates who did not present in clinic when initially called, if they remained in the prison. Written informed consent was obtained from all who were approached and agreed. All participants completed an orally administered 60-question assessment, which included demographic information and close-ended questions including the following domains: drug use history, IDU, needle use, acquisition and sharing, sexual history as it relates to risk behaviors, history of prior HCV testing or treatment, and knowledge of HCV. Blood samples were collected from each participant and tested for the presence of hepatitis C antibodies (Bayer ADVIA Centaur® HCV Assay; Siemens Healthcare Diagnostics Inc., Tarrytown NY).

A physician (P. Losikoff) provided each participant individualized pre- and post-test counseling including risk reduction education, indications for further diagnostic testing, and current available treatment options. Antibody positive individuals received HCV viral load tests (COBAS AmpliPrep/COBAS Tagman HCV test; Roche Diagnostics, Indianapolis, IN) and genotype determination (Versant HCV

genotype assay², Siemens Healthcare Diagnostics Inc.). If indicated, individuals were referred for further evaluation and follow-up to a clinic located at either RIDOC or The Miriam Hospital (Providence, RI). As part of a longitudinal assessment of immune correlates during early infection, HCV-seropositive patients were offered repeat testing every 6 months at The Miriam Hospital or RIDOC. The institutional Review Boards of Lifespan, RIDOC Medical Research Advisory Group (MRAG), and the federal Office of Human Research Protection (OHRP) approved this study.

We were able to obtain a historical comparison from a similar population of incarcerated men at RIDOC using data collected from studies conducted between 1998 and 2000.¹² For the purposes of comparison, the methods of that study included conducting HCV testing on excess sera collected for mandatory HIV testing on all prison inmates at intake during this time period. Risk behavior data were also collected from the nurse intake form, including the same question above that served as inclusion criteria for the current study. Using these data, we were able to calculate the HCV prevalence at intake among men <30 years that reported “any drug use” during that time period, and compared that to the same sub-population within the current study to identify potential trends.

DATA ANALYSIS

Means are presented with standard deviations throughout. All statistical analyses were performed using STATA version 11.1 (StataCorp, College Station, TX, USA). A description of the population and HCV infection rate was summarized. Bivariate analyses of the association between HCV infection status and HCV associated risk behaviors and HCV associated risk behaviors and gender were created. Student's two-tailed *t* test was used to evaluate the association between serostatus and reported risk behavior, or reported risk behavior and gender at a 95 % confidence interval.

RESULTS

From August 2010 to December 2011, we approached 72 inmates who were between 18 and 29 years of age and had reported any drug use on their intake form. Of 72 inmates approached, 68 (96 %) agreed to participate in the study. Sixty-seven completed HCV testing; one participant withdrew from the study, declining to have blood drawn after initially agreeing. The mean age of all participants was 24 years; the overwhelming majority were Caucasians who had completed at least a high school education (Table 1). The majority of participants reported using injection drugs. Despite engaging in behaviors placing them at high risk of HCV transmission, most participants had no prior HCV screening despite believing themselves to be at risk for infection. Indeed, 77 % of individuals who ultimately tested positive thought themselves at risk before screening. The overall rate of HCV infection in this population was 24 %.

HCV-infected individuals were more likely than non-infected individuals to report IDU, and more frequently shared needles with a friend, sexual partner, or running buddy who was also known to be infected (Table 2). While an equal number of males and females participated in this study, there was a higher rate of HCV infection among women. Despite comparable rates of reported IDU, young women reported significantly more frequent needle sharing. More women than men who shared needles reported sharing needles with a friend/running buddy known to be

TABLE 1 Socio-demographic characteristics and HCV status of young prisoners with self-reported drug use

Mean age (SD)	24 (2.9)
Gender	
Male	49 % (33/68)
Female	51 % (35/68)
Race	
Caucasian	78 % (51/65)
Other	22 % (14/65)
Education	
Did not complete high school	34 % (22/65)
Completed high school	66 % (43/65)
Ever injected	58 % (36/62)
Believe themselves at risk for HCV	64 % (39/61)
HCV antibody positive	24 % (17/67)
Ever screened for HCV in the past?	38 % (23/61)

infected with HCV. In addition, women reported initiating IDU at an earlier mean age than men. Women more frequently reported having sex with individuals they knew to be infected with hepatitis C. Women also had less knowledge of HCV (Fig. 1).

Between 1998 and 2000, Macalino and colleagues screened all inmates at the RIDOC for HCV.¹² In the historical comparison calculation, among the 2,044 men <30 years of age, 1,788 had available risk behavior data. Of those, 750 reported a history of “any drug use”. Eighty-six men had HCV at intake for a rate of 11.4 %. Male inmates that were part of the current study had a prevalence rate of 18 %. Table 3 presents the rates among men only from this period until 2011, evidencing an increase in HCV infection among young adults during the past 12 years.

DISCUSSION

Our findings confirm nationwide reports of increasing HCV infection among adolescents and young adults. To our knowledge, this is the first report confirming this trend in a correctional setting. As observed in neighboring Massachusetts, as well as other states throughout the nation, the increase in new HCV infection among young adults in RIDOC can most likely be attributed to increased IDU in this age group.¹⁰

TABLE 2 Frequency of self-reported risk behaviors among young drug using prisoners by HCV serostatus

	HCV+	HCV–
Ever injected	71 % (10/14)	53 % (25/47)
Age initiated IDU, mean (SD)	19.2 (4.8)	19.3 (3.1)
Ever shared needles ^a	90 % (9/10)	48 % (12/25)
Shared with HCV+	60 % (6/10)	42 % (5/12)
Sex partners with HCV+	57 % (8/14)	17 % (6/35)

^aGroups of HCV + and HCV– individuals who reported sharing needles are statistically different, *P*=0.02

FIGURE 1. Frequency of self-reported risk behaviors among young drug using prisoners by gender. ^aPercent of individuals who reported needle sharing among those who reported “ever injecting.” ^bMales and females are significantly different; $P=0.049$. ^cPercent of individuals who shared needles with someone known to be infected with HCV among individuals who reported “ever sharing needles.” ^dLack of knowledge composite variable comprised of answers to four T/F questions relating to HCV: (1) “Most people with hepatitis C develop a chronic infection with hepatitis C that does not go away,” (2) “I could become infected with hepatitis C by sharing needles with someone who is infected with hepatitis C,” (3) “There is a vaccination for hepatitis C” and (4) “Drinking alcohol can make liver disease worse if you have hepatitis C.” Participants were thought to “lack knowledge” if they answered one or more of these statements incorrectly.

Younger injection drug users are more likely to share needles and to share needles more frequently than their older counterparts, increasing their risk of acquiring HCV.¹³ In our cohort, we also observed a high frequency of unsafe practices such as needle sharing and sharing needles with individuals who were known to be HCV infected. This difference between older and younger injection drug users may be related to the nature of adolescent and young adult social networks, which are characterized by more trust and sharing.¹⁴ Moreover, otherwise healthy young adults are less likely to seek or have access to health care and, therefore, are less likely than their older counterparts to receive education and prevention information.¹² This is consistent with the low frequency of prior HCV screening, and lack of knowledge regarding HCV acquisition and transmission reported by the majority of participants in our study.

Young incarcerated females had a higher rate of HCV infection than their male counterparts, a trend seen in earlier studies based in correctional settings.¹⁵ Women prisoners reported more widespread needle sharing, as well as sharing with known or suspected HCV-infected individuals. The historic reluctance to incarcerate women has resulted in a greater disease burden and a higher risk of infection among those

TABLE 3 Increase in rate of HCV infection in young incarcerated adults (<30 years old) at the RIDOC reporting ‘any drug use’ at intake from 1998 to 2011

Inmates RIDOC, 2011	24 %	McNamara (current study)
Male inmates, 2011	18 %	
Male inmates, RIDOC 1998–2000	11.4 %	Macalino et al. ¹²

who are incarcerated. In the RIDOC, 90 % of the female population is incarcerated for drug use, prostitution, or both. Women prisoners consistently report higher risk behaviors and prevalence of blood-borne pathogens.¹⁶

This study is limited by the possibility that drug use was underreported on the nurse intake form, and consequently potentially underestimated the impact of drug use on HCV. Although we approached any individual who admitted “some” drug use, those who failed to report any on the intake form would not have been asked to participate in the study, perhaps missing some HCV-infected individuals. While the trend toward IDU in young adults has been substantiated in neighboring states, it is difficult to generalize the findings here to the US or other regions of the country. Our results might be unique to the correctional setting in Rhode Island. However, our findings contribute to a growing body of evidence surrounding the increased rate of HCV among adolescents and young adults attributable to IDU. Unfortunately for many of these youths, the only contact they have with health care providers is when they are detained or incarcerated in a correctional institution.

Recent advances in case detection and treatment will facilitate screening in correctional institutions. On-site rapid testing for HCV will make screening possible for incarcerated individuals with short sentences, or even those awaiting trial.¹⁷ Moreover, more effective and shorter courses of chemotherapy for HCV promise higher rates of clearance with reduced side effects creating the possibility of treating individuals during periods of incarceration. These advancements underlie calls to concentrate HCV screening in correctional facilities on the 1945–1965 birth cohort in order to reduce morbidity and mortality from chronic HCV infection.¹⁸ We believe, however, HCV screening and treatment (including treatment for drug addiction) that target young adults in such facilities offer a unique opportunity to stem the epidemic of HCV among this population, which experiences the highest rate of new cases.

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