

Epidemiology of the Viral Hepatitis-HIV Syndemic in San Francisco: A Collaborative Surveillance Approach

MELISSA A. SANCHEZ, PhD, MA^a
SUSAN SCHEER, PhD, MPH^b
SUE SHALLOW, MPH, CACLS^c
SHARON PIPKIN, MPH^b
SANDRA HUANG, MD^c

ABSTRACT

Objectives. To describe the epidemiology of people coinfecting with hepatitis B virus (HBV) or hepatitis C virus (HCV) and HIV in San Francisco, the San Francisco Department of Public Health's Communicable Disease Control and Prevention Section and the HIV Epidemiology Section collaborated to link their registries.

Methods. In San Francisco, hepatitis reporting is primarily through passive laboratory-based surveillance, and HIV/AIDS reporting is primarily through laboratory-initiated active surveillance. We conducted the registry linkage in 2010 using a sequential algorithm.

Results. The registry match included 31,997 HBV-infected people who were reported starting in 1984; 10,121 HCV-infected people who were reported starting in 2001; and 34,551 HIV/AIDS cases reported beginning in 1981. Of the HBV and HCV cases, 6.3% and 12.6% were coinfecting with HIV, respectively. The majority of cases were white males; however, black people were disproportionately affected. For more than 90% of the HBV/HIV cases, male-to-male sexual contact (men who have sex with men [MSM]) was the risk factor for HIV infection. Injection drug use was the most frequent risk factor for HIV infection among the HCV/HIV cases; however, 35.6% of the HCV/HIV coinfecting males were MSM but not injection drug users.

Conclusions. By linking the two registries, we found new ways to foster collaborative work and expand our programmatic flexibility. This analysis identified particular populations at risk for coinfection, which can be used by viral hepatitis and HIV screening, prevention, and treatment programs to integrate, enhance, target, and prioritize prevention services and clinical care within the community to maximize health outcomes.

^aSan Francisco Department of Public Health, Communicable Disease Control and Prevention Section, Chronic Hepatitis Surveillance, San Francisco, CA

^bSan Francisco Department of Public Health, HIV Epidemiology Section, San Francisco, CA

^cSan Francisco Department of Public Health, Communicable Disease Control and Prevention Section, San Francisco, CA

Address correspondence to: Melissa A. Sanchez, PhD, MA, San Francisco Department of Public Health, Chronic Hepatitis Surveillance, Communicable Disease Control and Prevention Section, 101 Grove St., Ste. 408, San Francisco, CA 94102; tel. 415-554-2743; fax 415-554-2848; e-mail <melissa.sanchez@sfdph.org>.

©2014 Association of Schools and Programs of Public Health

In the United States, an estimated 1.1 million people are chronically infected with hepatitis B virus (HBV),¹ an estimated 3.2 million people are chronically infected with hepatitis C virus (HCV),² and an estimated 1.1 million people are infected with human immunodeficiency virus (HIV).³ Coinfection with HBV or HCV among HIV-infected individuals is common, as all three viruses share similar modes of transmission, including sexual practices among men who have sex with men (MSM), injection drug use, and other percutaneous exposures to infected blood. While the estimated prevalence of chronic HBV and HCV in the general U.S. population is relatively low—0.3%¹ and 1.3%,² respectively—both HBV and HCV prevalence among HIV-infected people is higher. The prevalence of chronic HBV among HIV-infected people is estimated to be 6%–14%,^{4–8} and the estimated prevalence of HCV among HIV-infected people in the U.S. is estimated at 25%.⁹ Additionally, rates of coinfection with chronic HBV or HCV and HIV vary by risk group, type of exposure, and efficiency of transmission.

Coinfection with HBV and HIV is most commonly linked to sexual practices among MSM. It is estimated that 15%–25% of all new HBV infections in the U.S. occur among MSM.⁹ Coinfection with HCV and HIV is most commonly linked to injection drug use. However, there are limited data describing the epidemiology of coinfection with HBV and HIV or with HCV and HIV either in San Francisco, California, or in the U.S. as a whole.

With the goal of describing the epidemiology of individuals who are coinfecting with either chronic HBV or HCV infection and HIV, two sections within the San Francisco Department of Public Health (SFDPH)—the Communicable Disease Control and Prevention (CDCP) Section's (Chronic Viral Hepatitis Registry Team and the HIV Epidemiology Section's HIV/AIDS Surveillance Unit—collaborated to link their respective registries to describe the epidemiology of people coinfecting with HBV or HCV and HIV in San Francisco. These two sections are organized and function separately within the SFDPH but have a history of collaboration and support. This linkage offered a unique opportunity to look at the epidemiology of people living in San Francisco who are coinfecting with HBV or HCV and HIV.

METHODS

Hepatitis reporting

Reporting of chronic hepatitis B and past or present hepatitis C infection is primarily through passive laboratory-based surveillance. Laboratories and provid-

ers are mandated by the Title 17 California Code of Regulations, Sections 2500 and 2505, to report positive laboratory results for hepatitis B and hepatitis C.¹⁰ Most cases are reported by laboratories rather than providers. Although test results consistent for infection with hepatitis B did not become laboratory reportable until May 1995, some laboratories voluntarily reported these tests to the SFDPH. Since 1984, a database that contains limited information from the first reported laboratory marker of chronic hepatitis B has been maintained. Test results consistent with markers of HCV infection became reportable by laboratories in July 2007, but some laboratories were voluntarily reporting positive laboratory tests for HCV to SFDPH prior to July 2007. Since July 2001, SFDPH has registered limited information from the first reported laboratory marker for HCV infection.

Since October 2005, a longitudinal person-based registry has been maintained by CDCP for cases with positive laboratory markers for chronic hepatitis B and/or with positive markers for infection with HCV. All positive test results for each case are entered into this database. The Centers for Disease Control and Prevention (CDC)/Council of State and Territorial Epidemiologists (CSTE) laboratory criteria for diagnosis are applied to identify people who meet the laboratory criteria for either probable or confirmed chronic hepatitis B¹¹ or infection with HCV.¹² People infected with chronic HBV included in this analysis met the CDC/CSTE laboratory criteria for either probable or confirmed hepatitis B and were reported from January 1, 1984, to April 22, 2010. People with HCV infection included in this analysis met the CDC criteria for a past or present infection with HCV and were reported from July 1, 2001, to April 22, 2010. Enhanced surveillance activities are implemented monthly on a random sample of the newly reported cases through patient interviews and data-collection forms sent to the patients' providers, which measure the completeness of a patients' laboratory reports.

HIV/AIDS reporting

San Francisco HIV/acquired immunodeficiency syndrome (AIDS) cases are reported primarily through laboratory-initiated active surveillance. Case report forms are completed by SFDPH staff through a review of laboratory reports, pathology reports, and medical records. Cases are also identified through passive surveillance, including reports received from health-care providers and confidential testing sites, review of death certificates, hospital billing records, other disease registries, and reports from other health departments. AIDS cases included in this analysis cover the entirety of the

HIV epidemic from 1981 to April 2010. Confidential reporting of AIDS cases by name began in March 1981. HIV reporting was implemented on July 1, 2002, using a non-name code; on April 17, 2006, HIV reporting by name was implemented.¹³ Completeness of HIV/AIDS case reporting is reviewed annually and has been consistently found to be highly complete.¹⁴

Data linkage

People were included in this match if they were residents of San Francisco at the time of either their HIV or AIDS diagnosis. Because surveillance for chronic hepatitis B and HCV infection is passive and laboratory based, and HIV case ascertainment is primarily through active surveillance activities, for this linkage, data on race/ethnicity, county of residence, and transmission risk factors were taken from data obtained through HIV/AIDS surveillance. Data linkage was conducted using a sequential algorithm. The first match was an identical match between full name and full date of birth. Additional matches were performed using partial date of birth, soundex (an alpha numeric code derived from the last name), and Social Security number. Any matches made after the identical match were manually examined to confirm matches.

Data for certain racial/ethnic categories have been grouped. People of Latino origin, regardless of race, were grouped into the Latino category. Thus, white, black, and Asian race categories are all non-Latino. The “other” category includes racial/ethnic categories in which the numbers of people in that particular group were small and/or did not represent significant trends (e.g., Native Americans and people of mixed race). Risk categories were also grouped into the “other” category when the number of people in that group was small. “Other” may include transfusion recipients, hemophiliacs, heterosexuals, people acquiring HIV through perinatal transmission, or people of unidentified risk.

A memorandum of understanding was established between the CDCP Section and the HIV/AIDS Surveillance Section to document and ensure that all linked data were managed according to the CDC security and confidentiality requirements for both sections. Data linkage and all analyses were conducted using SAS[®] version 9.1.¹⁵

RESULTS

The registry match between SFPDPH’s Chronic Hepatitis Registry and HIV Registry was implemented on April 22, 2010. As of that date, the Chronic Hepatitis Registry included 31,997 people infected with HBV who were reported to CDCP from January 1, 1984, to April 22,

2010, and 10,121 people infected with HCV who were reported from July 1, 2001, to April 22, 2010. The HIV Registry included 34,551 people with HIV/AIDS who were reported to the HIV Epidemiology Section from January 1, 1981, to April 22, 2010. Of the 31,997 HBV cases, 2,018 (6.3%) were coinfecting with HIV, and of the 10,121 HCV cases, 1,278 (12.6%) were coinfecting with HIV. A total of 504 cases were infected with both HBV and HCV; of these coinfecting cases, 101 cases (20.0%) were also infected with HIV (data not shown).

Table 1 presents the gender and race/ethnicity of the HBV/HIV and HCV/HIV coinfecting cases. Of the 2,018 HBV/HIV coinfecting cases, 96.5% ($n=1,948$) were male and 3.5% ($n=70$) were female. Among the male cases, 63.4% ($n=1,236$) were white, 17.4% ($n=339$) were black, and 12.0% ($n=234$) were Latino. Among females, 54.3% ($n=38$) were black, 27.1% ($n=19$) were white, and 10.0% ($n=7$) were Latino. Among the 1,278 HCV/HIV coinfecting cases, 86.7% ($n=1,108$) were male, and 13.3% ($n=170$) were female. Among males, 58.7% ($n=650$) were white, 23.5% ($n=260$) were black, and 12.5% ($n=138$) were Latino. Of the 170 coinfecting females, 44.7% ($n=76$) were black, and 42.9% ($n=73$) were white.

HIV transmission categories for HBV/HIV and HCV/HIV coinfecting male cases by race/ethnicity are presented in Table 2. Among the 1,948 HBV/HIV coinfecting men, 1,783 (91.5%) had a recorded transmission category that indicated male-to-male sexual contact, including 1,340 (68.8%) MSM who were not injection drug users (IDUs) and 443 (22.7%) MSM who were IDUs. Of the 1,948 coinfecting men, 582 (29.9%) had an HIV transmission category that indicated injection drug use, including 139 (7.1%) IDUs who were not MSM and 443 (22.7%) men who were both MSM and IDUs. For white and Latino males, the distribution across all reported HIV transmission categories was comparable with the distribution for all 1,948 HBV/HIV coinfecting men. For the 339 black males, the distribution differed from the overall distribution among other races/ethnicities with a higher percentage of men, 20.6% ($n=70$), in an HIV transmission category that indicated injection drug use risk only, and a lower proportion, 49.3% ($n=167$), in the MSM but not IDU transmission category. For the 98 Asian males, the majority (89.8%, $n=88$) were in the MSM-only transmission category.

Among the 1,108 HCV/HIV coinfecting men, 693 (62.5%) had an HIV transmission category that indicated injection drug use, including 486 (43.9%) MSM who were also IDUs and 207 (18.7%) IDUs who were not MSM. Of the 1,108 coinfecting men, 880 (79.4%) had an HIV transmission category that indicated

Table 1. Demographic characteristics of 2,018 coinfecting HBV/HIV and 1,278 coinfecting HCV/HIV cases identified through a linkage of the SFDPH Chronic Hepatitis and HIV registries: San Francisco, 2010

| Race/ethnicity | Male N (column percent) | Female N (column percent) | Total N (column percent) |
|---------------------------|----------------------------|------------------------------|-----------------------------|
| HBV/HIV coinfecting cases | | | |
| White | 1,236 (63.4) | 19 (27.1) | 1,255 (62.2) |
| Black | 339 (17.4) | 38 (54.3) | 377 (18.7) |
| Latino | 234 (12.0) | 7 (10.0) | 241 (11.9) |
| Asian | 98 (5.0) | 3 (4.3) | 101 (5.0) |
| Other | 41 (2.1) | 3 (4.3) | 44 (2.2) |
| Total | 1,948 (96.5) ^a | 70 (3.5) ^a | 2,018 (100.0) ^a |
| HCV/HIV coinfecting cases | | | |
| White | 650 (58.7) | 73 (42.9) | 723 (56.6) |
| Black | 260 (23.5) | 76 (44.7) | 336 (26.3) |
| Latino | 138 (12.5) | 15 (8.8) | 153 (12.0) |
| Asian | 42 (3.8) | 1 (0.6) | 43 (3.4) |
| Other | 18 (1.6) | 5 (2.9) | 23 (1.8) |
| Total | 1,108 (86.7) ^a | 170 (13.3) ^a | 1,278 (100.0) ^a |

^aRow percent

HBV = hepatitis B virus

HIV = human immunodeficiency virus

HCV = hepatitis C virus

SFDPH = San Francisco Department of Public Health

male-to-male sexual contact, including 394 (35.6%) MSM who were not IDUs. For white males, the distribution across all HIV transmission categories was comparable with the overall distribution for all 1,108 HCV/HIV coinfecting men. For the 260 black males, when compared with the overall distribution among other races/ethnicities, a lower proportion (15.0%, $n=39$) were in the MSM-only transmission category, and a higher proportion (39.6%, $n=103$) were in the IDU but not MSM transmission category. For the 138 Latino males and the 42 Asian males, when compared with the overall distribution, a higher proportion (50.7%, $n=70$ Latino males and 59.5%, $n=25$ Asian males) were in the MSM-only transmission category (Table 2).

HIV transmission categories for HBV/HIV and HCV/HIV coinfecting females by race/ethnicity are presented in Table 3. Among the 70 HBV/HIV coinfecting women, 54 (77.1%) were in an HIV transmission category that indicated injection drug use, and 13 (18.6%) were classified as having heterosexual contact as their only risk for HIV infection. The 19 white females were more likely to be IDUs (94.7%, $n=18$) than were coinfecting women of other races/ethnicities. The distribution across HIV transmission categories for the 38 black and seven Latino females was comparable with the overall distribution for all 70 HBV/HIV coinfecting women.

Among the 170 HCV/HIV coinfecting women, 154 (90.6%) were in an HIV transmission category that

indicated injection drug use, and 12 (7.1%) were classified as having heterosexual contact as their only risk for HIV infection. For white, black, and Latino females, the distribution across all HIV transmission categories was comparable with the overall distribution for all 170 HCV/HIV coinfecting women, with the exception of the 10 (13.2%) black women who were classified as having heterosexual contact as their only risk for HIV infection (Table 3).

DISCUSSION

Consistent with the program collaboration and service integration (PCSI) principles, this surveillance collaboration enabled the chronic hepatitis and HIV epidemiologists to begin to describe the epidemiology of the viral hepatitis-HIV syndemic in San Francisco and, consequently, develop a more complete understanding of these coinfecting populations for public health planning and the development of more effective, integrated approaches to service delivery. This Chronic Hepatitis Registry and HIV Registry match provided the SFDPH CDCP Section and the SFDPH HIV Epidemiology Section with a unique opportunity to share and link our data, maximize our collective resources, and use the unique programming and analytical skills of epidemiologists from each section to successfully implement the registry match and analyze the results.

Although the majority of HBV/HIV coinfecting

cases in San Francisco were white males, we found that black people were disproportionately affected. Black males comprised only 6.6% of the San Francisco male population but accounted for 17.4% of HBV and HIV coinfecting males. Correspondingly, black females comprised 7% of the San Francisco female population but accounted for 54.3% of coinfecting females in this match.¹⁶ For more than 90% of this coinfecting population, MSM was the risk factor for infection with HIV. This finding is consistent with several studies of HBV infection among HIV-infected populations in Western Europe and the U.S.⁴⁻⁷

Although the greatest burden of HCV/HIV coinfection was among white males, black people were disproportionately affected. Black males comprised 23.5% of the HCV/HIV coinfecting males, and black females comprised 44.7% of the HCV/HIV coinfecting females in this registry match. Overall, findings among this HCV/HIV coinfecting population are consistent with those from several studies of HCV infection among HIV-infected populations in Western Europe and the U.S.^{4,8,9} Injection drug use was the most frequent risk factor for acquisition of HIV infection among the HCV/

HIV coinfecting population; however, notably, among HCV/HIV coinfecting males, 35.6% were MSM but not IDUs. This high percentage of coinfecting, non-injection drug-using MSM suggests that sexual activity may be a prominent mode of transmission for HCV infection among this HIV-infected male population. While sex is not considered an efficient mode of HCV transmission, several studies suggest that high-risk sexual behaviors, such as having multiple sexual partners and receptive anal fisting, increase the risk for infection.¹⁷⁻²² Building upon the collaborative framework developed for this registry match, next steps to address this issue will involve further database integration with SFPDPH's Sexually Transmitted Diseases Prevention and Control Services Program, which collects high-risk sexual practice data for cases within its registry. Database integration among all three sections would provide us the opportunity to examine the high-risk sexual practices of the HCV/HIV coinfecting population to better understand the role of sexual practices in transmitting HCV and to develop and implement specific prevention recommendations to populations affected by this syndemic.

Table 2. HIV transmission categories of 1,948 HBV/HIV and 1,108 HCV/HIV coinfecting male cases identified through a linkage of the SFPDPH Chronic Hepatitis and HIV registries, by race/ethnicity: San Francisco, 2010

| Race/ethnicity | MSM not IDU N (column percent) | IDU not MSM N (column percent) | Heterosexual, not MSM or IDU N (column percent) | MSM and IDU N (column percent) | Other/ unknown N (column percent) | Total N (column percent) |
|----------------------------------|---|---|--|--------------------------------------|--|--------------------------------|
| HBV/HIV coinfecting cases | | | | | | |
| White | 885 (71.6) | 51 (4.1) | 2 (0.2) | 289 (23.4) | 9 (0.7) | 1,236 (63.4) |
| Black | 167 (49.3) | 70 (20.6) | 4 (1.2) | 95 (28.0) | 3 (0.9) | 339 (17.4) |
| Latino | 180 (76.9) | 13 (5.6) | 4 (1.7) | 37 (15.8) | 0 (0.0) | 234 (12.0) |
| Asian | 88 (89.8) | 2 (2.0) | 1 (1.0) | 5 (5.1) | 2 (2.0) | 98 (5.0) |
| Other | 20 (48.8) | 3 (7.3) | 1 (2.4) | 17 (41.5) | 0 (0.0) | 41 (2.1) |
| Total | 1,340 (68.8) ^a | 139 (7.1) ^a | 12 (0.6) ^a | 443 (22.7) ^a | 14 (0.7) ^a | 1,948 (100.0) ^a |
| HCV/HIV coinfecting cases | | | | | | |
| White | 257 (39.5) | 83 (12.8) | 2 (0.3) | 300 (46.2) | 8 (1.2) | 650 (58.7) |
| Black | 39 (15.0) | 103 (39.6) | 4 (1.5) | 110 (42.3) | 4 (1.5) | 260 (23.5) |
| Latino | 70 (50.7) | 15 (10.9) | 0 (0.0) | 52 (37.7) | 1 (0.7) | 138 (12.5) |
| Asian | 25 (59.5) | 3 (7.1) | 0 (0.0) | 13 (31.0) | 1 (2.4) | 42 (3.8) |
| Other | 3 (16.7) | 3 (16.7) | 1 (5.6) | 11 (61.1) | 0 (0.0) | 18 (1.6) |
| Total | 394 (35.6) ^a | 207 (18.7) ^a | 7 (0.6) ^a | 486 (43.9) ^a | 14 (1.3) ^a | 1,108 (100.0) ^a |

^aRow percent

HIV = human immunodeficiency virus

HBV = hepatitis B virus

HCV = hepatitis C virus

SFPDPH = San Francisco Department of Public Health

MSM = men who have sex with men

IDU = injection drug user

Table 3. HIV transmission categories of 70 HBV/HIV and 170 HCV/HIV coinfecting female cases identified through a linkage of the SFDPH Chronic Hepatitis and HIV registries, by race/ethnicity: San Francisco, 2010

| Race/ethnicity | IDU N (column percent) | Heterosexual, not IDU N (column percent) | Other/unknown N (column percent) | Total N (column percent) |
|---------------------------|---------------------------|---|-------------------------------------|-----------------------------|
| HBV/HIV coinfecting cases | | | | |
| White | 18 (94.7) | 1 (5.3) | 0 (0.0) | 19 (27.1) |
| Black | 28 (73.7) | 8 (21.1) | 2 (5.3) | 38 (54.3) |
| Latino | 5 (71.4) | 2 (28.6) | 0 (0.0) | 7 (10.0) |
| Asian | 1 (33.3) | 1 (33.3) | 1 (33.3) | 3 (4.3) |
| Other | 2 (66.7) | 1 (33.3) | 0 (0.0) | 3 (4.3) |
| Total | 54 (77.1) ^a | 13 (18.6) ^a | 3 (4.3) ^a | 70 (100.0) ^a |
| HCV/HIV coinfecting cases | | | | |
| White | 68 (93.2) | 2 (2.7) | 3 (4.1) | 73 (42.9) |
| Black | 65 (85.5) | 10 (13.2) | 1 (1.3) | 76 (44.7) |
| Latino | 15 (100.0) | 0 (0.0) | 0 (0.0) | 15 (8.8) |
| Asian | 1 (100.0) | 0 (0.0) | 0 (0.0) | 1 (0.6) |
| Other | 5 (100.0) | 0 (0.0) | 0 (0.0) | 5 (2.9) |
| Total | 154 (90.6) ^a | 12 (7.1) ^a | 4 (2.4) ^a | 170 (100.0) ^a |

^aRow percent

HIV = human immunodeficiency virus

HBV = hepatitis B virus

HCV = hepatitis C virus

SFDPH = San Francisco Department of Public Health

IDU = injection drug user

Limitations

These findings were subject to at least three limitations. First, the risk factor data from this registry match came exclusively from the HIV registry; thus, they relate only to HIV infection, not HBV or HCV infection. Second, risk factor data were collected by reviewing the HIV-infected cases' medical records, and the accuracy of these data is solely reliant on providers having obtained comprehensive, unbiased patient histories and, subsequently, accurately, and completely recording these histories in the patients' charts. The risk factor data were not validated by patient interviews; therefore, they may be biased if the patient did not give the provider a complete risk factor history or if the provider did not ascertain or record all of the patient's risk factors. Finally, although the registry match allowed the two SFDPH sections to begin to describe the epidemiology of the viral hepatitis-HIV syndemic in San Francisco, it did not provide the two sections with the opportunity to update their registry with data from the other registry. The SFDPH is currently changing its practices to develop integrated security and confidentiality policies and integrated communicable disease surveillance systems for data exchange and sharing that will ultimately improve data completeness and validity for public health disease planning and management.

CONCLUSION

Through the collaboration between our two sections to match our registries and analyze the coinfection data, we found new ways to foster collaborative work and expand our programmatic flexibility. The results from this syndemic data analysis identified particular populations at risk for HBV and/or HCV and HIV coinfection, which can be used by viral hepatitis and HIV screening, prevention, and treatment programs to integrate, enhance, target, and prioritize prevention services and clinical care within the community to maximize health outcomes. These results were used by San Francisco's PCSI Prevention and Clinical Working Group to inform guidelines for HIV testing, HBV vaccination, and HCV screening, and to identify appropriate settings for integrated clinical services. In addition, these results provide a baseline measure from which to monitor trends in demographic and risk factor characteristics of the HIV/hepatitis coinfecting population, as well as to acknowledge future successes in screening, vaccination, and disease prevention.

The authors thank the Centers for Disease Control and Prevention (CDC) for its support (Cooperative Agreement #3U01CI000309-05 and #5U62PS001000-05). This content is

solely the responsibility of the authors and does not necessarily represent the official views of CDC.

The authors also thank the California Emerging Infections Program for its financial and technical support of the San Francisco Chronic Viral Hepatitis Registry Project; the Chronic Hepatitis Team—Rachel Arrington, Alex Leung, Martina Li, and Karen Luk—for their contributions to data collection and registry maintenance, and Amy Nishimura and David Stier, the project's Coordinator and Clinical Advisor, respectively; the human immunodeficiency virus (HIV) Surveillance Project Coordinator, Field Staff Coordinator, and Core Surveillance Director—Maree Kay Parisi, Viva Delgado, and Ling Hsu, respectively—as well as the field staff for coordinating and collecting HIV surveillance data; and the laboratorians, clinicians, and people living with HIV, chronic hepatitis B, and hepatitis C who provided the information that made this registry match possible.

Drawing on the goals and objectives of program collaboration and service integration, the authors approached CDC and requested to use HIV surveillance funding to support an epidemiologist within the San Francisco Department of Public Health Communicable Disease Control and Prevention Section to take the lead on the registry match and subsequent analyses. Without this support, given the limited staff and reduced funding for the Chronic Viral Hepatitis Registry Project, the authors would not have been able to conduct the match of the two registries.

This analysis was conducted using routinely collected surveillance data; therefore, it was exempt from institutional review board review.

REFERENCES

- Weinbaum CM, Williams I, Mast EE, Wang SA, Finelli L, Wasley A, et al. Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. *MMWR Recomm Rep* 2008;57(RR08):1-20.
- Armstrong GL, Wasley A, Simard EP, McQuillan GM, Kuhnert WL, Alter MJ. The prevalence of hepatitis C virus infection in the United States, 1999 through 2002. *Ann Intern Med* 2006;144:705-14.
- Centers for Disease Control and Prevention (US). Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 U.S. dependent areas—2010. *HIV Surveillance Report: Supplemental Report* 2012;17(No. 3, part A) [cited 2013 Jan 24]. Available from: URL: <http://www.cdc.gov/hiv/topics/surveillance/resources/reports>
- Denis F, Adjide CC, Rogez S, Delpyroux C, Rogez JP, Weinbreck P. [Seroprevalence of HBV, HCV and HDV hepatitis markers in 500 patients infected with the human immunodeficiency virus]. *Pathol Bios (Paris)* 1997;45:701-8.
- Thio CL, Seaberg EC, Skolasky R Jr, Phair J, Visscher B, Munoz A, et al. HIV-1, hepatitis B virus, and risk of liver-related mortality in the Multicenter Cohort Study (MACS). *Lancet* 2002;360:1921-6.
- Kellerman SE, Hanson DL, McNaghten AD, Fleming PL. Prevalence of chronic hepatitis B and incidence of acute hepatitis B infection in human immunodeficiency virus-infected subjects. *J Infect Dis* 2003;188:571-7.
- Konopnicki D, Mocroft A, de Wit S, Antunes F, Ledergerber B, Katlama C, et al. Hepatitis B and HIV: prevalence, AIDS progression, response to highly active antiretroviral therapy and increased mortality in the EuroSIDA cohort. *AIDS* 2005;19:593-601.
- Roca B, Suarez I, Gonzalez J, Garrido M, de la Fuente B, Teira R, et al. Hepatitis C virus and human immunodeficiency virus coinfection in Spain. *J Infect* 2003;47:117-24.
- Centers for Disease Control and Prevention (US). HIV and viral hepatitis: overview [cited 2012 Jun 27]. Available from: URL: <http://www.cdc.gov/hiv/resources/factsheets/hepatitis.htm>
- Title 17, California Code of Regulations, Sections 2500 and 2505 [cited 2013 Aug 20]. Available from: URL: <http://government.westlaw.com/linkedslice/search/default.asp?RS5GVT1.0&VR52.0&SP5CCR-1000>
- Centers for Disease Control and Prevention (US). National Notifiable Diseases Surveillance System. Chronic hepatitis B virus, 2010 case definition [cited 2011 Jan 5]. Available from: URL: <http://www.cdc.gov/hepatitis/statistics/2010surveillance/Commentary.htm>
- Centers for Disease Control and Prevention (US). National Notifiable Diseases Surveillance System. Hepatitis C virus infection, past or present, 2005 case definition [cited 2011 Jan 5]. Available from: URL: <http://www.cdc.gov/NNDSS/script/casedef.aspx?CondYrID5725&DatePub51/1/2005%2012:00:00%20AM>
- California Department of Public Health. HIV/AIDS surveillance in California [cited 2011 Jan 5]. Available from: URL: <http://www.cdph.ca.gov/programs/aids/Documents/STATSfig1and2.pdf>
- San Francisco Department of Public Health. HIV/AIDS epidemiology annual report, 2010. San Francisco: San Francisco Department of Public Health, HIV Epidemiology Section; 2011. Also available from: URL: http://www.sfdph.org/dph/files/reports/RptsHIVAIDS/AnnualReport2010_2.pdf [cited 2013 Feb 1].
- SAS Institute, Inc. SAS[®]: Version 9.1. Cary (NC): SAS Institute, Inc.; 2004.
- California Department of Finance. Interim population projections for California and its counties 2010–2050 [cited 2012 Jun 27]. Available from: URL: <http://www.dof.ca.gov/research/demographic/reports/projections/interim/view.php>
- Gotz HM, van Doornum G, Niesters HGM, den Hollander JG, Thio HB, de Zwart O. A cluster of acute hepatitis C virus infection among men who have sex with men—results from contact tracing and public health implications. *AIDS* 2005;19:969-74.
- van de Laar TJ, Paxton WA, Zorgdrager F, Cornelissen M, de Vries HJ. Sexual transmission of hepatitis C virus in human immunodeficiency virus-negative men who have sex with men: a series of case reports. *Sex Transm Dis* 2011;37:102-4.
- van de Laar T, Pybus O, Bruisten S, Brown D, Nelson M, Bhagani S, et al. Evidence of a large, international network of HCV transmission in HIV-positive men who have sex with men. *Gastroenterology* 2009;136:1609-17.
- Taylor LE, Holubar M, Wu K, Bosch RJ, Wyles DL, Davis JA, et al. Incident hepatitis C virus infection among US HIV-infected men enrolled in clinical trials. *Clin Infect Dis* 2011;52:812-8.
- van der Helm JJ, Prins M, del Amo J, Bucher HC, Chene G, Dorrucci M, et al. The hepatitis C epidemic among HIV-positive MSM: incidence estimates from 1990 to 2007. *AIDS* 2011;25:1083-91.
- Sexual transmission of hepatitis C virus among HIV-infected men who have sex with men—New York City, 2005–2010. *MMWR Morb Mortal Wkly Rep* 2011;60(28):945-50.