Chronic Hepatitis B and Hepatitis C Infection Surveillance Report 2009

San Francisco, California

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Introduction

The Chronic Hepatitis B and Hepatitis C Infection Surveillance Report, 2009 presents data collected by the San Francisco Department of Public Health (SFDPH) Chronic Viral Hepatitis Registry Project from January 1, 2009 through December 31, 2009 on persons who are chronically infected with hepatitis B virus or have a past or present hepatitis C infection. SFDPH receives confidential disease reports containing basic demographic information from laboratories and providers, as mandated by state regulation. This basic information comprises core surveillance for chronic hepatitis B and past or present hepatitis C infection. In addition, chronic hepatitis B information was enhanced by contacting providers and interviewing persons who are chronically infected with hepatitis B virus. This report provides overviews of hepatitis B and hepatitis C infection, a description of the SFDPH Chronic Viral Hepatitis Registry, findings of chronic hepatitis B and past or present hepatitis C infection core surveillance and findings of chronic hepatitis B enhanced surveillance activities.

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Introduction

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Overview of Hepatitis B Infection

Hepatitis B virus (HBV) causes a liver infection that can range in severity from a mild illness lasting a few weeks to a serious, lifelong illness. HBV may be transmitted when blood, semen, or other body fluids from an infected person enters the skin or mucous membranes of a person who is not immune to HBV through immunization or prior infection. Exposure can occur through sexual contact, needle sharing, accidental needle stick, sharing items that may be contaminated with blood such as razors or toothbrushes, unprotected contact with other body fluids (e.g., drainage from open skin wounds), or contact with HBV-contaminated surfaces. Thus, in addition to sexual contacts, household members who have prolonged, nonsexual close contact with persons with chronic hepatitis B may be at risk for exposure.[1] Hepatitis B virus can also be transmitted from an infected mother to her baby unless hepatitis B immunoglobulin and hepatitis B vaccine are given to the infant promptly at birth, followed by completion of a full hepatitis B vaccine series according to the schedule recommended by the Centers for Disease Control and Prevention (CDC) and the Advisory Committee on Immunization Practices.[2]

Acute HBV infection may be asymptomatic, particularly in children <5 years of age and immunosuppressed persons, or may cause an illness that typically begins three months after exposure (range, 60-150 days) and lasts for two to four months. Symptoms of acute infection include nausea, vomiting, loss of appetite, low-grade fever, abdominal pain, jaundice, dark-colored urine, and light-colored stools.[1,3] Approximately 95% of adults and children >5 years of age are able to eliminate the virus from the blood and are immune to reinfection. However, chronic HBV infection occurs more frequently in younger individuals: approximately 90% of infected infants and 25-50% of children infected at age 1 to 5 years will become chronically infected.[1] Persons who are immunosuppressed at the time of infection are also more likely to develop chronic hepatitis B.[3] HBV persists in the liver and may also be found in the bloodstream and in body fluids (such as feces, saliva, semen or urine) of chronically infected persons. Persons with chronic hepatitis B are at increased risk of developing severe liver complications such as cirrhosis, liver failure, and liver cancer. The CDC reports that from 2000-2003, HBV infection was the underlying cause of an estimated 2,000-4,000 deaths annually, mostly from cirrhosis and liver cancer.[1]

The incidence of acute hepatitis B has decreased in the United States from 11.5 cases per 100,000 population in 1985 to 1.6 in 2006, when an estimated 46,000 persons became newly infected with HBV. The greatest declines in acute hepatitis B have occurred in children and adolescents since 1990, when routine vaccination of children was implemented. However, the burden of chronic hepatitis B remains high: in 2008, the CDC estimated that 0.3-0.5% of U.S. residents, or 800,000-1.4 million persons, are chronically infected with HBV, 47-70% of whom were born in other countries.[3]

The prevalence of chronic HBV infection varies substantially by country. Highly endemic regions are defined by a prevalence of hepatitis B surface antigen (HBsAg) that is ≥8%; intermediate HBV endemicity is defined as a HBsAg prevalence of 2-7%; and low HBV endemicity is defined as a HBsAg prevalence of <2%. Eighty-eight percent of the world's population lives in countries of high or intermediate endemicity for HBV, including many countries in Asia, Africa, Eastern Europe, the Middle East, and the Pacific Islands, as well as some countries in Central and South America and the Caribbean. In September 2008, the CDC updated guidelines for identifying persons with chronic hepatitis B infection. Testing for HBsAg is now recommended for persons born in regions of intermediate or high endemicity for HBV, U.S.-born persons who were not vaccinated as infants and whose parents were born in regions with high HBV endemicity, injection drug users, men who have sex with men (MSM), persons with elevated liver enzymes alanine aminotransferase (ALT) or aspartate aminotransferase (AST) of unknown etiology, and persons with certain medical conditions that require immunosuppressive therapy. Testing for HBsAg continues to be recommended for pregnant women, infants born to mothers who test positive for HBsAg, household contacts and sexual partners of HBV infected persons, persons with HIV, and persons who may have been the source of body fluid or blood exposure.[3]

Overview of Hepatitis C Infection

Hepatitis C virus (HCV) is one of the most common bloodborne causes of chronic liver disease in the United States. HCV is transmitted primarily through contact with infected blood or blood products. Currently, injection drug use is the leading risk factor for HCV transmission in the United States and can be acquired from the use of shared, unsterilized needles, syringes or other injection equipment.[4,5] The receipt of donated blood, blood products and organs was once a common means of HCV transmission. However, due to the implementation of routine blood screening in mid-1992, and the introduction of virus inactivation procedures for clotting factor concentrates in 1987, the risk of HCV infection from these procedures in the United States is now rare. Other sources of exposure to HCV are from needlestick injuries in healthcare settings, mishandling and/or contamination of injection equipment (e.g., diabetes testing equipment, multi-dose vials) and from mother-to-child transmission, which occurs in approximately 4 of every 100 infants born to HCV-infected mothers. Other potential modes of transmission include sexual contact with an HCV-infected person or sharing personal items contaminated with infectious blood (e.g. razors, toothbrushes).[4]

Hepatitis C virus infection has an acute phase that can either resolve spontaneously or progress into a long-term chronic infection. Acute HCV infection is a short-term illness that occurs within the first six months after a person is exposed to the hepatitis C virus. Most people newly infected with HCV are asymptomatic. In those who do experience acute phase symptoms, symptoms typically occur 4-12 weeks after exposure, are usually mild and can include fever, fatigue, dark urine, light-colored stools, abdominal pain, loss of appetite, nausea, vomiting, joint

pain and jaundice.[4] In 2007, 849 cases of confirmed acute hepatitis C were reported in the United States, but due to the typically asymptomatic nature of acute HCV infection, this is certain to underestimate the true incidence. The CDC estimates that approximately 17,000 new HCV infections occurred in the United States in 2007.[6]

Acute HCV infection leads to chronic infection in approximately 75-85% of people infected with HCV. The remaining 15-25% of those newly infected are able to clear the virus without treatment and do not develop chronic infection. Most persons with chronic HCV infection are asymptomatic, and the infection is often not recognized until routine blood tests identify abnormal liver function.[4] The prevalence of chronic HCV infection in the general population of the United States has been conservatively estimated to be 1.3% or 3.2 million persons, most of whom were born between 1945 and 1964. The true prevalence may be even higher since incarcerated or homeless persons, populations known to have a high prevalence of HCV infection, may have been under-counted.[7]

Chronic HCV infection progresses very slowly, but complications of chronic infection may include cirrhosis, liver failure and liver cancer. Of those infected with HCV, 60-70% will develop chronic liver disease, 5-20% will develop cirrhosis over a period of 20-30 years and 1-5% will die from consequences of chronic infection (e.g. liver cancer or cirrhosis).[4] Chronic HCV infection is the leading indication for liver transplants and accounts for an estimated 12,000 deaths each year in the United States.[4,6]

The CDC recommends HCV testing for everyone at increased risk for HCV infection, including: all those who have ever injected drugs, even if it was only once in the remote past; recipients of clotting factor concentrates made in the United States before 1987; recipients of blood transfusions or solid organ transplants in the United States before 1992; patients who have ever received long-term hemodialysis; healthcare workers after needlestick injuries involving HCV-positive blood; all persons with HIV infection; children born to HCV-positive mothers; and patients with abnormal liver enzyme tests.[4]

Testing for HCV infection is often a multi-step process. A test for antibody to HCV virus (anti-HCV) by enzyme immunoassay (EIA) is recommended for initial screening. A positive anti-HCV test identifies persons who were exposed to HCV virus but is unable to distinguish a past infection from a present infection. Although the anti-HCV assay correctly identifies a true negative with 99% specificity, false-positive anti-HCV results occur frequently, especially among populations at low risk for HCV infection (e.g., blood donors, healthcare workers). Therefore, confirmation of positive anti-HCV tests is recommended, either with recombinant immunoblot assay (RIBA) to confirm the presence of anti-HCV antibody, or with a nucleic acid test (NAT) to detect the amount or presence of HCV RNA. Unfortunately, confirmatory testing of positive anti-HCV tests is not routinely performed. In response, the CDC developed criteria to improve the positive predictive value of anti-HCV testing: by restricting interpretation of

positive anti-HCV test results to only those results with the highest signal-to-cutoff (s/co) values, the positive predictive value of an anti-HCV test can be improved to 95%. This can serve as an alternative to confirmatory testing and provide a result with a high probability of reflecting the person's true HCV antibody status.[8]

There is currently no vaccine or effective postexposure prophylaxis (e.g. immune globulin) available for HCV.[4] HCV infection is also problematic in that prior infection does not protect against later infections with the same or different genotypes of the virus, and superinfection with more than one HCV genotype is possible.[9]

San Francisco Chronic Viral Hepatitis Registry

In 2005, the SFDPH received funding from the CDC to develop a population-based registry of persons in San Francisco with chronic hepatitis B and/or past or present HCV infection. SFDPH was able to build upon a pre-existing database that contained limited information from the first laboratory report of possible lab markers of chronic hepatitis B or past or present HCV infection reported on an individual between 1984 and 2004. Beginning in 2005, standardized protocols were implemented for data entry into a longitudinal, person-based information system that contains all positive hepatitis B and hepatitis C test results that are reported for San Francisco county residents and for persons whose residence is not known to be in another jurisdiction. The data that SFDPH receives from laboratories and clinicians represent core surveillance for chronic hepatitis B and past or present HCV infection and includes basic demographic information (name, sex, age, address) and hepatitis B or hepatitis C test results. Most of the data are reported by laboratories rather than clinicians. Laboratories have been mandated by the California Code of Regulations (CCR), Title 17, Section 2505,[10] to report positive hepatitis B surface antigen results to public health since May 1995. However, laboratory reporting of HCV test results was not required until July 2007, and due to the complex state requirements for reporting anti-HCV antibody results, laboratories did not report these in a consistent manner until 2009.

Chronic hepatitis B cases are classified as probable or confirmed, according to the CDC/Council of State and Territorial Epidemiologist (CSTE) case definition. Cases of chronic hepatitis B are defined by laboratory tests that are reportable to public health; clinical information from health care providers or patients is not required to meet the case definition. In contrast, to classify cases of chronic hepatitis C, the patient and health care provider must be contacted to determine clinical symptoms, signs, and results of liver test results that are not routinely reported to local health authorities, in order to distinguish between acute, chronic, and resolved HCV infection. Because resources are not available to conduct such investigations on the thousands of HCV lab reports received each year, SFDPH cannot identify cases of chronic hepatitis C, but is able to identify persons who meet the CDC/CSTE laboratory criteria for past or present HCV infection (http://www.cdc.gov/ncphi/disss/nndss/casedef/hepatitisccurrent.htm). These limitations are further outlined in item 3 of the Data Limitations section of this report.

SFDPH also received CDC funding in 2009 to conduct enhanced surveillance for chronic hepatitis B. By directly contacting clinicians and patients, SFDPH can acquire information unavailable through routine public health reporting to better characterize the population of San Franciscans who are chronically infected with hepatitis B, including detailed demographics and risk factors for infection. Through these enhanced surveillance activities, SFDPH educates persons with chronic hepatitis B infection about their disease and preventing transmission of the infection to their close contacts, and provides current public health guidance to clinicians who care for patients with chronic hepatitis B.

Methods

Core Surveillance

Laboratorians, clinicians and other mandated reporters report positive results of tests for hepatitis B and hepatitis C to the SFDPH in compliance with Title 17, California Code of Regulations (CCR), Sections 2500 and 2505. In addition to reporting test results, laboratories and providers are required to report patient identifiers (e.g., name, date of birth, gender, address, phone number, medical record number) and provider identifiers (e.g., name, facility, address).[10] The SFDPH stores the reported information in a secure electronic database, organized by the person reported.

CDC/CSTE laboratory criteria for diagnosis are applied to HBV test results to identify persons with probable and/or confirmed chronic hepatitis B. CDC defines a *probable* case of chronic hepatitis B as a person with a single positive hepatitis B surface antigen (HBsAg), positive HBV DNA, or positive hepatitis B e antigen (HBeAg) with no IgM antibody to hepatitis B core antigen (IgM anti-HBc) test reported. A *confirmed* case of chronic hepatitis B is a person who: a) has a single positive HBsAg, positive HBV DNA, or positive HBeAg test with a negative IgM anti-HBc or, b) tests positive for HBsAg, HBV DNA, or HBeAg two times at least six months apart.[11]

CDC/CSTE criteria are applied to HCV test results to identify persons who meet laboratory criteria for past or present HCV infection. These persons may have acute, chronic, or resolved infection because no single lab test distinguishes acute from chronic HCV infection or chronic infection from resolved infection. Classification of HCV infections to this degree would require contacting clinicians or patients for further information on symptoms and/or additional testing (e.g. liver enzyme tests, negative HCV NATs). Due to the large volume of reports and limited resources for follow-up, SFDPH is unable to identify and enumerate cases of chronic hepatitis C.

The CDC laboratory criteria used to identify past or present HCV infection are any one of the following: [12]

1. anti-HCV antibody positive (repeat reactive) by enzyme immunoassay (EIA), verified by an additional more specific assay (e.g. recombinant immunoblot assay (RIBA) for anti-HCV or nucleic acid testing for HCV RNA);

2. anti-HCV antibody positive by RIBA;
3. detection of HCV RNA;
4. HCV genotype;
5. anti-HCV antibody positive by EIA with a signal to cut-off (s/co) ratio predictive of a true positive (as determined by CDC).[12]

In 2003, the CDC expanded recommendations for confirmatory testing to include the signal-to-cutoff (s/co) value of anti-HCV screening test positive results, as referenced in item 5, above. For each brand of assay, the CDC has calculated specific threshold s/co values that predict a true anti-HCV positive result $\geq$95% of the time.[8] California regulations require laboratories to report anti-HCV antibody results in a manner that indicates whether or not the s/co value meets CDC criteria.[10]

For this report, age is defined as the age of the person at the time that the first positive hepatitis B or hepatitis C report is received by the SFDPH. Age is calculated by subtracting the date of birth from the date of first notification of the case to SFDPH, then dividing the difference by 365.25 (the .25 accounts for leap years). The number and percent of persons for whom age is unknown is shown in a table footnote.

Race is classified as American Indian/Alaska Native, Asian/Pacific Islander (A/PI), African American (Black), White or Other. The number and percent of persons for whom race is unknown is shown in a table footnote. Hispanic ethnicity was rarely reported and thus is not included in the data tables.

Enhanced Surveillance for Chronic Hepatitis B

Beginning in 2008, a subset of San Francisco chronic hepatitis B cases were interviewed by telephone as part of enhanced surveillance activities. Twenty-five percent of probable or confirmed chronic hepatitis B cases were randomly selected from hepatitis B cases reported to the SFDPH Chronic Viral Hepatitis Registry from October 1, 2007 through July 31, 2009. Individuals with multiple hepatitis B tests reported from October 1, 2007 through July 31, 2009 were eligible to be included in the sample based on their earliest reported test in that time period.

Following selection for enhanced follow-up, a one-page data collection form was faxed to the health care provider who ordered the most recent positive HBV test to request patient locating information, race/ethnicity, primary language and pregnancy status and to notify them that SFDPH will contact their patient. Cases were ineligible for enhanced surveillance interview follow-up if they had been previously interviewed or sampled for an interview, if they were found to be a resident of another county, if their clinician asked SFDPH not to contact them, if they were found to have an acute case of hepatitis B, if the lab test was discovered to be a false positive, or if they were deceased.

Using a structured telephone interview, eligible persons were asked about demographic information, including race/ethnicity, country of birth and primary language, as well as questions about selected health services received for hepatitis B, disease status and risk factors for acquisition of HBV. Education about HBV transmission and preventing infection of close contacts was offered by phone and contacted cases were also sent educational materials and community resources for testing and vaccination in the desired language(s). Cantonese-speaking interviewers conducted interviews in Cantonese and a third party interpretation service was used to conduct interviews in other non-English languages. Interviews for children 18 years and younger were conducted with a parent of the child and omitted questions involving recreational drug use and sexual activity. Cases who stated that they were unaware of their HBV diagnosis were given a shortened interview which focused on collecting demographic, hepatitis B risk factor and selected health characteristic information, and the clinician was notified about the case's unaware status.

Data collected and summarized in this report is kept strictly confidential. SFDPH is authorized by law to collect information on cases of chronic hepatitis B and past or present HCV infection for the purpose of controlling or preventing disease including: the reporting of disease, the conduct of public health surveillance, public health investigation and public health intervention.[13] SFDPH employees have a legal and ethical responsibility to protect the confidentiality of protected health information, and to use that information only in the performance of their jobs.

Data Limitations

1. Surveillance data do not measure prevalence: The data presented are not an estimate of the prevalence of chronic HBV or HCV infection in San Francisco residents. Prevalence cannot be calculated because some persons infected with HBV or HCV are not tested, and others were tested before consistent reporting to SFDPH was established. In addition, some persons who were tested anonymously may not have been reported to SFDPH. Finally, people who were included in these data may not live in San Francisco, either because their address information was not provided or because they have moved.

2. Surveillance data do not measure incidence: The data presented are not an estimate of the incidence rate of chronic hepatitis B or past or present HCV infected cases in 2009. The incidence rate is the number of newly infected persons occurring within a defined time in a defined geographical area. While SFDPH does identify the first date the case was reported to them, this date is not necessarily the date the case became infected or was newly diagnosed. For example, some cases may have been infected many years ago but had no symptoms and were not tested when newly infected, but were tested in 2009 because a clinician was following recommended screening practices or because symptoms of chronic hepatitis have developed.

3. HCV Infection: The HCV infection data presented potentially overestimate the number of reported persons who have chronic HCV infection. Acute HCV infections may be included because no single laboratory test distinguishes acute from chronic HCV infection, and acute infection is based on clinical symptoms and liver function tests that are not reported to the health department. Resolved HCV infections may also be included, because no single laboratory test distinguishes chronic from resolved HCV infection; resolved HCV infection requires a clinician assessment and a pattern of negative tests (e.g., HCV NATs) that are not required to be reported to public health. Distinguishing between acute, chronic, and resolved infections would require public health follow up with clinicians and/or patients to collect symptom and additional laboratory test results. Due to the large volume of reports and limited resources for follow-up, SFDPH was limited to conducting HCV surveillance based on HCV test results that are required to be reported to public health and could only define persons as having past or present infection.

4. Reporting gaps: Complete identification of chronic hepatitis B and past or present HCV infected cases depends on complete reporting by laboratories and clinicians. All reports of positive hepatitis B and hepatitis C test results received by SFDPH in 2009 came from laboratories, which are mandated to report positive hepatitis B and hepatitis C test results under Title 17, California Code of Regulations (CCR).[10] Under-reporting by laboratories is believed to be minimal as the majority have automated processes for fulfilling their legally mandated obligations to report to SFDPH. Although Title 17, CCR also mandates reporting of chronic hepatitis B and past or present HCV infection by clinicians, SFDPH has not received reports of chronic hepatitis B or past or present HCV infection from clinicians during this period. There are likely San Francisco residents with chronic hepatitis B and/or past or present HCV infection who did not receive laboratory testing for hepatitis B or hepatitis C during this period, and whose treating clinician did not report their condition. Information about these persons is therefore missing from this report. Finally, the data presented may include persons who have left San Francisco or who have died after they were reported to the SFDPH.

5. Missing information: Laboratory information systems frequently do not receive or store information about patient race and ethnicity, resulting in a large proportion of cases reported with unknown race and ethnicity. Since 2006, SFDPH has been able to supplement race information by collaborating with two large laboratories to establish a link between their laboratory information systems and the demographic data from the clinical records and report that information electronically. Through the enhanced surveillance interviews on a subset of cases, SFDPH was also able to obtain race information by self-report.

Similarly, some laboratory reports are missing the patient's address. For approximately 15.5% of persons who were reported to SFDPH in this period (13.6% of chronic hepatitis B cases and 17.6% of past or present HCV infected cases), their residence was unknown. Information about cases whose county of residence was unknown was included in this report, along with cases that are known to live in San Francisco. Thus, the core surveillance data presented may overestimate

the number of San Franciscans who were reported with chronic hepatitis B or past or present HCV infection during this period.

6. Duplication: SFDPH follows procedures to minimize duplicate records for persons whose laboratory results may be submitted with slight variations in name spelling (e.g., use of middle initial, typographic error). However, in some instances it may not be obvious that two different names belong to the same person, so two cases will be recorded instead of one. This would lead to a slight overestimate of the number of persons who were reported with chronic hepatitis B or past or present HCV infection in this period. Conversely, in some situations, information from a case may have been erroneously matched and joined to the information from another case, leading to potential underestimation of the number of chronic hepatitis B and past or present HCV infected cases reported in this period. The magnitude of potential error caused by incorrect deduplication of similar records is estimated to be between -2% and + 2%.[14]

7. Limitations of enhanced surveillance interviews: A 25% random sample of reported chronic hepatitis B cases were selected for enhanced surveillance interview in order to obtain information that would be representative of diagnosed, reported persons with chronic hepatitis B in San Francisco. Full or partial interviews were conducted with 64% of the sample but could not be completed for all eligible cases. The results may have been affected by selection bias if the 36% of cases who were not interviewed differed substantially from interviewed cases. Another limitation of the data is that information about their medical history was obtained by patient interview and was not validated against medical records, and is thus subject to patient recall bias.

Epidemiology of Chronic Hepatitis B in San Francisco

Core Surveillance Data

From January 1, 2009 through December 31, 2009, SFDPH received over 5,000 positive hepatitis B laboratory reports on 3,546 individuals. Of these 3,546 individuals, 1,110 (31.3%) were newly reported to SFDPH. Of the 3,546 cases reported in 2009, 1,114 (31.4%) met the CDC laboratory criteria for a probable case of chronic hepatitis B and 2,432 (68.6%) met the CDC laboratory criteria for a confirmed case of chronic hepatitis B.

Data presented in Tables 1.1 and 1.2 below are for all probable and confirmed cases of chronic hepatitis B with at least one test reported to SFDPH in 2009 (n=3,546). These data do not represent the number of incident or prevalent infections (see limitations section). More cases were male (52.8%) (Table 1.1) and between the ages of 25-54 years (70.3%) (Table 1.2) when they were first reported to SFDPH. Of the 65.6% of cases for whom race was known, 86.6% of cases were Asian/Pacific Islander (A/PI) (Table 1.3).

Table 1.1. Sex of reported chronic hepatitis B cases, 2009*

Sex	N	%
Male	1,858	52.8%
Female	1,662	47.2%
Total	3,520	100%

*Sex data missing for 26/3,546 (0.7%) of all cases

Table 1.2. Age group of reported chronic hepatitis B cases, 2009*

Age group, years	N	%
<2	6	0.2%
2-4	9	0.3%
5-14	35	1.0%
15-24	305	8.6%
25-34	899	25.4%
35-44	856	24.2%
45-54	732	20.7%
55-64	487	13.7%
65+	215	6.1%
Total	3,544	100.2%†

*Age data missing for 2/3,546 cases (0.1%) of all cases

†Total percent is >100% due to rounding

Table 1.3. Race of reported chronic hepatitis B cases, 2009*

Race	N	%
Asian/Pacific Islander	2,016	86.6%
White	171	7.3%
African American	95	4.1%
American Indian/Alaska Native	4	0.2%
Other	41	1.8%
Total	2,327	100%

*Race data missing for 1,219/3,546 (34.4%) of all cases

Enhanced Surveillance Data

Public health follow-up was conducted on a random 25% sample of the 2,775 probable or confirmed chronic hepatitis B cases reported to the SFDPH from January 1, 2009 through July 31, 2009. Of the 342 cases eligible for interview (see methods section for exclusion criteria), full or partial interviews were conducted with 220 (64%). Twenty-five percent of cases were unable to be contacted, 8% refused to be interviewed and 3% had missing or invalid locating information. Five percent of the cases stated that they were unaware of their chronic hepatitis B diagnosis. For these cases, SFDPH conducted a shortened interview to obtain information on demographic data, hepatitis B risk factors and selected health characteristics, and also to provide information and counseling toward hepatitis B. SFDPH did not collect information about hepatitis B-related health services received from cases who were unaware of their diagnosis.

Tables 2.1 and 2.2 below present demographic data for all cases that completed a full or shortened (unaware case) interview. Table 2.3 below presents data on selected health characteristics for all cases that completed a full or shortened (unaware case) interview as well as hepatitis B-related health services received for all cases who completed an interview and were aware of their HBV diagnosis. Table 2.4 below presents data on risk factors for hepatitis B infection for all cases that completed a full or shortened (unaware case) interview.

Demographic Characteristics

Fifty percent of interviewed cases were male and 40% of interviewed cases were 15-44 years of age. Nearly eighty-seven percent were of A/PI race, of whom 82.7% were Chinese, 6.3% were Vietnamese and 3.1% were Filipino (Table 2.1).

Table 2.1. Demographic characteristics of interviewed chronic hepatitis B cases, 2009

Characteristic	n	%
Sex		
Male	110	50.0%
Female	110	50.0%
Total	220	100%
Age group, years		
<15	1	0.5%
15-24	11	5.0%
25-34	41	18.6%
35-44	36	16.4%
45-54	66	30.0%
55-64	42	19.1%
65+	23	10.5%
Total	220	100.1%*
Race		
Asian/Pacific Islander	191	86.8%
White	14	6.4%
African American	8	3.6%
American Indian/Alaska Native	1	0.5%
Other	6	2.7%
Total	220	100%
Asian Ethnicity		
Chinese	158	82.7%
Vietnamese	12	6.3%
Filipino	6	3.1%
Other	15	7.9%
Total	191	100%

*Total percent is >100% due to rounding

Over eighty-five percent of cases were foreign-born and of these, over 90% were born in countries highly endemic for HBV infection (Table 2.2). Primary language was reported as Cantonese for 50.5% of respondents and English for 19.5% of respondents.

Table 2.2. Country of birth and primary language of interviewed chronic hepatitis B cases, 2009

Characteristic	n	%
Country of Birth		
China	135	61.4%
USA	32	14.5%
Vietnam	25	11.4%
Philippines	5	2.3%
Burma (Myanmar)	3	1.4%
Cambodia	3	1.4%
Other	17	7.7%
Total	220	100.1%*
Primary Language		
Cantonese	111	50.5%
English	43	19.5%
Mandarin	15	6.8%
Vietnamese	14	6.4%
Tagalog	4	1.8%
Other/Multiple	33	15.0%
Total	220	100%

*Total percent is >100% due to rounding

Hepatitis B-Related Health Characteristics and Risk Factors

Nearly eighty-six percent of interviewees reported having health insurance and 20.6% said that they had received the hepatitis A vaccine (Table 2.3). Of those that were aware of their hepatitis B diagnosis at the time of interview, 70% reported they had ever received an abdominal ultrasound to check for liver cancer, 33.8% reported ever visiting a gastrointestinal (GI) or liver specialist for hepatitis B, 26.9% had ever taken prescription medication to treat HBV, 12.5% reported having a liver biopsy and 3% had been told by a doctor that they had liver cancer.

Among women of childbearing age (12-52 years), 18.7% were pregnant at the time of interview. Cases that were pregnant were referred to the San Francisco Perinatal Hepatitis B Coordinator for follow-up to ensure that their infants would receive hepatitis B immune globulin and vaccination according to the recommended schedule. Five individuals (1% of random sample) were deceased and not eligible for interview. Of the five death certificates obtained, two listed hepatitis B and sequelae of chronic hepatitis infection (liver failure, cirrhosis, end-stage liver disease) as a cause of death. The remaining three death certificates did not list HBV infection or sequelae of chronic hepatitis infection as a cause of death. Cause of death may or may not be related to chronic hepatitis B infection for individuals where cause of death is missing or unknown.

Table 2.3. Health services received for hepatitis B and selected health characteristics of interviewed chronic hepatitis B cases, 2009

Characteristic (n responding)	Yes		No		Unknown	
	N	%	n	%	n	%
Health Insurance (n=220)	189	85.9%	30	13.6%	1	0.5%
Abdominal ultrasound to check for liver cancer (n=200)*	140	70.0%	49	24.5%	11	5.5%
Visited GI or liver specialist for HBV (n=201)*	68	33.8%	131	65.2%	2	1.0%
Took medication for HBV (n=201)*	54	26.9%	145	72.1%	2	1.0%
Said they received hepatitis A vaccine (n=218)	45	20.6%	114	52.3%	59	27.1%
Liver biopsy (n=200)*	25	12.5%	165	82.5%	10	5.0%
Pregnant (n=75)†	14	18.7%	60	80.0%	1	1.3%
Told by MD they have liver cancer (n=200)*	6	3.0%	191	95.5%	3	1.5%

*Does not include cases unaware of HBV diagnosis.
†Asked only of females 12-52 years of age.

Table 2.4 shows lifetime risk factors reported by interviewees. Reported risk factors are not mutually exclusive; respondents could report more than one risk factor. Additionally, the presence of a risk factor does not necessarily indicate the source of HBV infection. Many respondents report having had close contact with someone who has hepatitis B: 29.4% reported sharing a residence with someone who has hepatitis B, 12.9% reported maternal HBV infection, and 7% reported sexual contact with someone who has hepatitis B. Over one-fourth of people did not know the hepatitis B status of their close contacts. Nearly nineteen percent of male respondents reported they were MSM, 10.8% of all respondents reported having ever been treated for a sexually transmitted disease (STD), and smaller percentages of respondents reported a history of injection drug use, incarceration or kidney dialysis.

Table 2.4. Lifetime risk factors of interviewed chronic hepatitis B cases, 2009

Characteristic (n responding)	Yes		No		Unknown	
	n	%	n	%	n	%
Household contact with HBV (n=218)	64	29.4%	99	45.4%	55	25.2%
Mother with HBV (n=217)	28	12.9%	118	54.4%	71	32.7%
MSM (n=107)*	20	18.7%	87	81.3%	0	0.0%
Treatment for STD (n=212)	23	10.8%	187	88.2%	2	0.9%
Sexual partner with HBV (n=214)	15	7.0%	140	65.4%	59	27.6%
Incarceration (n=216)	6	2.8%	210	97.2%	0	0.0%
Injection Drug Use (n=214)	5	2.3%	208	97.2%	1	0.5%
Kidney Dialysis (n=218)	4	1.8%	214	98.2%	0	0.0%

*Asked only of males.

Epidemiology of Past or Present Hepatitis C Infection in San Francisco

Core Surveillance Data

From January 1, 2009 through December 31, 2009, SFDPH received over 5,080 positive hepatitis C laboratory reports on 3,387 individuals. Of these 3,387 individuals, 2,253 (66.5%) were newly reported to SFDPH in 2009 with laboratory criteria consistent with past or present HCV infection.

Data presented in Tables 3.1, 3.2 and 3.3 below are for all persons who met laboratory criteria for past or present HCV infection with at least one test reported to SFDPH in 2009 (n=3,387). These data do not represent the number of incident or prevalent infections (see limitations section). More infections were reported in males (68.8%) (Table 3.1) and in persons between the ages of 45-64 years (65.5%) (Table 3.2) when they were first reported to SFDPH. Of the 60.9% of persons for whom race was known, 53.6% were White and 34.7% were African American (Table 3.3).

Table 3.1. Sex of reported persons with past or present HCV infection, 2009*

Sex	N	%
Male	2,299	68.8%
Female	1,041	31.2%
Total	3,340	100%

*Sex data missing for 47/3,387 (1.4%) of all persons

Table 3.2. Age group of reported persons with past or present HCV infection, 2009*

Age group, years	N	%
<15	6	0.2%
15-24	48	1.4%
25-34	238	7.0%
35-44	591	17.5%
45-54	1,209	35.7%
55-64	1,008	29.8%
65+	284	8.4%
Total	3,384	100%

*Age data missing for 3/3,387 (0.1%) of all persons

Table 3.3. Race of reported persons with past or present HCV infection, 2009*

Race	N	%
White	1,105	53.6%
African American	716	34.7%
Asian/Pacific Islander	164	7.9%
American Indian/Alaska Native	20	1.0%
Other	58	2.8%
Total	2,063	100%

*Race data missing for 1,324/3,387 (39.1%) of all persons

Discussion

Chronic infections with HBV or HCV are major causes of chronic liver disease, affecting 3.5-5.3 million people in the United States.[6] The most recent National Health and Nutrition Examination Survey (NHANES) estimated that most of the 3.2 million Americans chronically infected with HCV were male and most were born between 1945 and 1964.[7] San Francisco data for persons with past or present HCV infection reported in 2009 mirrors the NHANES findings; approximately two-thirds were male and two-thirds were between the ages of 45-64 years when first reported to the SFDPH. Furthermore, CDC estimates that 47%-70% of the 800,000-1.4 million persons in the U.S. who are chronically infected with HBV were born in other countries.[3] San Francisco estimates show a similar pattern, with 85.5% of interviewed chronic hepatitis B cases reporting being born outside of the United States.

There were no significant changes in the chronic hepatitis B core surveillance data between the 2007-2008 Chronic Hepatitis B Surveillance Report and this 2009 report. In both reports, more cases were male (52.8% in 2007-2008, 52.4% in 2009) and most cases were between the ages of 25-54 years when first reported to SFDPH (69.1% in 2007-2008, 70.3% in 2009). Approximately 86% of cases were of Asian/Pacific Islander race (86.3% in 2007-2008, 86.6% in 2009) among cases where race was known.

The enhanced surveillance interviews of persons with chronic hepatitis B have provided a more complete picture of the epidemiology of chronic HBV infection in San Francisco. As with core surveillance data, there were no significant changes in chronic hepatitis B enhanced surveillance data between the 2007-2008 Chronic Hepatitis B Surveillance Report and this 2009 report. Persons of A/PI race, who comprise 31% of the city's population but an estimated 86.6% of the chronic hepatitis B cases, are disproportionately affected.[15] Most are foreign-born and over 80% do not speak English as their primary language. Core surveillance estimates indicate that 58.3% of reported chronic hepatitis B cases were 15-44 years of age, an age group in which both males and females may be more likely to transmit HBV through sexual activity and in which women may transmit HBV perinatally. Infected persons who were foreign-born were born in countries highly endemic for HBV infection where they likely acquired HBV at birth or during early

childhood. Having a mother or other close contact infected with HBV were among the most frequently reported risk factors among interview respondents. However, over one-fourth of respondents did not know whether their close contacts were infected with hepatitis B, which may suggest knowledge gaps among cases about recommended measures to prevent transmission to their contacts (e.g., testing and vaccination).

Although 85.9% of respondents stated they had health insurance, the type and level of coverage provided for hepatitis-related monitoring and treatment was not determined. Because the information about health services received for hepatitis B was obtained by patient self-report and not medical chart review, it is not possible to evaluate whether the levels of hepatitis-B related health services were appropriate. For example, although only 20.6% of cases interviewed said that they had received the hepatitis A vaccine, it is possible that a substantial proportion of those who did not recall receiving hepatitis A vaccination were already immune through prior infection in their country of origin.

Although cases of chronic hepatitis B are found among all race groups in San Francisco, Asian/Pacific Islanders bear the largest burden of chronic HBV infection, highlighting the need to provide culturally and linguistically appropriate public and patient education about hepatitis B prevention for A/PI communities. Efforts to raise awareness about hepatitis B prevention and treatment in the A/PI and clinical communities have been undertaken by SF Hep B Free, a citywide campaign that began in 2007 to promote hepatitis B testing and vaccination of all A/PI persons in San Francisco.

New to the 2009 surveillance report is core surveillance data on persons with a past or present HCV infection in San Francisco. Although in 2009, SFDPH was not able to determine if these persons were chronically infected with HCV, in 2010, SFDPH received CDC funding to conduct enhanced surveillance on a subset of persons reported with markers of HCV infection. Data gathered from patients and clinicians will enable SFDPH to identify cases of chronic HCV infection and describe their risk factors. This will provide additional information on chronic HCV infection in San Francisco.

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