Viral Hepatitis Surveillance

United States, 2013

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Surveillance of Viral Hepatitis – United States, 2013

SUMMARY

As part of the Centers for Disease Control and Prevention's (CDC) National Notifiable Diseases Surveillance System (NNDSS), viral hepatitis case-reports are received electronically from state and territorial health departments via CDC's National Electronic Telecommunications System for Surveillance (NETSS), a computerized public health surveillance system that provides CDC with data on cases of nationally notifiable diseases on a weekly basis. Although the surveillance infrastructure is in place for reporting of both acute and chronic infections, case-reports of chronic hepatitis B virus (HBV) and past or present hepatitis C virus (HCV) infections, which account for the greatest burden of disease, were submitted by 41 states and 37 states, respectively, in 2013. As noted in a report from the Institute of Medicine (1), surveillance capacity to monitor viral hepatitis is limited at the state and local level, resulting in under-reporting and variable data quality.

The NNDSS data in this report should be interpreted with the understanding that reported cases of viral hepatitis represent only those infected persons who were detected, diagnosed, met a stringent case definition, and eventually reported to CDC in 2013. Because many infections are not reported, this Summary is most useful in detecting trends over time in newly reported cases of hepatitis A virus (HAV), HBV, and HCV infections. In an effort to account for under-ascertainment and under-reporting, a method was developed in 2011 to better quantify the number of new cases of hepatitis A, B, and C from the actual number cases reported for each disease (2). The estimates in this report were obtained using this new methodology. We caution the reader, however, that the estimates of the number of new cases after 2011, including those in this report, cannot be compared to estimates before 2011, which were obtained using a different (unpublished) methodology, but the trends seen in reported data still pertain, such as the increase in the number of acute cases of HCV infection among young persons that was observed beginning in 2011.

Because chronic HBV and current HCV infections are largely hidden and part of what the former United States Assistant Secretary for Health, Dr. Howard Koh has dubbed the "Silent Epidemic" (3), this report also provides data to inform our understanding of the current epidemic of chronic hepatitis B and C.

With progressive infant hepatitis A vaccination recommendations since 1996 and universal infant vaccination since 2006, vaccination rates and evidence of vaccine-induced immunity in young patients have been increasing in the past decade (4, 5). Despite protection among young persons, adults who do not fall into a high-risk group are not vaccinated and are therefore susceptible to infection. Since 2011, an increase in the number of reported cases of hepatitis A has been observed. In 2013, there were 1,781 reported cases of hepatitis A, which represented a 14% increase from 2012. This increase reflects cases ascertained during a large hepatitis A outbreak from imported pomegranate arils consumed by persons in several southwestern states and Hawaii (6). After adjusting for under-ascertainment and under-reporting (2), the estimated number of new HAV infections was 3,473.

Acute hepatitis B has been declining in incidence since 1990 mainly due to effective vaccination strategies, but for the first time since 1990, in 2013, the number of reported cases of acute hepatitis B increased to 3,050 cases, which represented a 5.4% increase from 2012. Although this increase may reflect the growing number of drug-related and healthcare-related outbreaks associated with hepatitis B transmission, it may be premature to interpret the increase from 2012-2013; continued monitoring over more years of data is warranted. Chronic HBV infection, estimated at 700,000-1.4 million of the U.S. population (7, 8), remains a major public health challenge. As the surveillance data from enhanced surveillance sites in this report indicate, about one-half of chronic HBV infections were among Asians/Pacific Islanders, and 63.9% of chronic HBV infections were among persons born outside of the United States. Other data indicate that approximately 47%-70% of chronic HBV-infected persons living in the United States were born in other countries (9), and of foreign born persons living in the United States with chronic HBV infection, an estimated 58% migrated from Asia (8). Further, the mortality data in this report show that Asians/Pacific Islanders are disproportionately dying with hepatitis B. Identifying these chronically infected persons and linking them to care is critical (10, 11). In 2014, the U.S. Preventive Services Task Force (USPSTF) joined with CDC in recommending HBV testing for persons born in countries where HBV infection is endemic (12). There were 3,050 cases of acute hepatitis B reported in 2013. After adjusting for under-ascertainment and under-reporting (2), the estimated number of new HBV infections was 19,764.

After receiving reports of approximately 800-1,000 cases of acute hepatitis C each year from 2006-2010, there was a significant increase of 151.5% in reported cases of acute HCV infection from 2010 to 2013. Cases of acute HCV infection rose from 850 in 2010 to 1,229 in 2011 to 1,778 in 2012 and then to 2,138 in 2013. The increase from 2010-2013 is thought to reflect both true increases in incidence and improved case ascertainment. Based on these data and epidemiologic studies, new cases of HCV infection are predominately among young persons who are white, live in non-urban areas (particularly in Eastern and Midwestern states), have a history of injection drug use, and previously used opioid agonists such as oxycodone (13, 14). Improved ascertainment by Florida, Massachusetts, and New York, funded by CDC to conduct active surveillance, partially explains increased incidence in these sites. In other locations where the number of cases has increased very markedly, such as Indiana, Kentucky, and New Jersey, the increases have occurred without any federal support for investigation or follow-up, reflecting overall increases in incidence (15) (Table 4.1). After adjusting for under-ascertainment and under-reporting (2), an estimated 29,718 new HCV infections occurred in 2013.

Mortality among HCV-infected persons—primarily adults aged 55-64 years—is increasing (16, 17). In 2007, the number of HCV-related deaths (n=15,106) exceeded the number of HIV/AIDS-related deaths (n=12,734) in the United States (16) and has since continued to increase. In 2013, the number of HCV-related deaths increased to 19,368; more than one-half of these deaths occurred among persons aged 55-64 years. A major public health challenge is to increase the proportion of persons tested and the proportion of those who test positive who are referred for care and treatment (10, 11). To address this challenge, in 2013, the USPSTF joined with CDC in recommending one-time screening for HCV infection to adults born between 1945 and 1965 (18).

BACKGROUND

Viral hepatitis is caused by infection with any of at least five distinct viruses: hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV), and hepatitis E virus (HEV). Most viral hepatitis infections in the United States are attributable to HAV, HBV, and HCV. All three of these unrelated viruses can produce an acute illness characterized by nausea, malaise, abdominal pain and jaundice, although many of these acute infections are asymptomatic or cause only mild disease. Thus, many persons infected with HBV or HCV are unaware they are infected and have clinically silent infections for decades until developing cirrhosis, end-stage liver disease, or hepatocellular carcinoma.

Hepatitis A

Transmitted through the fecal-oral route, HAV is acquired primarily through close personal contact with an infected person and during foodborne outbreaks (19). Unlike hepatitis B and C, hepatitis A does not cause chronic infection. Since 1995, effective vaccines to prevent HAV infection have been available in the United States, increasing the feasibility of eliminating indigenous transmission. In 1996, CDC's Advisory Committee on Immunization Practices (ACIP) recommended administration of hepatitis A vaccine to persons at increased risk for the disease, including international travelers, men who have sex with men (MSM), non-injection and injection-drug users (IDUs), and children living in communities with high rates of disease (20). In 1999, ACIP expanded these recommendations to include children living in 11 states with average hepatitis A rates of $\geq$20 cases per 100,000 population and recommended that vaccination be considered for children in an additional six states with rates of 10–20 cases per 100,000 population (21). ACIP expanded these recommendations in 2006 to include routine vaccination of newborns in all 50 states (4).

Hepatitis B

HBV is transmitted by percutaneous or mucosal exposure to the blood or body fluids of an infected person, from an infected mother to her newborn during childbirth, through close contact within households, through unscreened blood transfusion or unsafe injections in health care settings, through injection drug use, and from sexual contact with an infected person. Adults with diabetes mellitus are at an increased risk of acquiring HBV infection. Therefore, these persons are recommended to receive hepatitis B vaccination if younger than 60 years of age and to be considered for vaccination if aged 60 years or older (22).

The risk for chronic HBV infection decreases with increasing age at infection. Of infants who acquired HBV infection from their mothers at birth, as many as 90% become chronically infected, whereas 30%–50% of children infected at age 1–5 years become chronically infected. This percentage is smaller among adults, in whom approximately 5% of all acute HBV infections progress to chronic infection (23, 24).

Effective vaccines to prevent HBV infection have been available in the United States since 1981. Ten years later, a comprehensive strategy was recommended for the elimination of HBV

transmission in the United States (25, 26). This strategy encompassed the following four components:

- Universal vaccination of infants beginning at birth;
- Prevention of perinatal HBV infection through routine screening of all pregnant women for HBV infection and the provision of immunoprophylaxis to infants born either to infected women or to women of unknown infection status;
- Routine vaccination of previously unvaccinated children and adolescents; and
- Vaccination of adults at increased risk for infection (including health-care workers, dialysis patients, adults with diabetes, household contacts and sex partners of persons with chronic HBV infection, recipients of certain blood products, persons with a recent history of having multiple sex partners concurrently, those infected with a sexually transmitted disease, men who have sex with men [MSM], and injection drug users).

In addition to hepatitis B vaccination, efforts have been made to improve care and treatment for persons who are living with hepatitis B. In the United States, 700,000-1.4 million persons are estimated to be infected with the virus (7, 27), many of whom are unaware of their infection status (10). To improve health outcomes for these persons, CDC issued recommendations in 2008 to guide HBV testing and public health management of persons with chronic HBV infection (9). These guidelines stress the need for testing persons at high risk for infection, conducting contact management, educating patients, and administering FDA-approved therapies for treating hepatitis B. Other recent guidelines address the appropriate management of chronic HBV infection in surgeons, other health care workers, and students (28).

Hepatitis C

HCV is transmitted primarily through percutaneous (parenteral) exposure that can result from injection drug use, needle stick injuries, and inadequate infection control in health-care settings. Much less often, HCV transmission occurs among HIV-positive persons, especially MSM, as a result of sexual contact with an HCV-infected partner (29, 30), among persons who receive tattoos in unregulated settings (30), and among infants born to HCV-infected mothers (31). After adjustment for non-sampled populations in NHANES, there are an estimated 3.2 million chronically HCV-infected persons in the United States (32). After adjustment for populations not sampled in the NHANES household surveys (32), such as the incarcerated and homeless, there are an estimated 3.2 million chronically HCV-infected persons in the United States (11).

A single positive anti-HCV result cannot distinguish between acute and chronic HCV infection or between current or cleared HCV infection. Approximately 75%-85% of newly infected adults and adolescents develop chronic infection and making this distinction requires a health department to follow-up with a provider to determine if there were symptoms for reporting purposes. Laboratory criteria in the 2012 case definition for past or present HCV infection require one or more of the following: anti-HCV positive (repeatedly reactive) by EIA, verified by at least one more specific assay, or HCV RIBA positive, or HCV nucleic acid test (NAT) positive, or anti-HCV screening-test positive with an assay-specific signal-to-cutoff ratio predictive of a true case. In 2013, the RIBA test was phased out in the United States and the revised testing algorithm has been published (33). This assessment requires, on average, review

of at least 4 records by hepatitis surveillance staff in health departments (34). No clinical symptoms are required; however, the case must be known to not be an acute case.

Because of the high burden of current HCV infection in the United States and because no vaccine is available for preventing infection, national recommendations (35) emphasize other primary prevention activities, including screening and testing blood donors, inactivating HCV in plasma-derived products, testing persons at risk for HCV infection and providing them with risk-reduction counseling, and consistently implementing and practicing infection control in health-care settings. In 2010, the FDA approved point-of-care tests for HCV infection, which meant that patients could receive HCV test results within the same visit and faster referral to care (36). In 2012, CDC augmented existing risk-based recommendations for HCV testing by recommending one-time screening for HCV infection among all those born during 1945-1965 (37). It is estimated that persons born during these years have a 3% prevalence of HCV antibodies, which is five times higher than the prevalence seen in adults born in other years. Of all persons living with HCV infection, about 75% were born during 1945-1965; a similar percentage of HCV-associated deaths can be attributed to this birth cohort (37). The goal of birth-cohort HCV testing is to identify unrecognized infections among the segment of the population with the largest risk of HCV-associated morbidity and mortality, thereby increasing opportunities for persons infected with HCV to benefit from appropriate care and treatment.

Linkage to care and treatment is critical to improving health outcomes for persons found to be infected with HCV. Such linkage is particularly important in light of the major advancements that have been made in HCV treatments. For patients infected with HCV, treatment has previously consisted of pegylated interferon combined with oral doses of ribavirin (38). Approximately 40%-50% of HCV-infected patients receiving this therapy cleared their infection (38). However, HCV treatment improved drastically in 2011 with the development of the initial direct-acting oral agents, telaprevir and boceprevir, which were capable of achieving a sustained virologic response rate of ≥80% (38, 39). These two drugs were available during the reporting period in 2013 that this Surveillance Report covers, but are now discontinued in the United States because of the development of newer all-oral direct-acting antiviral agents. In 2013, the FDA approved the use of simeprevir and sofosbuvir (40). When given in combination with pegylated interferon and ribavirin or together as an all-oral combination regimen for a shorter duration of 8-12 weeks, these agents increase virologic cure rates to ≥90% (41, 42). In 2014, two new all-oral regimens, Harvoni (ledipasvir/sofosbuvir) and Viekira Pak (ombitasvir, paritaprevir, and ritonavir tablets; dasabuvir tablets), were licensed for the treatment of HCV. These four agents are now the standard-of-care for HCV treatment in the United States. Evidence-based guidance is available from AASLD/IDSA to assist providers caring for HCV-infected patients (43). The AASLD/IDSA HCV guidance is continuously updated to incorporate new information regarding HCV testing, linkage to care, and treatment (http://www.hcvguidelines.org).

Sources of Information

CDC relies on several sources of information to determine the incidence, prevalence, trends, and burden of hepatitis A, B, and C disease.

National Notifiable Diseases Surveillance System (NNDSS)

Background

The basis for most case-reports is passive surveillance through the *National Notifiable Diseases Surveillance System (NNDSS)***.** State and local health departments report acute hepatitis A, B and C (incident cases) through this system. However, a number of states do not report cases of chronic hepatitis B and C through the NNDSS. Collecting, verifying and reporting the many chronic cases of hepatitis B and C in the United States (estimated at over 4 million) are beyond the capability of many health departments. Reports of chronic hepatitis B and C are included in this Surveillance Summary from *NNDSS* from states that gave permission for CDC to publish those counts.

Each week, state and territorial health departments report cases of acute, symptomatic viral hepatitis to CDC's NNDSS. Since 1990, states have been electronically submitting individual case-reports (absent of personal identifiers) to CDC. States' participation in reporting nationally notifiable diseases, including viral hepatitis, is voluntary.

National surveillance for viral hepatitis (including acute hepatitis A, hepatitis B, and hepatitis C; chronic hepatitis B; and chronic [past or present] hepatitis C) is based on case definitions developed and approved by the Council of State and Territorial Epidemiologists (CSTE) and CDC. Reported cases of acute and chronic viral hepatitis are required to meet the following clinical and laboratory criteria (available at: http://wwwn.cdc.gov/nndss/script/ConditionList.aspx?Type=0&Yr=2012). However, these criteria are evaluated at state or local health departments and are not validated by CDC. Although states may classify cases as confirmed, probable, and suspect, only confirmed cases of acute viral hepatitis are presented in this report.

Adjustments to Reported Cases from the National Notifiable Diseases Surveillance System

To better estimate the incidence of acute hepatitis A, B, and C in the United States, CDC recently undertook an analysis to recalculate the multipliers that had been used previously to account for under-ascertainment and under-reporting. A model was developed and tested that factored in the probability of symptoms (I), referral to care and treatment (II), and rates of reporting to local and state health departments (III). Results of the analysis indicated that reported cases represent an estimated one of every 1.95 hepatitis A cases, one of every 6.48 acute hepatitis B cases, and one of every 13.90 acute hepatitis C cases (2). Accordingly, to obtain the estimated number of acute hepatitis A, B, and C after accounting for under-ascertainment and under-reporting, these new estimators were first applied to the acute hepatitis case data from NNDSS in the 2011

Surveillance Summary and will continue to be applied to future annual surveillance summaries, including in this report. These estimates cannot be used to deduce trends by comparison with estimations obtained in years prior to 2011, as earlier estimates were based on different (and unpublished) calculations; still, trends in reported cases can be evaluated, for example, the trend in the increase in acute hepatitis C that was first observed in 2011 among nationally reported cases.

Enhanced Viral Hepatitis Surveillance Sites

Background

In November 2012, CDC funded seven health departments to conduct enhanced viral hepatitis surveillance through a three-year CDC funding agreement. All chronic cases of viral hepatitis obtained through these sites are de-duplicated. Additionally, for a sample of cases and in some sites such as New York State, all cases, follow-up case investigation is conducted by health departments to obtain clinical, laboratory, and epidemiological information, including risk behaviors and exposures. Each quarter, a dataset of cumulative cases from each site was sent to CDC through the CDC Secure Access Management System, a secure electronic file transfer portal.

Methods

In 2013, CDC funded four states (Florida, Massachusetts, Michigan, and Washington), two cities (Philadelphia and San Francisco), and 57 counties in New York State to conduct 'enhanced' – that is, active – viral hepatitis surveillance, representing a combined population of approximately 35.6 million persons. In each of these jurisdictions, clinical laboratories were mandated to submit laboratory reports from persons with positive HBV and HCV test results to state or local health departments. Participating health departments routinely review each report to assess whether the current case definitions were met as established by CSTE and CDC. To determine whether a case is new, each site matches new case-reports to existing cases in the surveillance registry using personal identifying information. New cases are added to an electronic registry, whereas duplicate cases are used to update previous reports. Most health departments collect basic demographic data (e.g., age and sex) from the laboratory reports. Efforts vary by site regarding the level of investigation undertaken to collect and store supplemental information (e.g., risk factor data) from patients or their providers.

Data analyses from participating enhanced surveillance sites presented in this surveillance report were conducted on all serologically-confirmed cases of chronic hepatitis B and chronic (past or present) hepatitis C infection reported for the year 2013. Rates were calculated using appropriate jurisdiction-specific (state, county, or city) 2013 population estimates obtained from the U.S. Census Bureau.

Limitations

The number of cases of chronic HBV infection and past or present HCV infection from participating enhanced surveillance sites included in this report is likely an underestimate of the true burden of disease because cases of chronic infection are generally asymptomatic and less likely to be identified and reported. Additionally, data from these sites are not representative of the U.S. population, and because not all sites conduct comprehensive follow-up, data regarding race/ethnicity, place of birth, and risk are missing for some case-reports.

Mortality/Death Certificates

Background

Death certificates are completed for all deaths registered in the United States. Information from death certificates is provided by funeral directors, attending physicians, medical examiners, and coroners, and certificates are filed in vital statistics offices within each state and the District of Columbia. Through a program called the National Vital Statistics System (NVSS) (44), information from death certificates is compiled by CDC's National Center for Health Statistics (NCHS) to produce national multiple-cause-of-death (MCOD) data (44); causes of death are coded in accordance with the International Classification of Diseases, Tenth Revision (ICD-10) (45). MCOD data are used to determine the national burden of mortality associated with viral hepatitis and to characterize decedents.

A major study of these records from 1999-2007 showed that the annual number of deaths among HCV-infected persons exceeded the annual number of deaths among HIV-infected persons since 2007 (16). Another study showed that fewer than 20% of HCV-infected decedents have HCV listed on their death certificate, even though 75% or more had pre-mortem evidence of serious liver disease (17).

Methods

We obtained and analyzed 2009-2013 national multiple-cause mortality data through NVSS. The following case definitions were used to identify a death associated with hepatitis A, B, and C.

Any death record with a report of any of the following ICD-10 codes listed as the underlying or one of the multiple (e.g., contributing) causes of death in the record axis:

- Hepatitis A (ICD-10: B15),
- Hepatitis B (ICD-10: B16, B17.0, B18.0, and B18.1), or
- Hepatitis C (ICD-10: B17.1 and B18.2).

Demographic information on age, race/ethnicity, and sex were examined. Deaths were divided into six age categories: 0–34, 35–44, 45–54, 55–64, 65–74, and ≥75 years. Race categories prior to 2010 consisted of white (Hispanic and non-Hispanic), black (Hispanic and non-Hispanic), and non-black, non-white (which included all other racial and ethnic groups). Beginning in 2010, race/ethnicity was examined and consisted of the following categories: White, non-Hispanic, Black, non-Hispanic, Hispanic, Asian/Pacific Islander (API) and American Indian/Alaska Native

(AI/AN) to be consistent with those used by the Division of Viral Hepatitis (DVH). To calculate national mortality rates, the number of deaths associated with each type of hepatitis was divided by the total U.S. Census population for each demographic characteristic. Rates on race/ethnicity, sex, and overall total were standardized to the age distribution of the U.S. standard population in 2000 (46).

Interpretation of Mortality Data

- Differences in recording practices of death certificate information may cause misclassification of ICD-10 codes and demographic information.
- Certain racial/ethnic populations likely are underrepresented in US Census data (the denominator for calculating rates), potentially causing overestimated rates for these populations.
- Analyses do not adjust for deaths resulting from undiagnosed viral hepatitis infections.
- Death records listing more than one type of viral hepatitis infection were counted once for each type of infection. For example, a death with ICD-10 codes for both hepatitis B and C virus infections is counted once as a hepatitis B death and once as a hepatitis C death.
- Before 2010, the race category designated as "non-white/non-black" included all other racial groups (e.g., APIs, AI/ANs, and persons who are Hispanic). This lack of specificity limits race-specific interpretation of mortality data prior to 2010.

Investigation of Healthcare-Associated Outbreak Cases

In 2013, CDC participated in two state-based investigations of healthcare-associated outbreaks of viral hepatitis infection, one involving HBV infection and one involving HCV infection. Additional information may be found at the following link that summarizes known outbreaks that occurred during 2008-2014 (available at: http://www.cdc.gov/hepatitis/Statistics/HealthcareOutbreakTable.htm).

HEPATITIS A

Hepatitis A

Historically, hepatitis A rates vary cyclically, with nationwide increases every 10-15 years. The last peak was in 1995; since that time, rates of hepatitis A generally declined until 2011. In 2013, a total of 1,781 cases of hepatitis A were reported from 50 states to CDC (Table 2.1), a 14% increase from 2012. This reflects cases ascertained during a large hepatitis A outbreak from imported pomegranate arils consumed by persons in several southwestern states and Hawaii (6). The overall incidence rate in 2013 was 0.6 cases per 100,000 population. After adjusting for under-ascertainment and under-reporting, an estimated 3,473 hepatitis A cases occurred in 2013. (Data for 2013 were unavailable for the District of Columbia.)

2012 CSTE/CDC Case Definition (NNDSS)

Clinical Description

Acute hepatitis is defined as acute illness with 1) discrete onset of symptoms (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain) and 2) jaundice, or elevated serum alanine aminotransferase (ALT) or aspartate aminotransferase (AST) levels.

Laboratory Criteria

Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive.

Table 2.1. Reported cases of hepatitis A, nationally and by state — United States, 2009-2013

State	2009		2010		2011		2012		2013	
	Rate*	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)
Alabama	0.3	(12)	0.2	(8)	0.2	(8)	0.4	(19)	0.2	(10)
Alaska	0.3	(2)	0.7	(5)	0.6	(4)	0.1	(1)	0.1	(1)
Arizona	1.0	(68)	1.0	(61)	1.2	(77)	1.4	(93)	1.0	(66)
Arkansas	0.4	(12)	0.1	(2)	0.1	(3)	0.3	(8)	0.3	(9)
California	0.7	(273)	0.6	(242)	0.5	(186)	0.5	(209)	0.7	(255)
Colorado	1.0	(52)	0.7	(36)	0.4	(21)	0.5	(28)	1.0	(51)
Connecticut	0.5	(18)	0.8	(29)	0.5	(18)	0.6	(23)	0.5	(19)
Delaware	0.5	(4)	0.8	(7)	0.2	(2)	1.0	(9)	0.4	(4)
District of Columbia	0.2	(1)	0.2	(1)	U	U	U	U	U	U
Florida	0.9	(171)	0.7	(139)	0.5	(87)	0.5	(87)	0.6	(115)
Georgia	0.5	(54)	0.4	(40)	0.3	(27)	0.5	(46)	0.4	(36)
Hawaii	0.8	(11)	0.6	(8)	0.6	(8)	0.4	(5)	1.1	(16)
Idaho	0.3	(5)	0.5	(8)	0.4	(6)	0.7	(11)	0.5	(8)
Illinois	1.0	(126)	0.4	(48)	0.6	(73)	0.5	(67)	0.6	(79)
Indiana	0.3	(17)	0.2	(12)	0.4	(24)	0.2	(11)	0.5	(32)
Iowa	1.3	(38)	0.4	(11)	0.3	(8)	0.2	(7)	0.6	(17)
Kansas	0.4	(12)	0.5	(14)	0.1	(4)	0.5	(15)	0.4	(11)
Kentucky	0.3	(12)	0.6	(26)	0.2	(10)	0.6	(25)	0.5	(24)
Louisiana	0.1	(6)	0.2	(11)	0.1	(5)	0.2	(7)	0.3	(14)
Maine	0.1	(1)	0.5	(7)	0.5	(6)	0.7	(9)	0.8	(10)
Maryland	0.8	(47)	0.4	(23)	0.4	(26)	0.5	(28)	0.5	(29)
Massachusetts	1.1	(71)	0.7	(48)	0.6	(39)	0.6	(40)	0.6	(43)
Michigan	0.7	(72)	0.7	(73)	0.7	(70)	1.0	(100)	0.8	(83)
Minnesota	0.6	(29)	0.7	(37)	0.5	(27)	0.5	(29)	0.6	(32)
Mississippi	0.3	(9)	0.1	(2)	0.2	(7)	0.4	(11)	0.2	(5)
Missouri	0.4	(21)	0.4	(21)	0.2	(13)	0.3	(20)	0.1	(8)
Montana	0.6	(6)	0.4	(4)	0.3	(3)	0.6	(6)	0.6	(6)
Nebraska	1.2	(21)	0.8	(14)	0.3	(5)	0.9	(16)	0.7	(13)
Nevada	0.6	(15)	0.5	(14)	0.2	(5)	0.4	(10)	0.7	(19)
New Hampshire	0.5	(7)	0.2	(2)	0.0	(0)	0.5	(6)	0.7	(9)
New Jersey	0.8	(71)	0.9	(76)	0.9	(79)	0.7	(60)	0.8	(68)
New Mexico	0.4	(8)	0.2	(5)	0.3	(7)	0.5	(10)	1.0	(20)
New York	0.7	(136)	0.8	(147)	0.6	(113)	0.6	(111)	0.8	(167)
North Carolina	0.4	(41)	0.5	(48)	0.3	(31)	0.3	(34)	0.5	(46)
North Dakota	0.3	(2)	0.6	(4)	0.0	(0)	0.3	(2)	1.2	(9)
Ohio	0.3	(36)	0.4	(47)	0.3	(39)	0.3	(36)	0.5	(59)
Oklahoma	0.2	(7)	0.2	(6)	0.3	(11)	0.3	(12)	0.4	(14)
Oregon	0.5	(19)	0.4	(17)	0.3	(11)	0.2	(9)	0.7	(29)
Pennsylvania	0.5	(68)	0.4	(53)	0.5	(60)	0.5	(62)	0.4	(53)

Rhode Island	0.9	(9)	0.9	(9)	0.8	(8)	0.3	(3)	0.4	(4)
South Carolina	1.4	(63)	0.6	(26)	0.2	(11)	0.1	(6)	0.3	(14)
South Dakota	0.4	(3)	0.1	(1)	0.2	(2)	0.0	(0)	0.5	(4)
Tennessee	0.2	(13)	0.2	(12)	0.4	(23)	0.4	(23)	0.3	(20)
Texas	0.7	(184)	0.6	(139)	0.5	(138)	0.5	(134)	0.4	(109)
Utah	0.3	(7)	0.4	(12)	0.3	(8)	0.1	(4)	0.4	(12)
Vermont	0.3	(2)	0.0	(0)	1.0	(6)	0.3	(2)	1.1	(7)
Virginia	0.5	(42)	0.6	(52)	0.4	(30)	0.6	(49)	0.4	(36)
Washington	0.6	(42)	0.3	(21)	0.5	(31)	0.4	(29)	0.6	(45)
West Virginia	0.3	(6)	0.8	(15)	0.4	(8)	0.4	(8)	0.2	(4)
Wisconsin	0.6	(33)	0.4	(23)	0.1	(8)	0.4	(21)	0.6	(37)
Wyoming	0.4	(2)	0.7	(4)	0.4	(2)	0.2	(1)	0.0	(0)
Total	**0.6**	**(1,987)**	**0.5**	**(1,670)**	**0.4**	**(1,398)**	**0.5**	**(1,562)**	**0.6**	**(1,781)**

*Rate per 100,000 population.
U=No data available for reporting.
Source: CDC, National Notifiable Diseases Surveillance System.

- The number of hepatitis A cases reported in the United States has declined, from 1,987 reported cases in 2009 to 1,781 reported cases in 2013.
- However, the 1,781 hepatitis A cases in 2013 represent an increase of 14% from 1,562 cases in 2012 due to a large outbreak in 2013 (6).
- Of the 50 states that reported hepatitis A cases in 2013, 27 states had rates below the national rate.
- In 2013, the case rate ranged from no cases in Wyoming to 1.2 cases per 100,000 population in North Dakota.

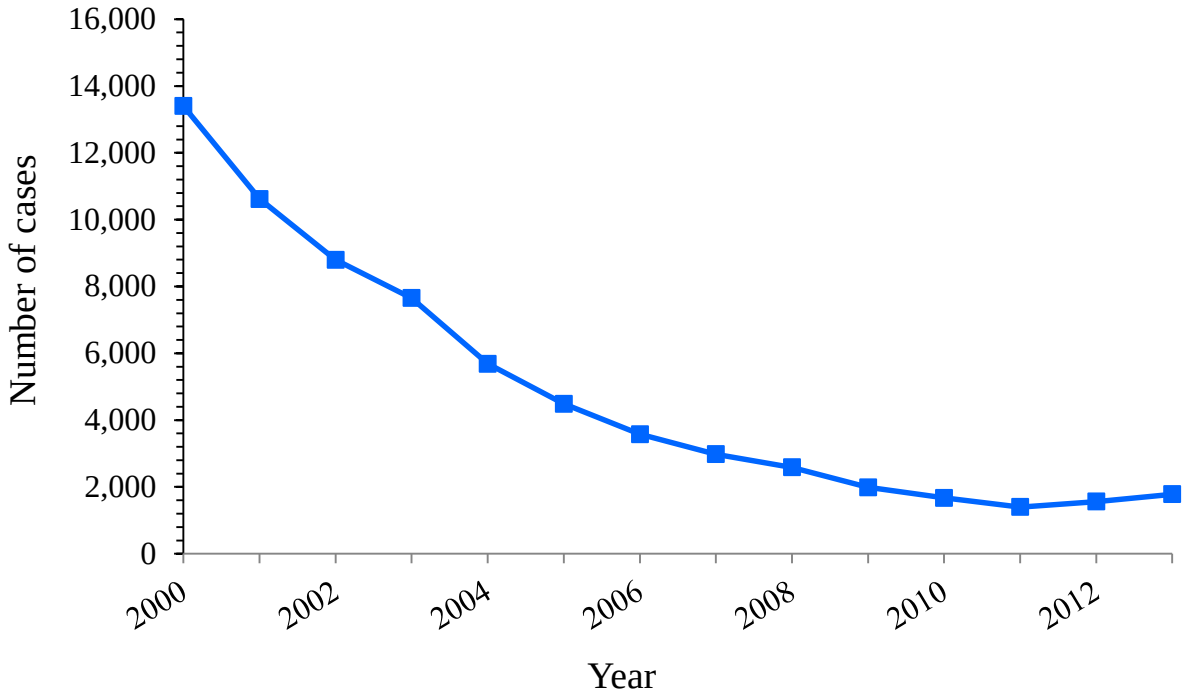
Table 2.2. Clinical characteristics of reported cases of hepatitis A — United States, 2013

Clinical characteristic	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	1,095	61.5	753	68.8
Hospitalized for hepatitis A	1,081	60.7	519	48.0
Died from hepatitis A	959	53.8	9	0.9

*A total of 1,781 hepatitis A cases were reported during 2013.
†Case-reports for which questions regarding clinical characteristics were answered with "yes" or "no." Reports with any other response were excluded.
§Numbers and percentages represent only those case-reports for which data regarding clinical characteristics were available; numbers likely are underestimates.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 1,781 case-reports of hepatitis A received during 2013, 61.5% included information about whether the patient had jaundice, 60.7% included information regarding hospitalization caused by hepatitis A, and 53.8% included information on death from hepatitis A.
- Jaundice was reported for 753 (68.8%) of the 1,095 hepatitis A case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis A was reported for 519 (48.0%) of the 1,081 hepatitis A case-reports that included information about hospitalization.
- Death from hepatitis A was reported for 9 (0.9%) of the 959 hepatitis A case-reports that included information about death.

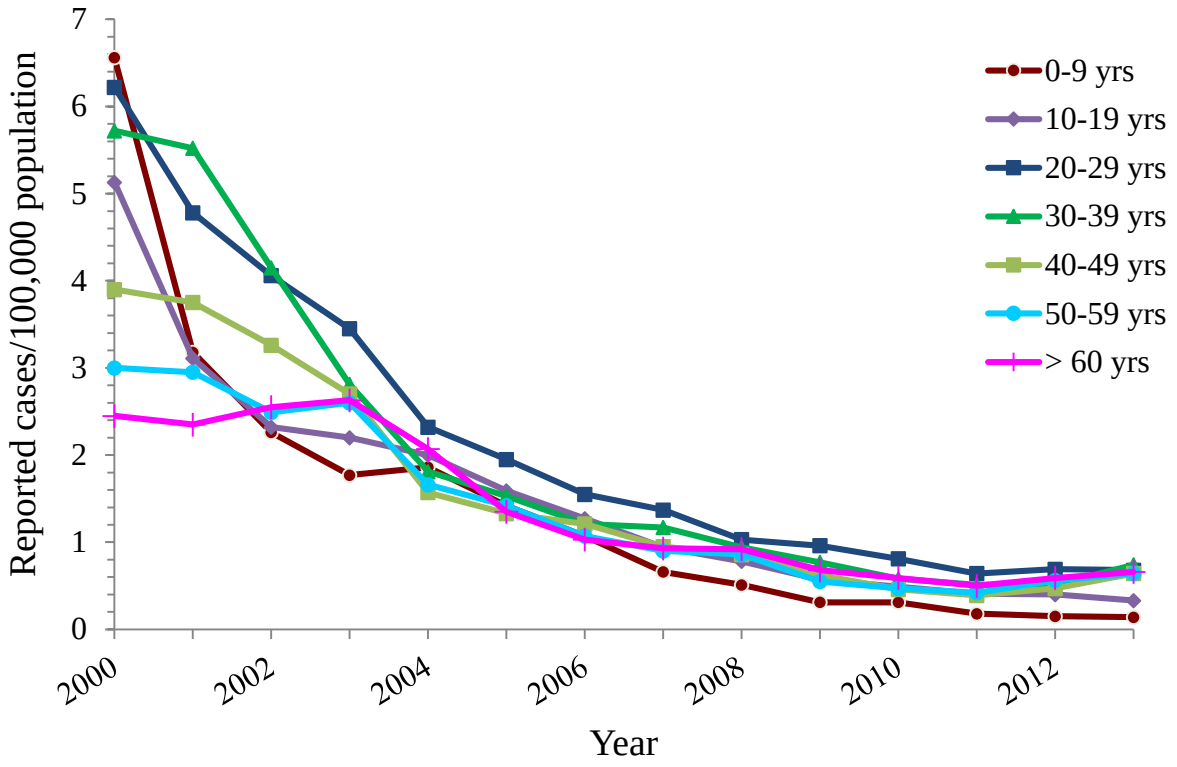
Figure 2.1. Reported number of hepatitis A cases – United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- The number of hepatitis A cases declined by 86.7%, from 13,397 in 2000 to 1,781 in 2013.
- The number of hepatitis A cases increased by 27.4% from 1,398 in 2011 to 1,781 2013 and by 14.0% from 1,562 in 2012 to 1,781 in 2013.

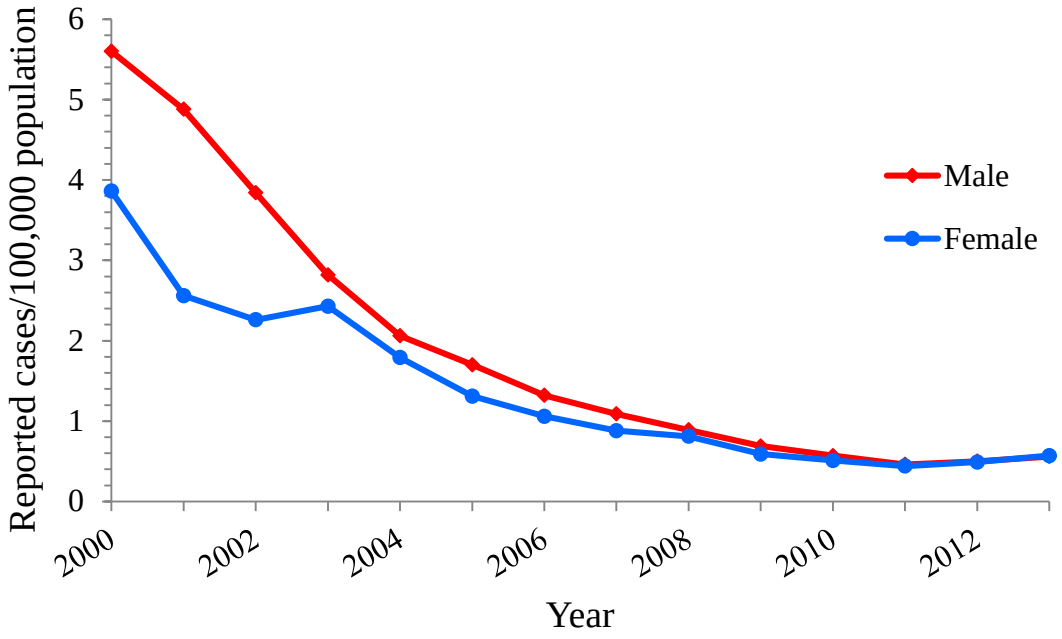
Figure 2.2. Incidence of hepatitis A, by age group – United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000-2011, rates of hepatitis A declined among all age groups but only continued to decline in 2012 and 2013 among cases aged 0-9 and 10-19 years.
- When comparing the 2013 hepatitis A rates of all age groups, persons aged 30–39 years had the highest rate (0.74 cases per 100,000 population) and persons aged 0-9 years had the lowest rate (0.14 cases per 100,000 population).
- The largest increases were among persons aged 30-39 years (from 0.51 cases per 100,000 population in 2011 to 0.74 cases per 100,000 population in 2013) and persons aged 40–49 years (from 0.39 cases per 100,000 population in 2011 to 0.64 cases per 100,000 population in 2013).

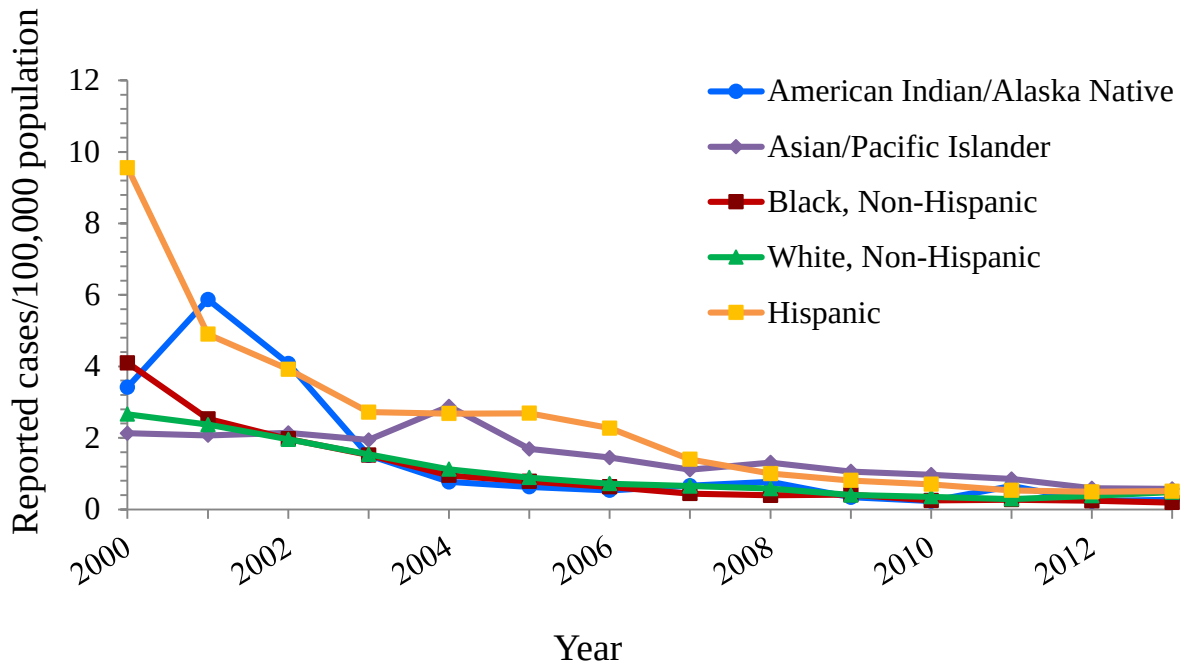
Figure 2.3. Incidence of hepatitis A, by sex – United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000-2011, rates of hepatitis A among males and females both declined, and by 2011, the rates in these two groups were similar.
- Rates among males and females have increased proportionally from 2011-2013.
- In 2013, the incidence rate was 0.6 cases per 100,000 population for males and females.

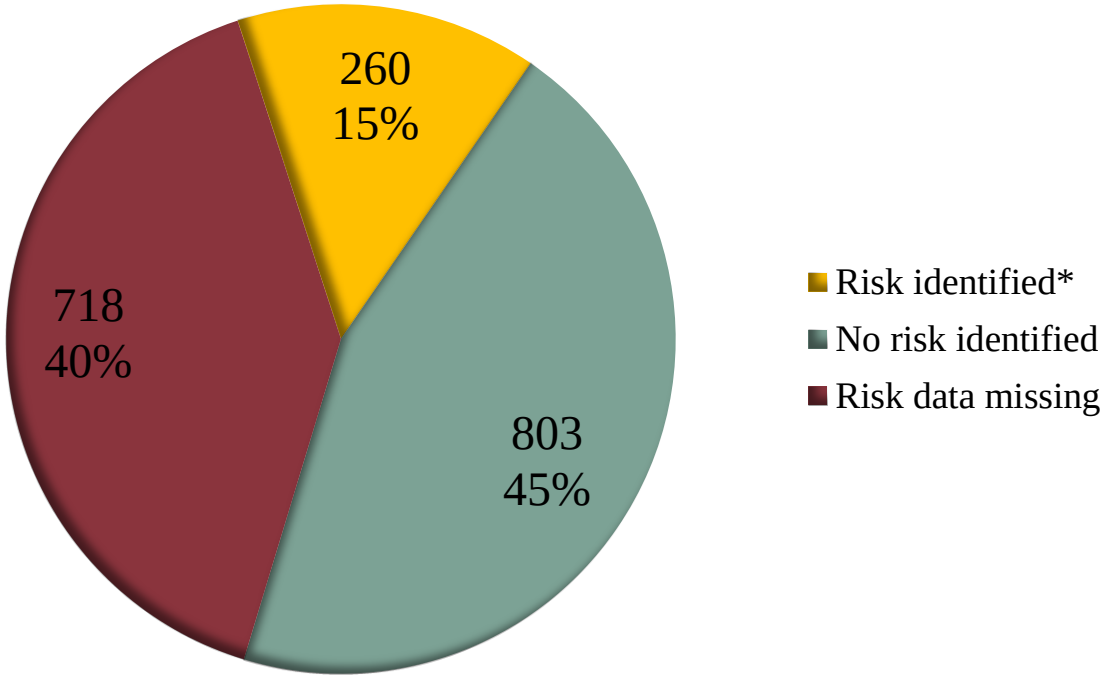
Figure 2.4. Incidence of hepatitis A, by race/ethnicity – United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000-2007, rates of hepatitis A among Hispanics were generally higher than those of other racial/ethnic populations.
- Since 2008, the rate of hepatitis A has been higher for Asians/Pacific Islanders (0.57 cases per 100,000 population in 2013) than for other race/ethnic groups.

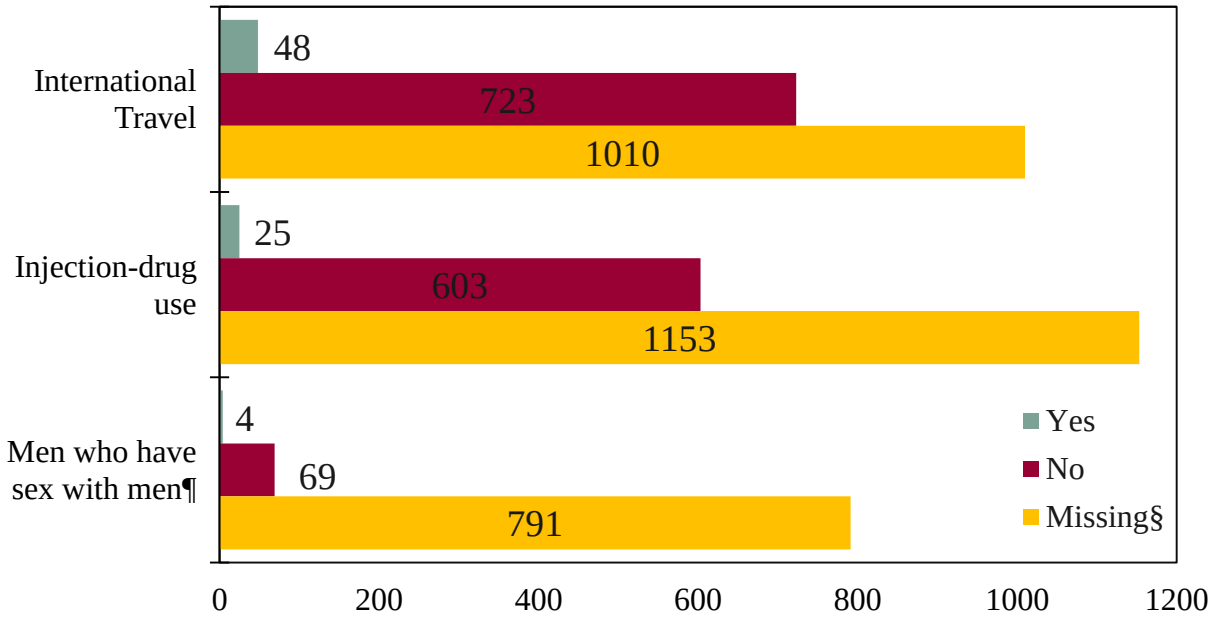
Figure 2.5. Availability of information on risk exposures/behaviors associated with hepatitis A – United States, 2013



*Includes case-reports indicating the presence of at least one of the following risks 2–6 weeks prior to onset of acute, symptomatic hepatitis A: 1) having traveled to hepatitis A-endemic regions of Mexico, South/Central America, Africa, Asia/South Pacific, or the Middle East; 2) having sexual/household or other contact with suspected/confirmed hepatitis A patient; 3) being a child/employee in day care center/nursery/preschool or having had contact with such persons; 4) being involved in a foodborne/waterborne outbreak; 5) being a man who has sex with men; and 6) using injection drugs.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 1,781 case-reports of hepatitis A received by CDC during 2013, a total of 718 (40%) cases did not include a response (i.e., a "yes" or "no" response to any of the questions about risk exposures and behaviors) to enable assessment of risk exposures or behaviors.
- Of the 1,063 case-reports that had risk exposure/behavior information:
    - 803 (75.5%) indicated no risk exposures/behaviors for hepatitis A; and
    - 260 (24.5%) indicated at least one risk exposures/behaviors for hepatitis A during the 2–6 weeks prior to onset of illness.

Figure 2.6a. Hepatitis A reports*, by risk exposure/behavior† – United States, 2013

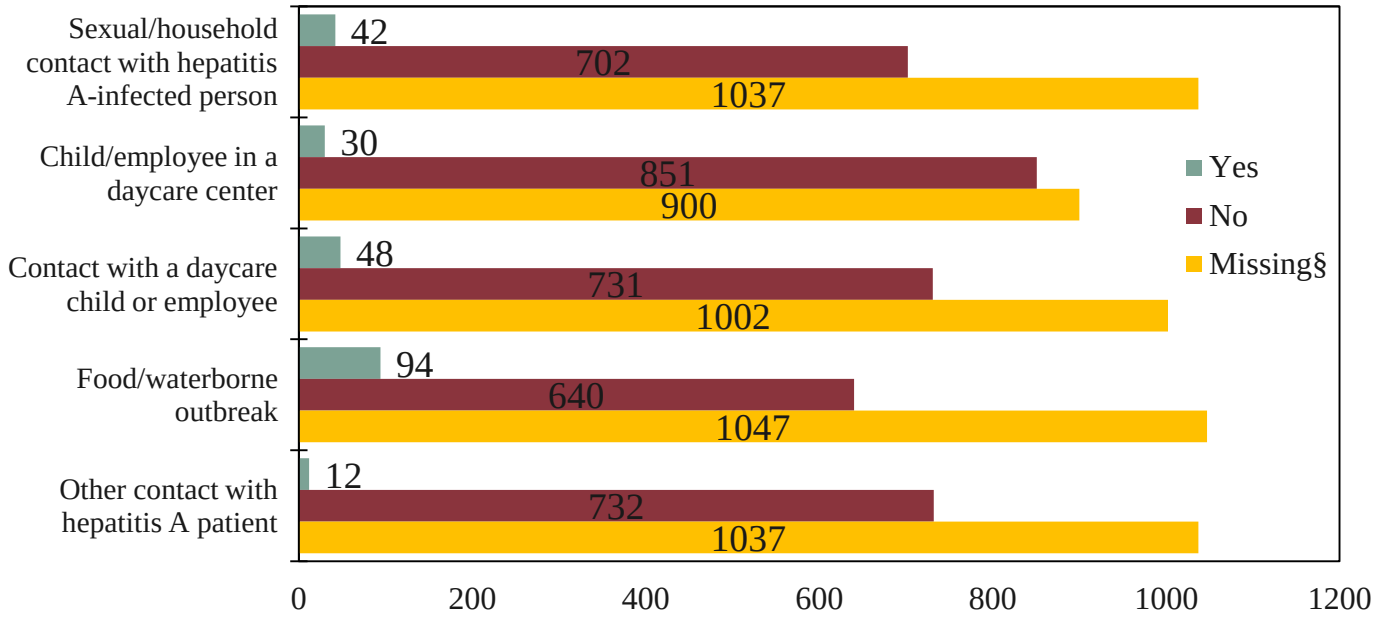


*A total of 1,781 case-reports of hepatitis A were received in 2013.
†More than one risk exposure/behavior may be indicated on each case-report.
§No risk data reported.
¶A total of 864 hepatitis A cases were reported among males in 2013.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.6a presents reported risk exposures/behaviors for hepatitis A during the incubation period, 2–6 weeks prior to onset of symptoms:

- Of the 771 case-reports that included information about travel, 6.2% (n= 48) indicated traveling outside of the United States or Canada.
- Of the 628 case-reports that included information about injection-drug use, 4.0% (n=25) indicated use of injection drugs.
- Of the 73 case-reports from males that included information about sexual preference/practices, 5.5% (n=4) indicated having sex with another man.

Figure 2.6b. Hepatitis A reports*, by risk exposure/behavior† – United States, 2013



*A total of 1,781 case-reports with hepatitis A were received in 2013.
†More than one risk exposure/behavior may be indicated on each case-report.
§No risk data reported.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 2.6b presents reported risk exposures/behaviors during the incubation period, 2–6 weeks prior to onset of symptoms:

- Of the 744 case-reports that contained information about contact with a hepatitis A-infected person, 5.6% (n=42) indicated sexual or household contact with a person confirmed or suspected of having hepatitis A.
- Of the 881 case-reports that included information about employment or attendance at a nursery, daycare center, or preschool, 3.4% (n=30) indicated working at or attending a nursery, day-care center, or preschool.
- Of the 779 case-reports that included information about household contact with an employee of or a child attending a nursery, day-care center, or preschool, 6.2% (n=48) indicated such contact.
- Of the 734 case-reports that included information about linkage to an outbreak, 12.8% (n=94) indicated exposure that may have been linked to a common-source foodborne or waterborne outbreak.
- Of the 744 case-reports that included information about additional contact (i.e., other than household or sexual contact) with someone confirmed or suspected of having hepatitis A, 1.6% (n=12) indicated such contact.

Table 2.3. Number and rate of hepatitis A-related deaths, by demographic characteristics and year — United States, 2009–2013

Demographic characteristic		2009		2010		2011		2012		2013	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)	0–34	1	0.00	3	0.00	0	0.00	2	0.00	2	0.00
	35–44	1	0.00	7	0.02	1	0.00	5	0.01	2	0.00
	45–54	14	0.03	25	0.06	11	0.02	12	0.03	13	0.03
	55–64	22	0.06	34	0.09	16	0.04	23	0.06	30	0.08
	65–74	12	0.06	10	0.05	12	0.05	17	0.07	19	0.08
	≥75	32	0.17	16	0.09	29	0.15	18	0.09	14	0.07
Race§	White	68	0.02								
	Black	13	0.04								
	Non-White, non-Black	1	0.00								
Race/ethnicity¶	White, NH (non-Hispanic)			65	0.03	44	0.02	51	0.02	63	0.02
	Black, NH			15	0.04	10	0.03	8	0.02	6	0.01
	Hispanic			12	0.03	6	0.02	8	0.02	8	0.02
	Asian/Pacific Islander			2	0.02	8	0.06	7	0.05	3	0.02
	American Indian/Alaskan Native			1	0.05	1	0.04	2	0.08	0	0.00
Sex	Male	50	0.03	73	0.05	37	0.02	46	0.03	50	0.03
	Female	32	0.02	22	0.01	32	0.02	31	0.02	30	0.01
Overall		**82**	**0.02**	**95**	**0.03**	**69**	**0.02**	**77**	**0.02**	**80**	**0.02**

*Rates for race, sex, and overall total are age-adjusted per 100,000 U.S. standard population in 2000.
†Cause of death is defined as the underlying cause of death or one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B15 (hepatitis A).
§The race category "White" Included white, non-Hispanic and white Hispanic. The race category "Black" included black, non-Hispanic and black Hispanic. The race category "Non-White, non-Black" included all other races.
¶The race/ethnicity category was added starting in 2010 to incorporate bridged race categories. One death in 2012 is not represented under the race/ethnicity category due to missing race and/or ethnicity data.
Source: CDC, National Vital Statistics System.

- In 2013, the overall hepatitis A-related mortality rate was 0.02 deaths per 100,000 population (n=80).
- From 2009-2013, the hepatitis A-related mortality rate remained steady at 0.02 deaths/100,000 population each year, except in 2010 when the mortality rate was 0.03 deaths/100,000 population.
- In 2013, hepatitis A-related mortality rates were higher among persons aged ≥45 years (≥0.03 deaths/100,000 population) when compared to persons aged 0-44 years (0.00 deaths/100,000 population).

- In 2013, hepatitis A-related age-specific mortality rates increased with increasing age groups from 0.00 deaths/100,000 population among persons aged 0-34 years to 0.08 deaths/100,000 population among persons aged 55-64 years and 65-74 years to 0.07 deaths/100,000 population among persons aged ≥75 years.
- In 2013, the persons with the highest hepatitis A-related mortality rates were aged 55-64 and 65-74 years (0.08 deaths/100,000 population for each age group).
- In 2013, hepatitis A-related mortality rates were higher in males, 0.03 deaths/100,000 population, than in females, 0.01 deaths/100,000 population.

HEPATITIS B

Acute Hepatitis B

In 2013, a total of 3,050 cases of acute hepatitis B were reported from 48 states to CDC (Table 3.1). The overall incidence rate for 2013 was 1.0 case per 100,000 population. After adjusting for under-ascertainment and under-reporting, an estimated 19,764 acute hepatitis B cases occurred in 2013. (Data for 2013 were unavailable for the District of Columbia, Rhode Island, and Wyoming.)

2012 CSTE/CDC Case Definition (NNDSS)

Clinical Description

Acute hepatitis is defined as acute illness with 1) discrete onset of symptoms* (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain) and 2) jaundice or elevated serum alanine aminotransferase (ALT) >100 IU/L.

Laboratory Criteria

- Hepatitis B surface antigen (HBsAg) positive

AND

- Immunoglobulin M (IgM) antibody to hepatitis B core antigen (IgM anti-HBc) positive (if done)

*A documented negative HBsAg laboratory test result within 6 months prior to a positive test (either HBsAg, hepatitis B "e" antigen (HBeAg), or hepatitis B virus nucleic acid testing (HBV NAT) including genotype) result does not require an acute clinical presentation to meet the surveillance case definition.

Table 3.1. Reported cases of acute hepatitis B, nationally and by state — United States, 2009-2013

State	2009		2010		2011		2012		2013	
	Rate*	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)
Alabama	1.9	(89)	1.4	(68)	2.5	(119)	1.6	(79)	1.9	(90)
Alaska	0.6	(4)	0.7	(5)	0.4	(3)	0.1	(1)	0.1	(1)
Arizona	0.6	(42)	0.4	(26)	0.2	(14)	0.2	(14)	0.4	(28)
Arkansas	2.2	(65)	2.3	(66)	1.9	(57)	2.5	(74)	1.7	(50)
California	0.7	(258)	0.7	(252)	0.4	(157)	0.4	(136)	0.4	(138)
Colorado	0.5	(27)	0.9	(46)	0.4	(23)	0.5	(24)	0.5	(24)
Connecticut	0.5	(16)	0.6	(22)	0.5	(19)	0.4	(15)	0.2	(8)
Delaware†	U	U	U	U	1.4	(13)	1.2	(11)	1.5	(14)
District of Columbia	1.7	(10)	0.5	(3)	U	U	U	U	U	U
Florida	1.6	(299)	1.6	(297)	1.1	(213)	1.3	(247)	1.7	(323)
Georgia	1.5	(144)	1.7	(165)	1.4	(142)	1.1	(109)	1.0	(104)
Hawaii	0.5	(6)	0.4	(6)	0.4	(6)	0.4	(5)	0.3	(4)
Idaho	0.7	(11)	0.4	(6)	0.1	(2)	0.3	(5)	0.8	(13)
Illinois	0.9	(118)	1.1	(135)	0.7	(85)	0.7	(86)	0.7	(94)
Indiana	1.2	(74)	1.2	(75)	1.1	(70)	1.4	(90)	1.5	(101)
Iowa	1.2	(37)	0.5	(15)	0.5	(15)	0.4	(13)	0.4	(11)
Kansas	0.2	(6)	0.4	(11)	0.5	(15)	0.3	(9)	0.4	(11)
Kentucky	2.1	(90)	3.1	(136)	3.5	(151)	4.1	(180)	4.9	(214)
Louisiana	1.6	(73)	1.2	(55)	1.4	(62)	1.0	(44)	1.8	(82)
Maine	1.1	(15)	1.0	(13)	0.6	(8)	0.7	(9)	0.8	(11)
Maryland	1.3	(72)	1.2	(67)	1.1	(62)	0.9	(52)	0.7	(43)
Massachusetts	0.3	(17)	0.2	(13)	1.0	(67)	1.1	(75)	1.1	(71)
Michigan	1.3	(132)	1.2	(122)	0.9	(91)	0.8	(81)	0.5	(53)
Minnesota	0.7	(38)	0.4	(23)	0.4	(20)	0.3	(17)	0.4	(19)
Mississippi	1.1	(33)	1.1	(33)	1.9	(57)	2.6	(78)	1.8	(55)
Missouri	0.8	(47)	1.1	(67)	1.0	(60)	0.8	(48)	1.0	(61)
Montana	0.1	(1)	0.0	(0)	0.0	(0)	0.2	(2)	0.4	(4)
Nebraska	1.2	(22)	0.7	(12)	0.7	(12)	0.5	(10)	0.5	(9)
Nevada	1.3	(34)	1.5	(41)	1.1	(29)	1.0	(28)	1.0	(29)
New Hampshire	0.5	(6)	0.4	(5)	0.2	(3)	0.3	(4)	0.2	(2)
New Jersey	1.1	(93)	0.9	(77)	0.8	(73)	0.8	(70)	0.7	(65)
New Mexico	0.4	(8)	0.2	(5)	0.5	(10)	0.1	(3)	0.1	(3)
New York	0.7	(129)	0.7	(139)	0.7	(134)	0.6	(113)	0.6	(117)
North Carolina	1.1	(104)	1.2	(113)	1.1	(109)	0.7	(73)	0.8	(75)
North Dakota	0.0	(0)	0.0	(0)	0.0	(0)	0.0	(0)	0.0	(0)
Ohio	0.8	(88)	0.8	(95)	0.8	(90)	1.5	(178)	1.9	(225)
Oklahoma	3.3	(122)	3.1	(115)	2.6	(100)	2.1	(79)	1.0	(40)

Oregon	1.2	(44)	1.1	(42)	0.8	(32)	0.6	(25)	0.8	(32)
Pennsylvania	0.8	(106)	0.6	(72)	0.7	(84)	0.5	(63)	0.3	(43)
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	1.2	(56)	1.3	(59)	0.8	(39)	0.8	(37)	1.2	(58)
South Dakota	0.5	(4)	0.2	(2)	0.2	(2)	0.2	(2)	0.6	(5)
Tennessee	2.2	(136)	2.4	(150)	3.0	(192)	3.7	(240)	4.0	(262)
Texas	1.7	(420)	1.6	(394)	0.8	(204)	0.7	(170)	0.5	(142)
Utah	0.2	(5)	0.3	(8)	0.4	(10)	0.5	(13)	0.2	(5)
Vermont	0.0	(0)	0.3	(2)	0.0	(0)	0.3	(2)	0.3	(2)
Virginia	1.4	(110)	1.2	(97)	1.0	(84)	1.0	(84)	0.9	(72)
Washington	0.7	(48)	0.7	(50)	0.5	(35)	0.5	(34)	0.5	(33)
West Virginia	4.6	(84)	4.7	(88)	6.1	(113)	7.6	(141)	10.5	(195)
Wisconsin	0.4	(24)	0.9	(54)	0.3	(17)	0.4	(22)	0.2	(9)
Wyoming	0.7	(4)	0.5	(3)	0.0	(0)	0.0	(0)	U	U
Total	**1.1**	**(3,371)**	**1.1**	**(3,350)**	**0.9**	**(2,903)**	**0.9**	**(2,895)**	**1.0**	**(3,050)**

*Rate per 100,000 population.
†Updated data for Delaware in 2011.
U=No data available for reporting.
Source: CDC, National Notifiable Diseases Surveillance System.

- The number of acute cases of hepatitis B decreased by 9.5% during 2009–2013, from 3,371 reported cases to 3,050 reported cases; increases in Florida, Indiana, Kentucky, Massachusetts, Mississippi, Missouri, Ohio, Tennessee and West Virginia occurred during this time period.
- Of the 48 states that reported acute hepatitis B cases in 2013, 31 states had rates below the national rate of 1.0 per 100,000 population.
- Rates of acute hepatitis B in 2013 ranged from no cases reported in North Dakota to 10.5 cases per 100,000 population in West Virginia.

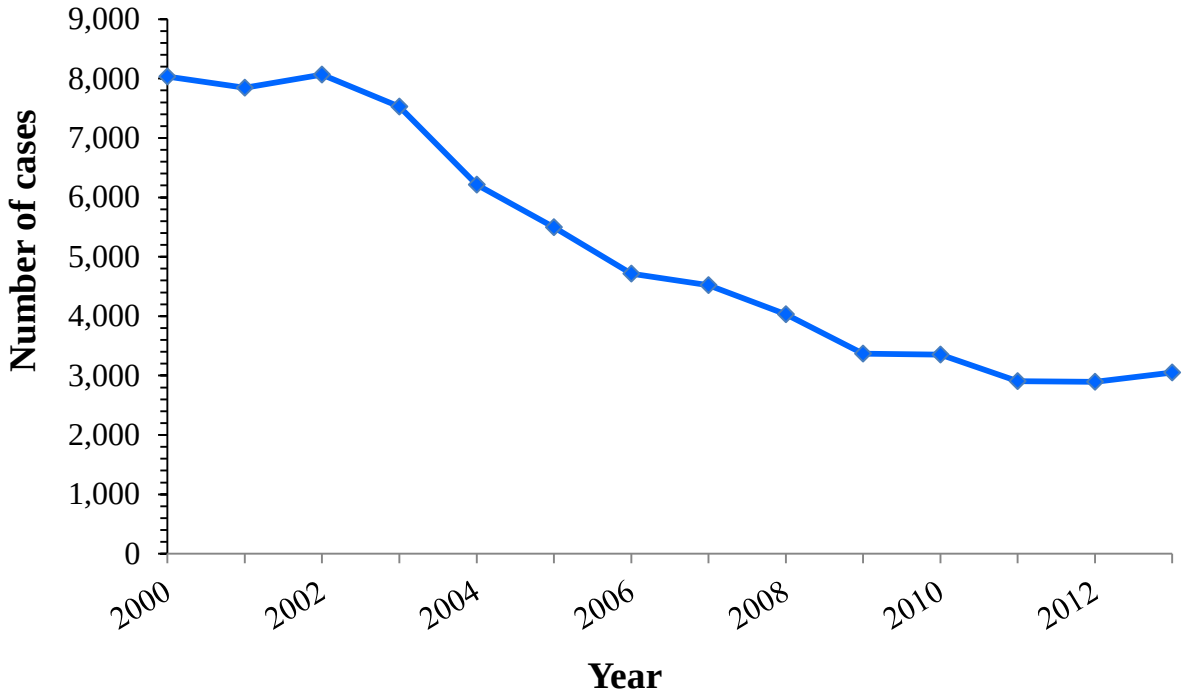
Table 3.2. Clinical characteristics of reported cases of acute hepatitis B — United States, 2013

Clinical characteristic	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	2,149	70.5	1,653	76.9
Hospitalized for hepatitis B	2,125	69.7	1,250	58.8
Died from hepatitis B	2,018	66.2	18	0.9

*A total of 3,050 hepatitis B cases were reported during 2013.
†Case-reports for which questions regarding clinical characteristics were answered with "yes" or "no." Reports with any other response were excluded.
§Numbers and percentages represent only those case-reports for which data regarding clinical characteristics were available; numbers likely are underestimates.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 3,050 case-reports of acute hepatitis B received in 2013, 70.5% included information regarding whether the patient had jaundice, 69.7% included information regarding hospitalization caused by hepatitis B, and 66.2% included information on death from hepatitis B. (Note: more severe cases are likely to be ascertained and reported.)
- Jaundice was reported for 1,653 (76.9%) of the 2,149 acute hepatitis B case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis B was reported for 1,250 (58.8%) of the 2,125 acute hepatitis B case-reports that included information about hospitalization.
- Death from hepatitis B was reported for 18 (0.9%) of the 2,018 acute hepatitis B case-reports that included information about death.

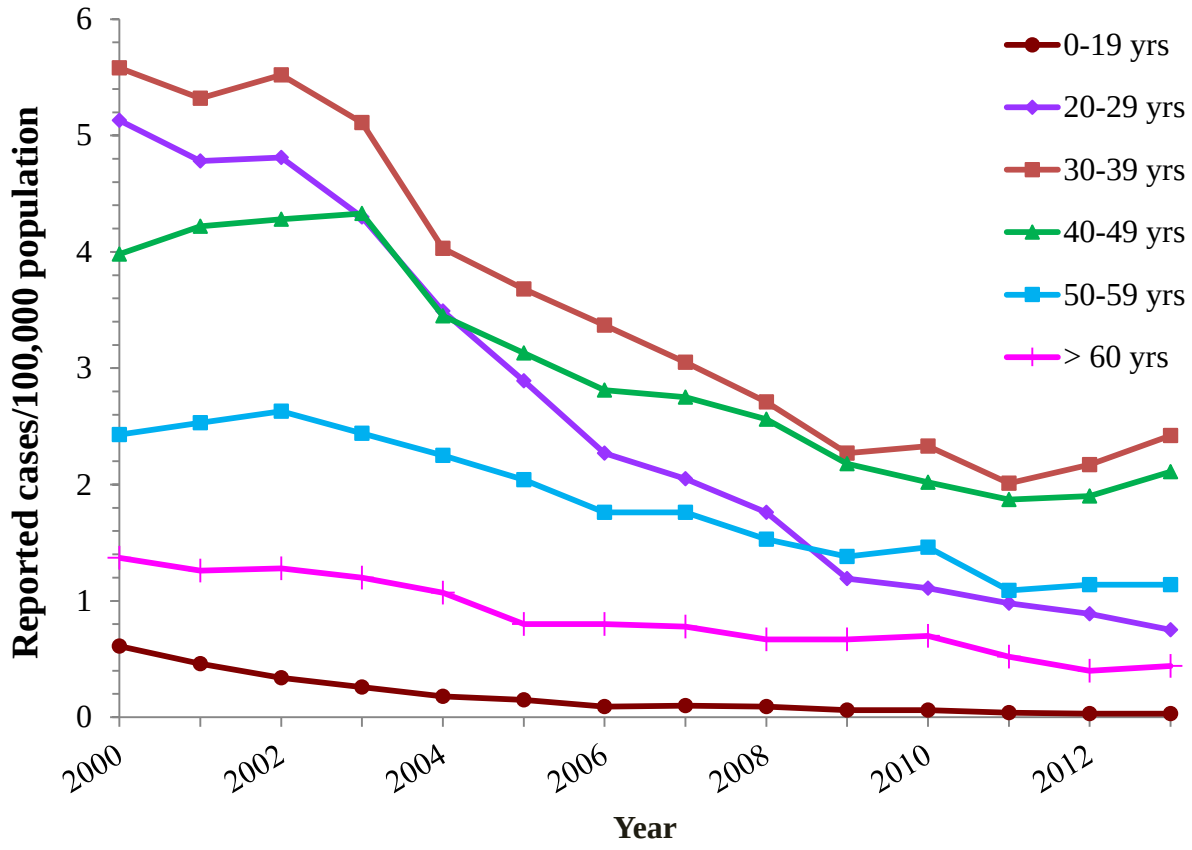
Figure 3.1. Reported number of acute hepatitis B cases — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- The number of reported cases of acute hepatitis B decreased by 62%, from 8,036 in 2000 to 3,050 in 2013.
- Acute hepatitis B cases increased by 5.4% from 2012-2013.

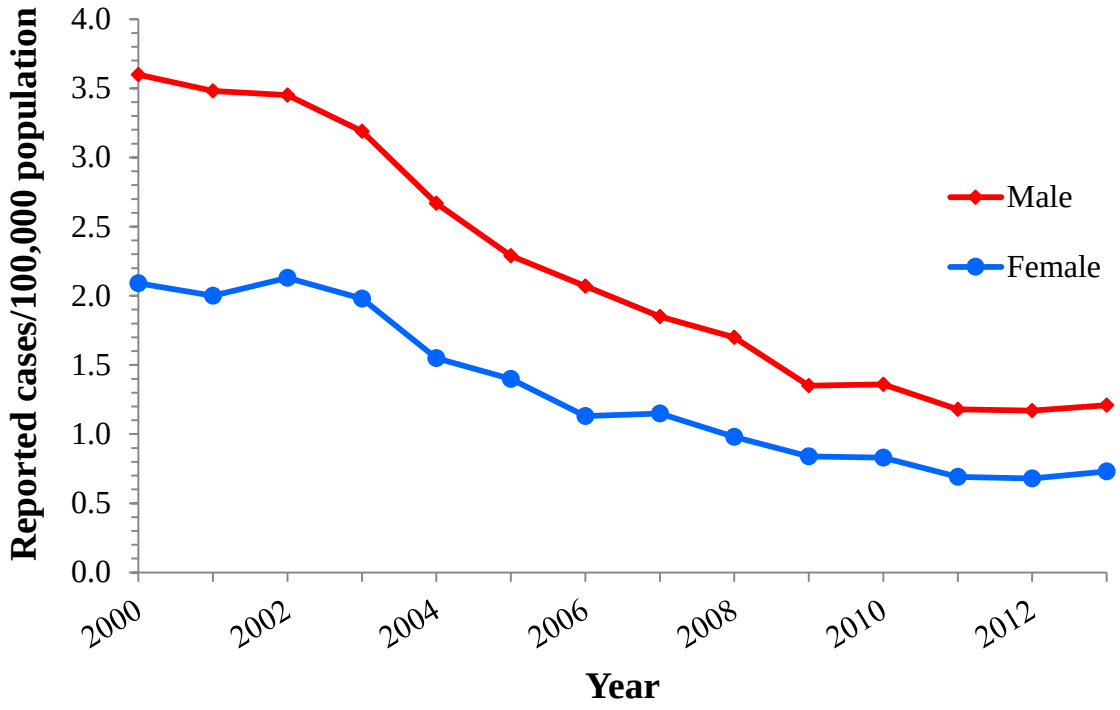
Figure 3.2. Incidence of acute hepatitis B, by age group — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2003-2011, rates of acute hepatitis B declined among all age groups.
- From 2011-2013, rates of acute hepatitis B increased among the 30-39 and 40-49 year age groups but remained steady among the other age groups.
- In 2013, rates were highest for persons aged 30–39 years (2.42 cases/100,000 population); the lowest rates were among children and adolescents aged ≤19 years (0.03 cases/100,000 population).

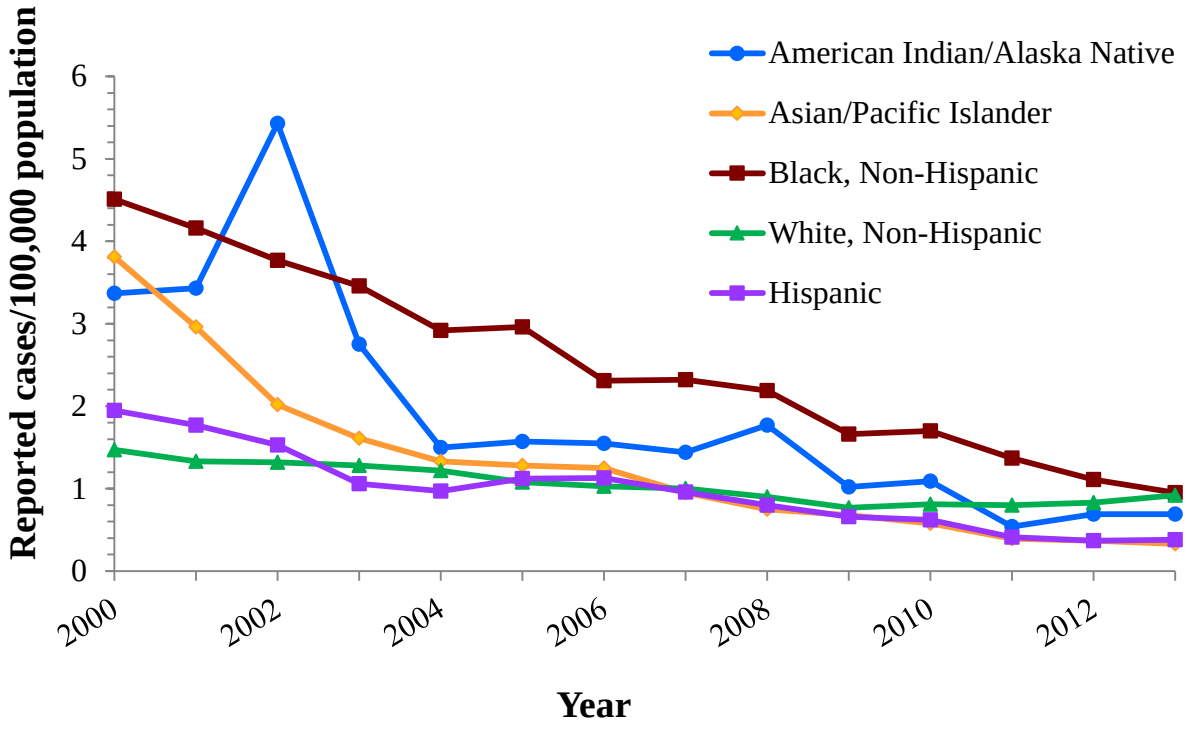
Figure 3.3. Incidence of acute hepatitis B, by sex — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- While the incidence rate of acute hepatitis B remained higher for males than for females, the gap narrowed from 2002-2013.
- Incidence rates of acute hepatitis B decreased for both males and females from 2000-2012, but slightly increased from 2012-2013 for both.
- In 2013, the rate for males was approximately 1.7 times higher than that for females (1.21 cases and 0.73 cases per 100,000 population, respectively).

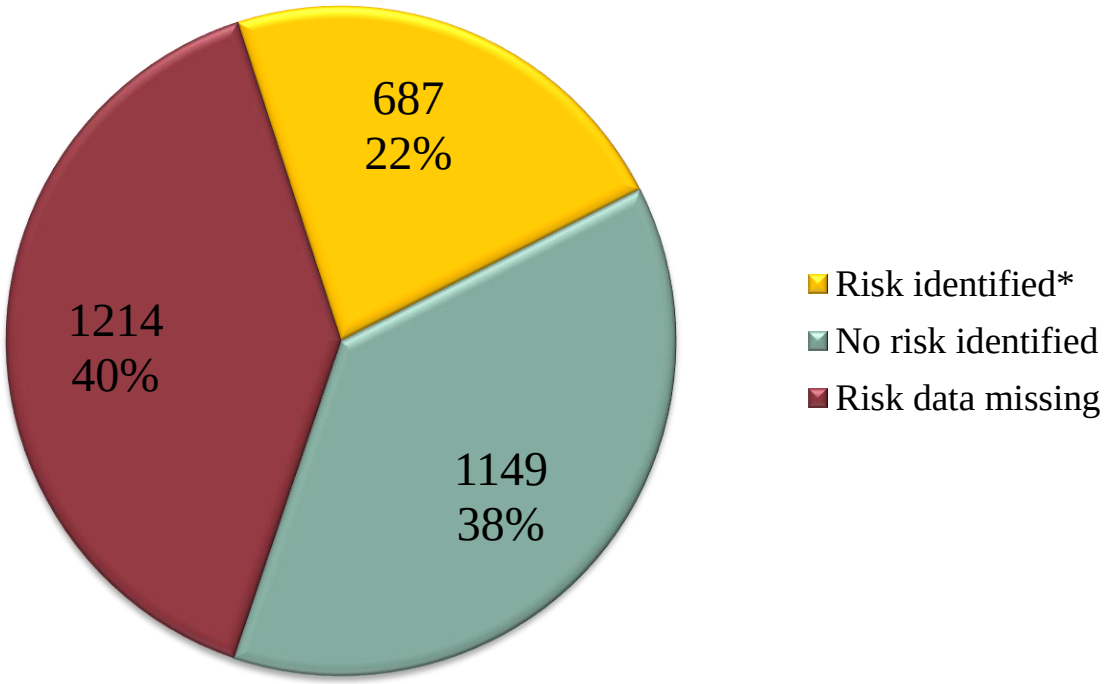
Figure 3.4. Incidence of acute hepatitis B, by race/ethnicity — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000-2013, the rate of acute hepatitis B declined among all racial/ethnic populations, except for a 58.3% increase among American Indians/Alaska Natives from 2001-2002 and a 10.8% increase among non-Hispanic Whites from 2012-2013.
- In 2013, the rate of acute hepatitis B was lowest among Asians/Pacific Islanders (0.33 cases per 100,000 population) and highest for non-Hispanic Blacks (0.95 cases per 100,000 population).

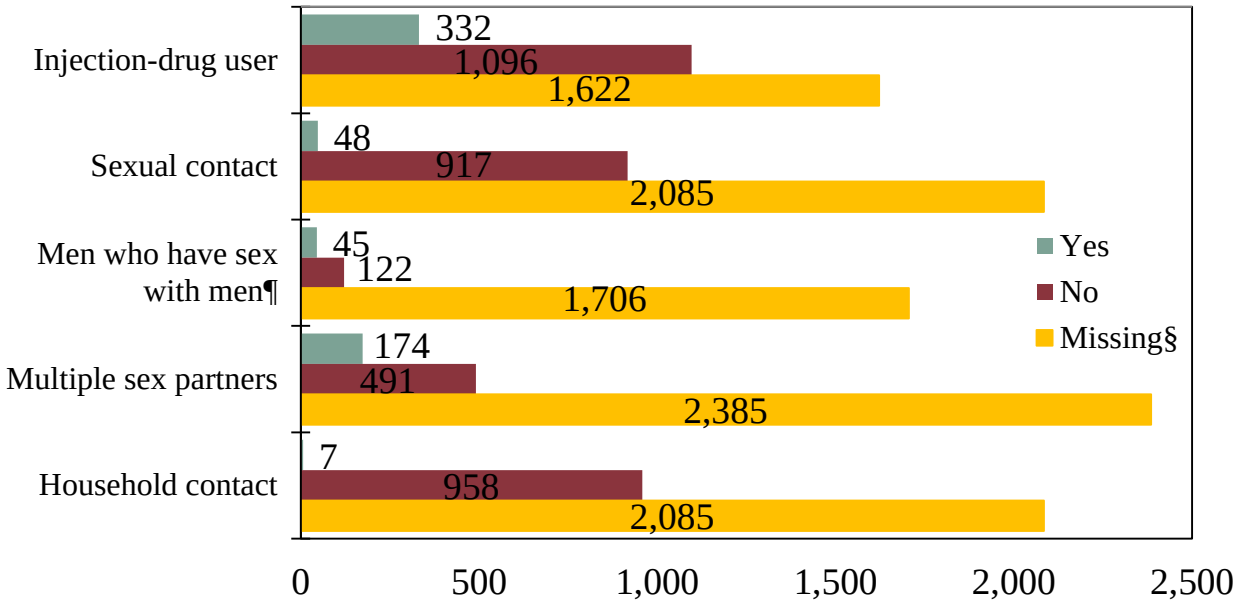
Figure 3.5. Availability of information on risk exposures/behaviors associated with acute hepatitis B — United States, 2013



* Includes case-reports indicating the presence of at least one of the following risks 6 weeks to 6 months prior to onset of acute, symptomatic hepatitis B: 1) using injection drugs; 2) having sexual contact with suspected/confirmed hepatitis B patient; 3) being a man who has sex with men; 4) having multiple sex partners concurrently; 5) having household contact with suspected/confirmed hepatitis B patient; 6) occupational exposure to blood; 7) being a hemodialysis patient; 8) having received a blood transfusion; 9) having sustained a percutaneous injury; and 10) having undergone surgery.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 3,050 case-reports of acute hepatitis B received by CDC during 2013, a total of 1,214 (40%) did not include a response (i.e., a "yes" or "no" response to any of the questions about risk exposures and behaviors) to enable assessment of risk exposures or behaviors.
- Of the 1,836 case-reports that had risk exposure/behavior information:
  - 1,149 (62.6%) indicated no risk exposure/behavior for acute hepatitis B.
  - 687 (37.4%) indicated at least one risk exposure/behavior for acute hepatitis B during the 6 weeks to 6 months prior to illness onset**.**

Figure 3.6a. Acute hepatitis B reports*, by risk exposure/behavior† — United States, 2013

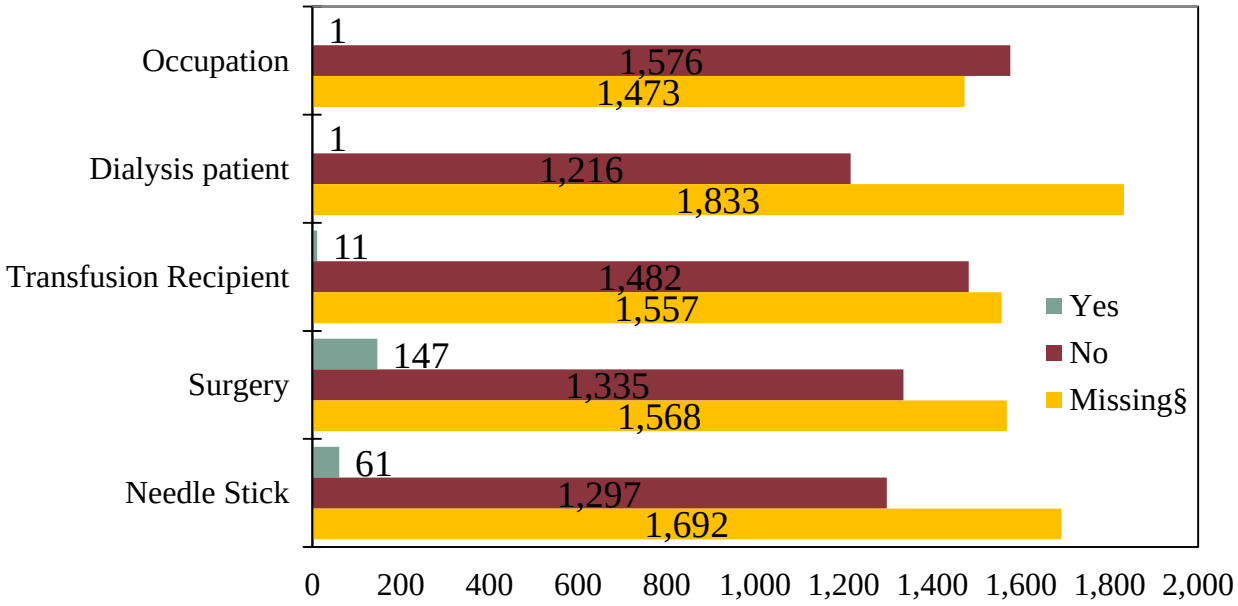


*A total of 3,050 case-reports of acute hepatitis B were received in 2013.
† More than one risk exposure/behavior may be indicated on each case-report.
§ No risk data reported.
¶A total of 1,873 acute hepatitis B cases were reported among males in 2013.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 3.6a presents reported risk exposures/behaviors for hepatitis B during the incubation period, 6 weeks to 6 months prior to onset of symptoms.

- Of the 1,428 case-reports that included information about injection-drug use, 23.2% (n=332) indicated use of injection drugs.
- Of the 965 case-reports that included information about sexual contact, 5.0% (n=48) indicated sexual contact with a person with confirmed or suspected hepatitis B.
- Of the 167 case-reports from males that included information about sexual preference/practices, 26.9% (n=45) indicated sex with another man.
- Of the 665 case-reports that had information about number of sex partners, 26.2% (n=174) indicated having ≥2 sex partners.
- Of the 965 case-reports that included information about household contact, 0.7% (n=7) indicated household contact with someone with confirmed or suspected hepatitis B.

Figure 3.6b. Acute hepatitis B reports*, by risk exposure/behavior† — United States, 2013



*A total of 3,050 case-reports of hepatitis B were received in 2013.
†More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 3.6b presents reported risk exposures/behaviors during the incubation period, 6 weeks to 6 months prior to onset of symptoms.

- Of the 1,577 case-reports that included information about occupational exposures, 0.1% (n=1) indicated employment in a medical, dental, or other field involving contact with human blood.
- Of the 1,217 case-reports that included information about receipt of dialysis or kidney transplant, 0.1% (n=1) indicated patient receipt of dialysis or a kidney transplant.
- Of the 1,493 case-reports that included information about receipt of blood transfusion, 0.7% (n=11) indicated patient receipt of a blood transfusion.
- Of the 1,482 case-reports that included information about surgery, 9.9% (n=147) indicated having surgery.
- Of the 1,358 case-reports that included information about needle stick injury, 4.5% (n=61) indicated having an accidental needle stick/puncture.

Chronic Hepatitis B

2012 CSTE/CDC Case Definition (NNDSS)

Clinical Description

No symptoms are required. Persons with chronic HBV infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic liver disease to cirrhosis or liver cancer.

Laboratory Criteria

- IgM antibodies to IgM anti-HBc negative AND a positive result on one of the following tests: HBsAg, HBeAg, or nucleic acid test for hepatitis B virus DNA (including qualitative, quantitative and genotype testing), OR
- HBsAg positive or nucleic acid test for HBV DNA positive (including qualitative, quantitative and genotype testing) or HBeAg positive two times at least 6 months apart (Any combination of these tests performed 6 months apart is acceptable.)

Table 3.3. Number of newly reported chronic hepatitis B case-reports submitted by states, 2013

Jurisdiction§	No. chronic hepatitis B case-reports submitted	Data source
Colorado¶	511	NNDSS
Delaware	126	State-provided
Florida¶	4,270	NNDSS
Iowa	266	State-provided
Kansas	108	State-provided
Maine¶	107	State-provided
Michigan¶	1,130	State-provided
Minnesota¶	189	NNDSS
Montana¶	21	State-provided
New Jersey**	303	NNDSS
New Mexico¶	119	NNDSS
New York (minus New York City)**	636	State-provided
New York City**	5,857	State-provided
Oregon**	150	State-provided
Pennsylvania¶	1,512	State-provided
South Carolina††	448	NNDSS
South Dakota¶	79	NNDSS
West Virginia¶	212	State-provided
Total	**16,044**	

Abbreviation: NNDSS, National Notifiable Diseases Surveillance System
* For case-definition, see http://wwwn.cdc.gov/nndss/script/ConditionList.aspx?Type=0&Yr=2012
†Reports may not reflect unique cases.
§Jurisdictions that gave permission to report their number of chronic HBV cases
¶Includes confirmed and probable case-reports only.
**Includes confirmed case-reports only.
††Includes confirmed, probable, and suspect case-reports.

- In 2013, 41 states reported 31,763 case-reports of chronic hepatitis B.
- Eighteen states agreed to publication of their chronic hepatitis B case data for this report, representing 50.5% (n=16,044) of all reports of chronic hepatitis B received by CDC in 2013.
- Of the 18 states, the greatest number of reports was from New York City (n=5,857); the least number of reports was from Montana (n=21).

Table 3.4. Reported cases of chronic hepatitis B, by demographic characteristics and laboratory tests – Enhanced Viral Hepatitis Surveillance Sites, 2013

Category	MA No. (%)	MI No. (%)	NYS No. (%)	Phil No. (%)	SF No. (%)	WA§ No. (%)	Total No. (%)
Sex							
Female	224 49.1%	207 43.9%	236 36.5%	118 42.1%	339 46.3%	72 42.4%	1,196 43.4%
Male	231 50.7%	264 56.1%	409 63.2%	162 57.9%	387 52.9%	91 53.5%	1,544 56.0%
Unknown/missing	1 0.2%	0 0.0%	2 0.3%	0 0.0%	6 0.8%	7 4.1%	16 0.6%
Race/ethnicity							
American Indian/Alaskan Native, non-Hispanic (NH)	0 0.0%	5 1.1%	1 0.2%	0 0.0%	0 0.0%	4 2.4%	10 0.4%
Asian/Pacific Islander, NH	177 38.8%	114 24.2%	176 27.2%	98 35.0%	364 49.7%	48 28.2%	977 35.4%
Black, NH	80 17.5%	98 20.8%	83 12.8%	52 18.6%	9 1.2%	5 2.9%	327 11.9%
White, NH	46 10.1%	124 26.3%	99 15.3%	14 5.0%	16 2.2%	30 17.6%	329 11.9%
Hispanic	30 6.6%	7 1.5%	29 4.5%	12 4.3%	0 0.0%	5 2.9%	83 3.0%
Other, NH	29 6.4%	26 5.5%	26 4.0%	9 3.2%	6 0.8%	5 2.9%	101 3.7%
Unknown/missing	94 20.6%	97 20.6%	233 36.0%	95 33.9%	337 46.0%	73 42.9%	929 33.7%
Age group, years							
0-14	7 1.5%	9 1.9%	5 0.8%	3 1.1%	6 0.8%	4 2.4%	34 1.2%
15-24	34 7.5%	31 6.6%	60 9.3%	22 7.9%	49 6.7%	15 8.8%	211 7.7%
25-39	165 36.2%	143 30.4%	240 37.1%	93 33.2%	258 35.2%	48 28.2%	947 34.4%
40-54	141 30.9%	147 31.2%	189 29.2%	101 36.1%	215 29.4%	62 36.5%	855 31.0%
55+	109 23.9%	141 29.9%	153 23.6%	61 21.8%	204 27.9%	41 24.1%	709 25.7%
Unknown/missing	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%

Place of birth							
United States	39 8.6%	127 27.0%	12 1.9%	139 49.6%	10 1.4%	U	327 12.6%
Outside United States	224 49.1%	121 25.7%	47 7.3%	120 42.9%	67 9.2%	U	579 22.4%
Unknown/missing	193 42.3%	223 47.3%	588 90.9%	21 7.5%	655 89.5%	U	1,680 65.0%
Hepatitis B laboratory testing¶							
HBV surface antigen +	399 87.5%	269 57.1%	541 83.6%	233 83.2%	654 89.3%	81 47.6%	2,177 79.0%
[IgM anti-HBc] -	77 16.9%	25 5.3%	106 16.4%	0 0.0%	0 0.0%	42 24.7%	250 9.1%
HBV "e" antigen +	155 34.0%	2 0.4%	99 15.3%	64 22.9%	75 10.2%	12 7.1%	407 14.8%
HBV NAT +	281 61.6%	4 0.8%	203 31.4%	228 81.4%	465 63.5%	45 26.5%	1,226 44.5%
Total no. cases	456	471	647	280	732	170	2,756
2013 Estimated population total**	6,692,824	9,895,622	11,245,290	1,553,165	837,442	5,405,750	35,630,093
Rate per 100,000 population	6.8	4.8	5.8	18.0	87.4	3.1	7.7

Abbreviations: MA, Massachusetts; MI, Michigan; NYS, New York State; Phil, Philadelphia; SF, San Francisco; WA, Washington State
*Chronic hepatitis B data from Florida, one of the 7 funded sites, were not included in this table. Chronic hepatitis B data from all funded sites, including Florida, will be published in an updated table in July.
†Cases and population estimates from New York excluded those who resided in New York City.
§Cases from Washington excluded Snohomish County, Pierce County, and 90% of King County.
¶Cases can be reported with more than one laboratory test result. The denominator used to calculate proportions was the total number of cases reported for each site.
**Population estimates for the United States: https://wonder.cdc.gov/bridged-race-population.html. Population estimates from Washington excluded Snohomish and Pierce Counties.
U = No data available for reporting.
Source: CDC, Enhanced Viral Hepatitis Surveillance Sites.

- In 2013, a total of 2,756 chronic hepatitis B cases were reported by six funded sites.
- San Francisco reported the greatest number of cases (n=732, 26.6%) and highest rate (87.4 cases/100,000 population) of chronic hepatitis B compared with the other sites.
- Among the 2,740 cases for which sex was known, 56.4% were male. By site, the proportion of cases that were male ranged from 50.8% in Massachusetts to 63.4% in New York State.

- Among the 1,827 cases for which race/ethnicity was known, 53.5% were non-Hispanic Asians/Pacific Islanders. By site, the proportion of non-Hispanic Asians/Pacific Islanders ranged from 30.5% in Michigan to 92.2% in San Francisco.
- Most (n=1,802; 65.4%) cases of chronic hepatitis B were among persons aged 25–54 years.
- Among the 906 cases for which place of birth was known, those born outside of the United States accounted for the greatest number of chronic hepatitis B cases (n=579, 63.9%). By site, the proportion of reported chronic hepatitis B cases born outside of the United States ranged from 46.3% in Philadelphia to 87.0% in San Francisco.

Table 3.5. Number and rate of hepatitis B-related deaths, by demographic characteristics and year – United States, 2009-2013

Demographic characteristic		2009		2010		2011		2012		2013	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)	0–34	39	0.03	48	0.03	41	0.03	38	0.03	40	0.03
	35–44	143	0.34	142	0.35	143	0.35	123	0.30	146	0.36
	45–54	469	1.05	448	1.00	421	0.94	428	0.97	389	0.89
	55–64	547	1.57	610	1.67	645	1.69	639	1.66	704	1.79
	65–74	254	1.22	296	1.36	285	1.27	314	1.31	343	1.36
	≥75	245	1.30	248	1.34	269	1.42	229	1.20	251	1.29
Race§	White	978	0.35								
	Black	320	0.87								
	Non-White, non-Black	399	2.15								
Race/ ethnicity¶**	White, NH (non-Hispanic)			856	0.34	832	0.32	818	0.31	868	0.33
	Black, NH			356	0.94	373	0.98	322	0.81	384	0.98
	Hispanic			136	0.43	161	0.48	139	0.39	149	0.39
	Asian/Pacific Islander			421	2.95	422	2.72	469	2.93	451	2.64
	American Indian/Alaskan Native			17	0.73	9	0.38	18	0.74	14	0.55
Sex	Male	1,267	0.80	1,316	0.81	1,321	0.80	1,272	0.75	1,375	0.79
	Female	430	0.24	476	0.27	483	0.26	499	0.27	498	0.26
Overall		**1,697**	**0.51**	**1,792**	**0.52**	**1,804**	**0.52**	**1,771**	**0.50**	**1,873**	**0.52**

*Rates for race, sex, and overall total are age-adjusted per 100,000 U.S. standard population in 2000.
†Cause of death is defined as the underlying cause of death or one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B16, B17.0, B18.0, B18.1 (hepatitis B).
§The race category "White" Included white, non-Hispanic and white Hispanic. The race category "Black" included black, non-Hispanic and black Hispanic. The race category "Non-White, non-Black" included all other races.
¶The race/ethnicity category was added starting in 2010 to incorporate bridged race categories. Six deaths in 2010, seven deaths in 2011, five deaths in 2012, and seven deaths in 2013 are not represented under the race/ethnicity category due to missing race and/or ethnicity data.
Source: CDC, National Vital Statistics System.

- In 2013, the hepatitis B-related mortality rate was 0.5 deaths/100,000 population (n=1,873).
- From 2009-2013, the hepatitis B-related mortality rate remained steady at 0.5 deaths/100,000 population.
- In 2013, Asians/Pacific Islanders had the highest hepatitis B-related mortality rate of 2.6 deaths/100,000 population compared to other racial/ethnic groups. Persons aged 55–64 years had the highest age-specific mortality rate, 1.8 deaths/100,000 population.

- In 2013, males who died with hepatitis B had a mortality rate that was nearly three times the mortality rate of females who died with hepatitis B (0.8 deaths/100,000 population vs. 0.3 deaths/100,000 population). From 2009-2013, the hepatitis B-related mortality rate remained relatively stable for males and females.

HEPATITIS C

Acute Hepatitis C

In 2013, a total of 2,138 cases of acute hepatitis C were reported from 41 states to CDC (Table 4.1). The overall incidence rate for 2013 was 0.7 cases per 100,000 population, an increase from 2009-2012. After adjusting under-ascertainment and under-reporting, an estimated 29,718 acute hepatitis C cases occurred in 2013. (Data for 2013 were unavailable for Alaska, Arizona, Connecticut, the District of Columbia, Hawaii, Iowa, Mississippi, New Hampshire, Rhode Island, and Wyoming.)

2012 CSTE/CDC Case Definition (NNDSS)

Clinical Description

An acute illness with a discrete onset of any sign or symptom* consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), and either a) jaundice, or b) elevated serum alanine aminotransferase (ALT) levels >400 IU/L.

Laboratory Criteria

One or more of the following three criteria:

- Antibodies to hepatitis C virus (anti-HCV) screening-test-positive with a signal-to-cutoff ratio predictive of a true positive as determined for the particular assay as defined by CDC. (URL for the signal to cut-off ratios: http://www.cdc.gov/hepatitis/HCV/LabTesting.htm), OR
- Hepatitis C Virus Recombinant Immunoblot Assay (HCV RIBA) positive, OR
- Nucleic Acid Test (NAT) for HCV RNA positive (including qualitative, quantitative or genotype testing)

AND, if done meets the following two criteria:

- Absence of IgM antibody to hepatitis A virus (if done) (IgM anti-HAV), AND
- Absence of IgM anti-HBc (if done)

*A documented negative HCV antibody laboratory test result followed within 6 months by a positive test (as described in the laboratory criteria for diagnosis) result does not require an acute clinical presentation to meet the surveillance case definition.

Table 4.1. Reported cases of acute hepatitis C, nationally and by state — United States, 2009-2013

State	2009		2010		2011		2012		2013	
	Rate*	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)	Rate	(No.)
Alabama	0.2	(10)	0.1	(7)	0.5	(23)	0.5	(24)	0.6	(30)
Alaska	U	U	U	U	U	U	U	U	U	U
Arizona	U	U	U	U	U	U	U	U	U	U
Arkansas	0.1	(2)	0.0	(1)	0.0	(0)	0.2	(5)	1.0	(30)
California	0.1	(43)	0.1	(32)	0.1	(48)	0.2	(63)	0.2	(72)
Colorado	0.6	(28)	0.4	(20)	0.5	(28)	0.8	(42)	0.4	(21)
Connecticut	1.5	(53)	1.0	(37)	1.3	(47)	0.9	(34)	U	U
Delaware	U	U	U	U	0.3	(3)	U	U	0.0	(0)
District of Columbia	0.2	(1)	0.3	(2)	U	U	U	U	U	U
Florida	0.3	(53)	0.3	(56)	0.3	(64)	0.6	(107)	0.7	(134)
Georgia	0.3	(31)	0.3	(32)	0.5	(53)	0.8	(82)	0.5	(48)
Hawaii	U	U	U	U	U	U	U	U	U	U
Idaho	0.5	(7)	0.7	(11)	0.8	(12)	0.7	(11)	0.9	(14)
Illinois	0.0	(6)	0.0	(1)	0.0	(6)	0.2	(26)	0.3	(37)
Indiana	0.3	(22)	0.4	(27)	1.3	(84)	1.7	(110)	2.7	(175)
Iowa	0.4	(11)	0.0	(0)	0.0	(0)	0.1	(3)	U	U
Kansas	0.0	(1)	0.1	(2)	0.3	(8)	0.6	(16)	0.6	(17)
Kentucky	1.5	(64)	2.5	(109)	3.2	(142)	4.1	(178)	5.1	(226)
Louisiana	0.2	(9)	0.1	(4)	0.2	(7)	0.2	(11)	0.4	(19)
Maine	0.2	(2)	0.2	(2)	0.9	(12)	0.6	(8)	0.6	(8)
Maryland	0.4	(23)	0.4	(24)	0.6	(35)	0.7	(39)	0.9	(53)
Massachusetts	0.2	(10)	0.2	(13)	0.3	(23)	0.6	(37)	2.6	(174)
Michigan	0.4	(35)	0.5	(45)	0.3	(32)	0.8	(76)	0.7	(74)
Minnesota	0.3	(15)	0.3	(16)	0.3	(17)	0.6	(32)	0.9	(47)
Mississippi	U	U	U	U	U	U	U	U	U	U
Missouri	0.0	(0)	0.1	(6)	0.1	(8)	0.1	(4)	0.1	(6)
Montana	0.1	(1)	0.4	(4)	0.9	(9)	0.9	(9)	1.6	(16)
Nebraska	0.2	(3)	0.1	(2)	0.1	(2)	0.2	(3)	0.1	(2)
Nevada	0.2	(5)	0.3	(7)	0.4	(10)	0.4	(12)	0.3	(9)
New Hampshire	U	U	U	U	U	U	U	U	U	U
New Jersey	0.1	(7)	0.3	(28)	0.6	(53)	0.8	(71)	1.2	(106)
New Mexico	0.3	(6)	0.7	(14)	0.7	(14)	1.0	(21)	0.6	(12)
New York	0.3	(53)	0.3	(50)	0.3	(52)	0.5	(93)	0.7	(131)
North Carolina	0.3	(24)	0.4	(39)	0.6	(60)	0.6	(63)	0.8	(79)
North Dakota	0.3	(2)	0.0	(0)	0.0	(0)	0.0	(0)	0.6	(4)
Ohio	0.2	(26)	0.1	(10)	0.1	(6)	0.1	(7)	1.0	(116)
Oklahoma	0.7	(27)	1.1	(41)	1.4	(53)	2.1	(80)	1.0	(40)

Oregon	0.5	(19)	0.5	(19)	0.5	(20)	0.9	(37)	0.4	(14)
Pennsylvania	0.3	(39)	0.2	(26)	0.3	(35)	0.5	(66)	0.6	(81)
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	0.0	(1)	0.0	(1)	0.0	(1)	0.0	(1)	0.0	(0)
South Dakota	U	U	U	U	U	U	U	U	0.0	(1)
Tennessee	0.5	(33)	0.7	(46)	1.3	(83)	2.0	(129)	1.5	(98)
Texas	0.1	(36)	0.1	(35)	0.1	(37)	0.2	(44)	0.1	(28)
Utah	0.2	(6)	0.4	(10)	0.4	(10)	0.6	(17)	0.4	(11)
Vermont	0.2	(1)	0.3	(2)	1.0	(6)	1.0	(6)	0.5	(3)
Virginia	0.1	(10)	0.2	(13)	0.3	(25)	0.9	(76)	0.5	(41)
Washington	0.3	(22)	0.4	(25)	0.6	(41)	0.8	(54)	0.9	(63)
West Virginia	1.7	(31)	1.1	(21)	2.5	(46)	3.0	(55)	3.1	(58)
Wisconsin	0.1	(3)	0.2	(10)	0.3	(15)	0.5	(26)	0.7	(40)
Wyoming	0.0	(0)	0.0	(0)	0.4	(2)	U	U	U	U
Total	**0.3**	**(781)**	**0.3**	**(850)**	**0.4**	**(1,232)**	**0.6**	**(1,778)**	**0.7**	**(2,138)**

*Rate per 100,000 population.
U=No data available for reporting.
Source: CDC, National Notifiable Diseases Surveillance System.

- The number of acute cases of hepatitis C reported in the United States increased each year from 2009-2013.
- The number of acute cases of hepatitis C reported in the United States increased 20%, from 1,778 reported cases in 2012 to 2,138 reported cases in 2013.
- The national rate of acute cases of hepatitis C remained stable, at 0.3 cases per 100,000 population from 2008 through 2010, but increased to 0.4 cases per 100,000 population in 2011, to 0.6 cases per 100,000 population in 2012, and to 0.7 cases per 100,000 population in 2013.
- Of the 41 states that submitted reports of acute hepatitis C in 2013, 22 states had rates below the national rate of 0.7 cases per 100,000 population.
- Rates of acute hepatitis C ranged from no cases reported in Delaware and South Carolina to 5.1 cases per 100,000 population reported in Kentucky.
- Twelve of 41 reporting states – California, Florida, Indiana, Kentucky, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, and Tennessee – accounted for 68.6% of acute cases reported in 2013.

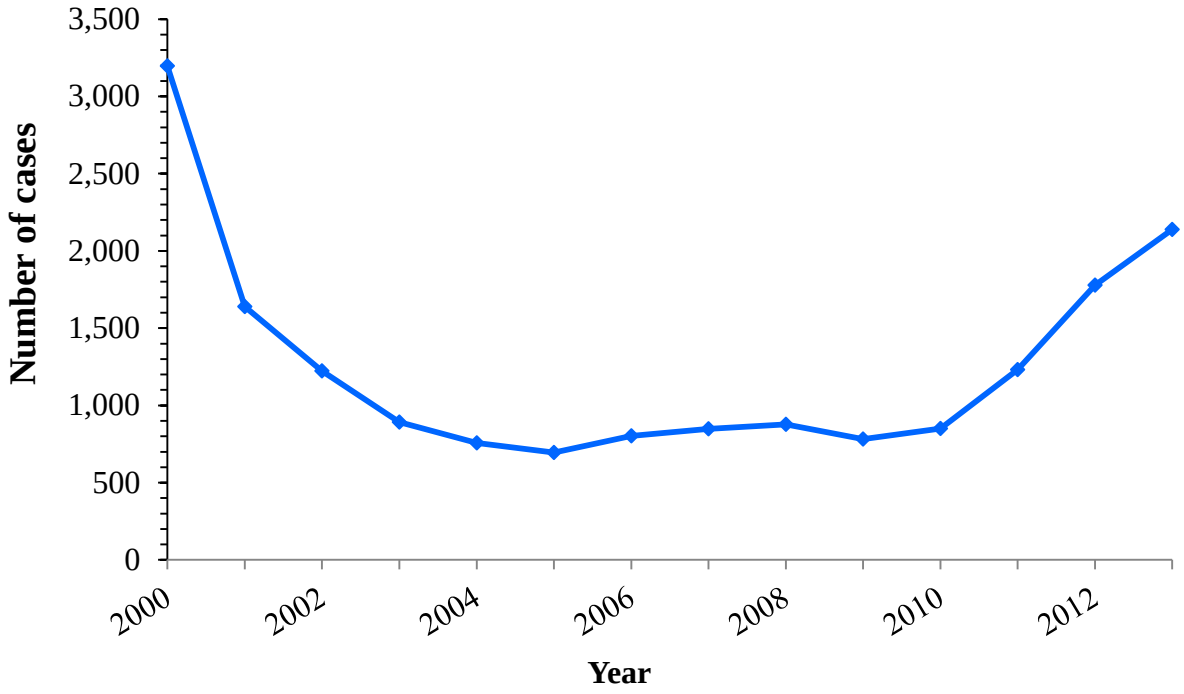
Table 4.2. Clinical characteristics of reported cases of acute hepatitis C — United States, 2013

Clinical characteristic	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	1,491	69.7	963	64.6
Hospitalized for hepatitis C	1,382	64.6	794	57.5
Died from hepatitis C	1,291	60.4	3	0.2

*A total of 2,138 hepatitis C cases were reported during 2013.
†Case-reports for which questions regarding clinical characteristics were answered with "yes" or "no." Reports with any other response were excluded.
§Numbers and percentages represent only those case-reports for which data regarding clinical characteristics were available; numbers likely are underestimates.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 2,138 case-reports of acute hepatitis C received during 2013, 69.7% (n = 1,491) included information about whether the patient had jaundice, 64.6% (n = 1,382) included information regarding hospitalization caused by hepatitis C, and 60.4% (n = 1,291) included information on death from hepatitis C. (Note: more severe cases are likely to be ascertained and reported.)
- Jaundice was reported for 963 (64.6%) of the 1,491 acute hepatitis C case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis C was reported for 794 (57.5%) of the 1,382 acute hepatitis C case-reports that included information about hospitalization.
- Death from hepatitis C was reported for 3 (0.2%) of the 1,291 acute hepatitis C case-reports that included information about death.

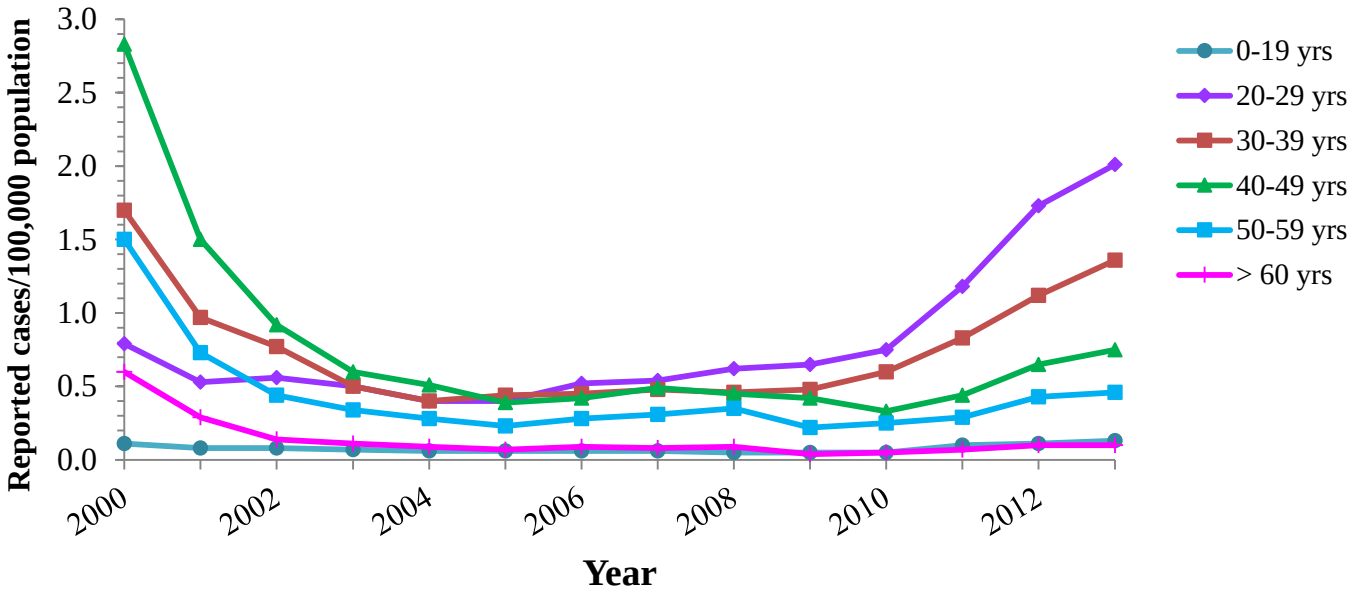
Figure 4.1. Reported number of acute hepatitis C cases — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- The number of reported cases of acute hepatitis C declined until 2003 and remained steady until 2010. However, from 2010-2013, there was an approximate 2.5-fold increase in the number of reported acute hepatitis C cases from 850 to 2,138 cases.

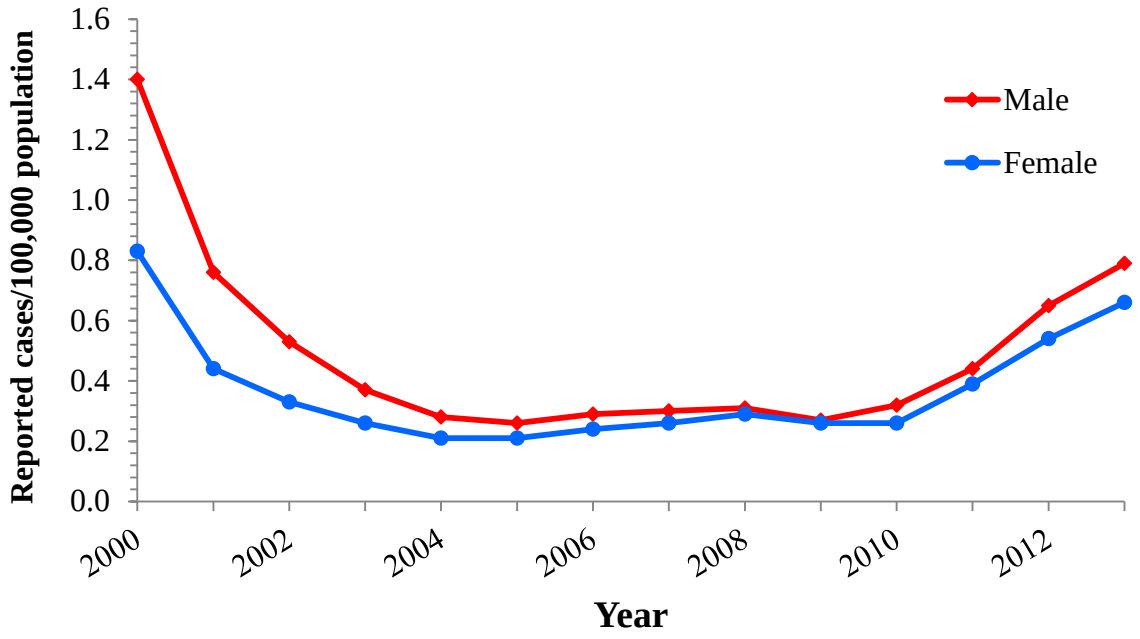
Figure 4.2. Incidence of acute hepatitis C, by age group — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000-2002, incidence rates for acute hepatitis C decreased among all age groups, except for persons aged 0–19 years; rates remained fairly constant among all age groups from 2002-2010.
- In 2013, the rate of acute hepatitis C increased among all age groups, except for persons aged 0-19 years and ≥60 years, compared with rates in 2010. The largest increases were among persons aged 20–29 years (from 0.75 cases per 100,000 population in 2010 to 2.01 cases per 100,000 population in 2013) and persons aged 30-39 years (from 0.60 cases per 100,000 population in 2010 to 1.36 cases per 100,000 population in 2013).
- In 2013, among all age groups, persons aged 20–29 years had the highest rate (2.01 cases per 100,000 population) and persons aged ≥60 years had the lowest rate (0.10 cases per 100,000 population) of acute hepatitis C.

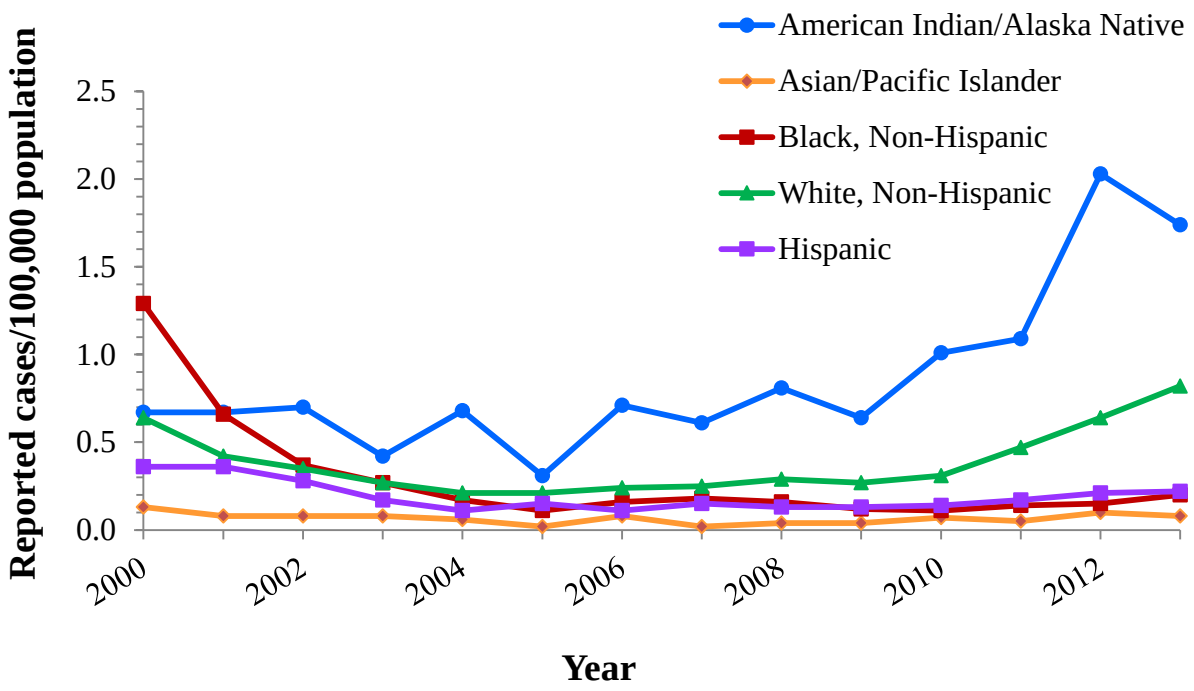
Figure 4.3. Incidence of acute hepatitis C, by sex — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- Incidence rates of acute hepatitis C decreased among males and females from 2000-2003 and remained fairly constant from 2004-2010.
- From 2010-2013, rates of acute hepatitis C increased among males and females; in 2013, rates among males and females were 0.8 and 0.7 cases per 100,000 population, respectively.

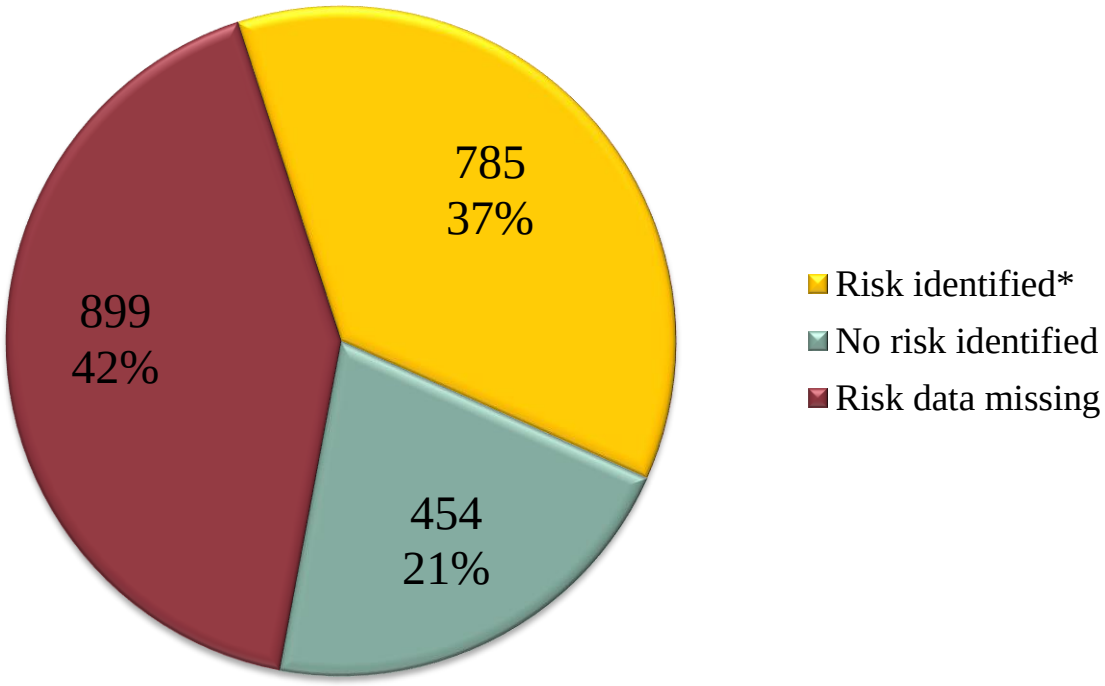
Figure 4.4. Incidence of acute hepatitis C, by race/ethnicity — United States, 2000-2013



Source: CDC, National Notifiable Diseases Surveillance System.

- Rates for acute hepatitis C decreased among all racial/ethnic populations from 2000-2003.
- From 2002-2013, the incidence rate of acute hepatitis C remained higher for American Indians/Alaska Natives relative to other racial/ethnic groups. Incidence rates have since increased for all racial/ethnic populations.
- From 2011-2012, acute hepatitis C rates increased by 86.2% among American Indians/Alaska Natives, 100% among Asian and Pacific Islanders, 7.1% among non-Hispanic Blacks, 36.2% among non-Hispanic Whites, and 23.5% among Hispanics.
- From 2012-2013, acute hepatitis C rates decreased 14.3% among American Indians/Alaska Natives and 20% among Asian and Pacific Islanders. Rates increased for non-Hispanic Blacks (33.3%), non-Hispanic Whites (28.1%), and Hispanics (4.8%).
- In 2013, rates of acute hepatitis C among American Indians/Alaska Natives; Asians/Pacific Islanders; Black, non-Hispanic; White, non-Hispanic; and Hispanics were 1.7, 0.08, 0.2, 0.82, and 0.22 cases per 100,000 population, respectively.

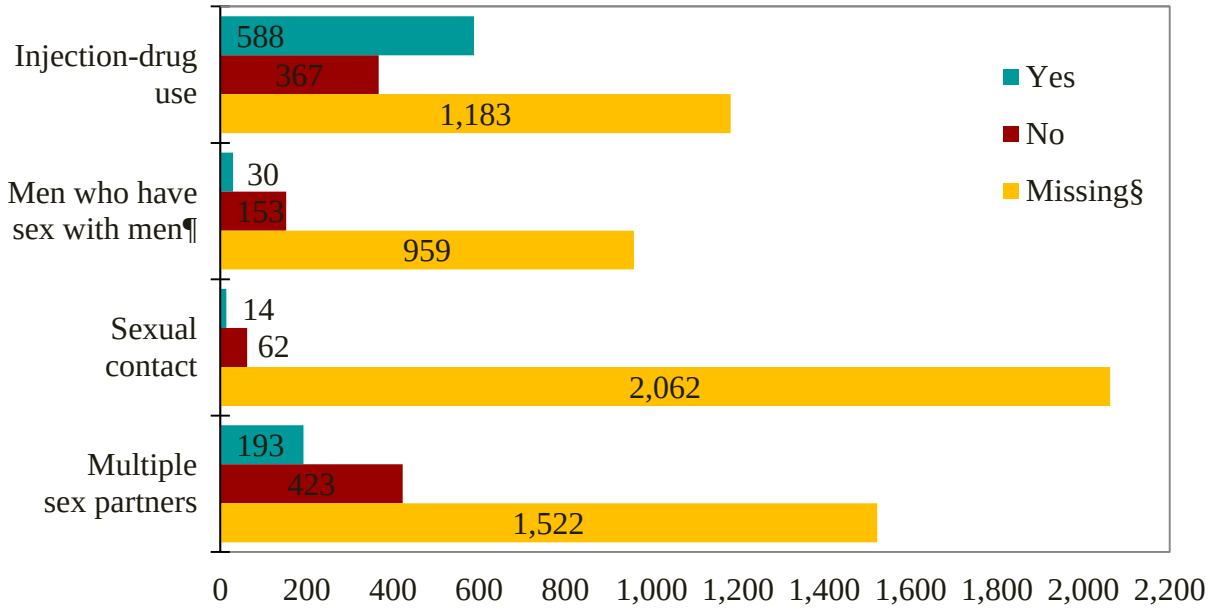
Figure 4.5. Availability of information on risk exposures/behaviors associated with acute hepatitis C — United States, 2013



*Includes case-reports indicating the presence of at least one of the following risks 2 weeks to 6 months prior to onset of acute, symptomatic hepatitis C: 1) using injection drugs; 2) having sexual contact with suspected/confirmed hepatitis C patient; 3) being a man who has sex with men; 4) having multiple sex partners concurrently; 5) having household contact with suspected/confirmed hepatitis C patient; 6) having had occupational exposure to blood; 7) being a hemodialysis patient; 8) having received a blood transfusion; 9) having sustained a percutaneous injury; and 10) having undergone surgery.
Source: CDC, National Notifiable Diseases Surveillance System.

- Of the 2,138 case-reports of acute hepatitis C received by CDC during 2013, 899 (42.0%) did not include a response (i.e., a "yes" or "no" response to any of the questions about risk exposures and behaviors) to enable assessment of risk exposures or behaviors.
- Of 1,239 case-reports that had risk exposure/behavior information:
  - 454 (36.6%) indicated no risk exposure/behavior for hepatitis C.
  - 785 (63.4%) indicated at least one risk exposure/behavior in the 2 weeks to 6 months prior to illness onset.

Figure 4.6a. Acute hepatitis C reports*, by risk exposure/behavior† — United States, 2013

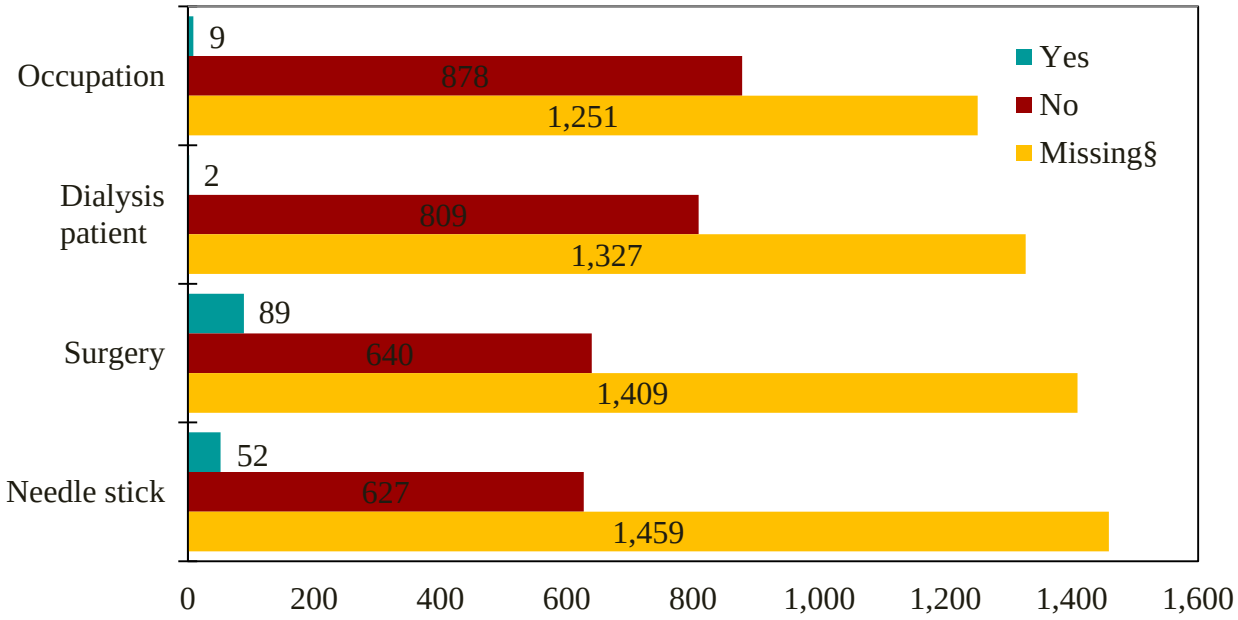


*A total of 2,138 case-reports of acute hepatitis C were received in 2013.
† More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.
¶A total of 1,142 acute hepatitis C cases were reported among males in 2013.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 4.6a presents reported risk exposures/behaviors for hepatitis C during the incubation period, 2 weeks to 6 months prior to onset of symptoms.

- Of the 955 case-reports that had information about injection drug use, 61.6% (n=588) indicated use of injection drugs.
- Of the 183 case-reports from males that included information about sexual preferences/practices, 16.4% (n=30) indicated sex with another man.
- Of the 76 case-reports that had information about sexual contact, 18.4% (n=14) reported sexual contact with a person with confirmed or suspected hepatitis C.
- Of the 616 case-reports that had information about number of sex partners, 31.3% (n=193) indicated having ≥2 sex partners.

Figure 4.6b. Acute hepatitis C reports*, by risk exposure/behavior† — United States, 2013



*A total of 2,137 case-reports of acute hepatitis C were received in 2013.
†More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.
Source: CDC, National Notifiable Diseases Surveillance System.

Figure 4.6b presents reported risk exposures/behaviors during the incubation period, 2 weeks to 6 months prior to onset of symptoms.

- Of the 887 case-reports that included information about occupational exposures, 1.0% (n=9) indicated employment in a medical, dental, or other field involving contact with human blood.
- Of the 811 case-reports that included information about receipt of dialysis or a kidney transplant, 0.2% (n=2) indicated patient receipt of dialysis or a kidney transplant.
- Of the 729 case-reports that included information about surgery, 12.2% (n=89) indicated having surgery.
- Of the 679 case-reports that included information about needle sticks, 7.7% (n=52) indicated having an accidental needle stick/puncture.

Hepatitis C, Past or Present

2012 CSTE/CDC Case Definition (NNDSS)

Clinical Description

Most persons infected with HCV are asymptomatic; however, many have chronic liver disease, which can range from mild to severe.

Laboratory Criteria

One or more of the following three criteria (except in persons less than 18 months of age, for whom only criteria 3 would meet the case classification criteria):

- Anti-HCV screening-test positive with a signal-to-cutoff ratio predictive of a true positive as determined for the particular assay as defined by CDC. (URL for the signal-to-cutoff ratios: http://www.cdc.gov/hepatitis/HCV/LabTesting.htm), OR
- HCV RIBA positive, OR
- NAT for HCV RNA positive (including qualitative, quantitative or genotype testing).

Table 4.3. Number of newly reported past or present hepatitis C case-reports submitted by states, 2013

Jurisdiction§	No. past/present hepatitis C case-reports submitted	Data source
Colorado	2,982	State-provided
Connecticut¶	2,749	State-provided
Florida¶	19,759	NNDSS
Kansas	1,532	State-provided
Maine**	1,265	State-provided
Michigan¶	6,719	State-provided
Minnesota**	1,601	NNDSS
Montana¶	1,141	State-provided
New Jersey**	6,580	NNDSS
New Mexico	959	State-provided
New York (minus New York City)**	6,633	State-provided
New York City**	6,822	State-provided
Oregon**	3,772	State-provided
Pennsylvania¶	8,882	State-provided
South Carolina††	3,238	NNDSS
South Dakota**	405	NNDSS
West Virginia**	4,503	State-provided
Total	**79,542**	

Abbreviation: NNDSS, National Notifiable Diseases Surveillance System
* For case-definition, see http://wwwn.cdc.gov/nndss/script/ConditionList.aspx?Type=0&Yr=2012.
†Reports may not reflect unique cases.
§Jurisdictions that gave permission to report their number of chronic HBV cases
¶Includes confirmed and probable case-reports only.
**Includes confirmed case-reports only.
††Includes confirmed, probable, and suspect case-reports.

- In 2013, 37 states reported 132,452 case-reports of chronic hepatitis C (past or present).
- Seventeen states agreed to publication of their past/present hepatitis C case data for this report, representing 60.0% (n=79,542) of all reports of past/present hepatitis C received by CDC in 2013.
- Of the 17 states, the greatest number of reports was received from Florida (n=19,759); the least number of reports was received from South Dakota (n=405).

Table 4.4. Reported cases of past or present hepatitis C, by demographic characteristics and laboratory tests – Enhanced Viral Hepatitis Surveillance Sites, 2013

Category	MA No. (%)	MI No. (%)	NYS No. (%)	Phil No. (%)	SF No. (%)	WA§ No. (%)	Total No. (%)
Sex							
Female	2,013 39.1%	2,188 35.4%	2,430 36.6%	457 35.9%	389 30.3%	1,119 41.0%	8,596 37.0%
Male	3,116 60.6%	3,976 64.3%	4,172 62.9%	813 63.9%	879 68.6%	1,534 56.2%	14,490 62.3%
Unknown/missing	17 0.3%	17 0.3%	31 0.5%	3 0.2%	14 1.1%	76 2.8%	158 0.7%
Race/ethnicity							
American Indian/Alaskan Native, non-Hispanic (NH)	20 0.4%	66 1.1%	23 0.3%	1 0.1%	16 1.2%	121 4.4%	247 1.1%
Asian/Pacific Islander, NH	86 1.7%	22 0.4%	72 1.1%	22 1.7%	60 4.7%	23 0.8%	285 1.2%
Black, NH	208 4.0%	1,228 19.9%	578 8.7%	341 26.8%	230 17.9%	35 1.3%	2,620 11.3%
White, NH	2,492 48.4%	2,923 47.3%	2,851 43.0%	219 17.2%	455 35.5%	712 26.1%	9,652 41.5%
Hispanic	347 6.7%	85 1.4%	430 6.5%	86 6.8%	96 7.5%	72 2.6%	1,116 4.8%
Other, NH	115 2.2%	78 1.3%	88 1.3%	7 0.5%	14 1.1%	18 0.7%	320 1.4%
Unknown/missing	1,878 36.5%	1,779 28.8%	2,591 39.2%	597 46.9%	411 32.1%	1,748 64.1%	9,004 38.7%
Age group, years							
0-14	41 0.8%	36 0.6%	13 0.2%	9 0.7%	0 0.0%	8 0.3%	107 0.5%
15-24	798 15.5%	567 9.2%	724 10.9%	78 6.1%	32 2.5%	249 9.1%	2,448 10.5%
25-39	1,762 34.2%	1,285 20.8%	1,815 27.4%	238 18.7%	209 16.3%	609 22.3%	5,918 25.5%
40-54	1,353 26.3%	1,611 26.1%	1,809 27.3%	411 32.3%	437 34.1%	969 35.5%	6,590 28.4%
55+	1,192 23.2%	2,682 43.4%	2,260 34.1%	537 42.2%	597 46.6%	891 32.6%	8,159 35.1%
Unknown/missing	0 0.0%	0 0.0%	12 0.2%	0 0.0%	7 0.5%	3 0.1%	22 0.1%

Hepatitis C laboratory testing¶							
Anti-HCV+	4,145	2,367	5,165	890	896	1,640	15,103
	80.5%	38.3%	77.9%	69.9%	69.9%	60.1%	65.0%
HCV RNA +	3,820	1,402	5,575	1,120	780	1,476	14,173
	74.2%	22.7%	84.0%	88.0%	60.8%	54.1%	61.0%
Total no. cases	5,146	6,181	6,633	1,273	1,282	2,729	23,244
2013 Estimated population total**	6,692,824	9,895,622	11,245,290	1,553,165	837,442	5,405,750	35,630,093
Rate per 100,000 population	76.9	62.5	59.0	82.0	153.1	50.5	65.2

Abbreviations: MA, Massachusetts; MI, Michigan; NYS, New York State; Phil, Philadelphia; SF, San Francisco; WA, Washington State
*Past or present hepatitis C data from Florida, one of the 7 funded sites, were not included in this table. Past or present hepatitis C data from all funded sites, including Florida, will be published in an updated table in July.
†Cases and population estimates from New York excluded those who resided in New York City.
§Cases from Washington excluded Snohomish County, Pierce County, and 90% of King County.
¶Cases can be reported with more than one laboratory test result. The denominator used to calculate proportions was the total number of cases reported for each site.
**Population estimates for the United States: https://wonder.cdc.gov/bridged-race-population.html. Population estimates from Washington excluded Snohomish and Pierce Counties.
Source: CDC, Enhanced Viral Hepatitis Surveillance Sites.

- In 2013, a total of 23,244 past or present hepatitis C cases were reported by six funded sites.
- New York state reported more cases of past or present hepatitis C (n=6,633, 28.5%) compared with the other sites. However, San Francisco had the highest rate of past or present hepatitis C with 153.1 cases per 100,000 population reported.
- Among the 23,086 cases for which sex was known, most (62.8%) were male. By site, the proportion of male cases ranged from 57.8% in Washington to 69.3% in San Francisco.
- Among the 14,240 cases for which race/ethnicity was known, non-Hispanic Whites accounted for the greatest proportion (67.8%) of past or present hepatitis C. By site, the proportion of non-Hispanic Whites ranged from 32.4% in Philadelphia to 76.3% in Massachusetts.
- Among the 23,222 cases for which age was known, 63.5% were among persons aged ≥40 years.
- 65.0% of cases had a positive hepatitis C virus antibody test result reported. The proportion with a positive hepatitis C virus antibody test result ranged from 38.3% in Michigan to 80.5% in Massachusetts.
- 61.0% of cases had a positive hepatitis C RNA test result reported. The proportion with a positive hepatitis C RNA test result ranged from 22.7% in Michigan to 88.0% in Philadelphia.

Table 4.5. Number and rate of hepatitis C-related deaths, by demographic characteristics and year – United States, 2009-2013

Demographic characteristic		2009		2010		2011		2012		2013	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)§	0–34	116	0.08	117	0.08	128	0.09	158	0.11	121	0.08
	35–44	828	1.99	712	1.73	696	1.71	622	1.54	573	1.42
	45–54	5,469	12.26	5,171	11.49	5,073	11.34	4,749	10.73	4,344	9.93
	55–64	6,683	19.21	7,431	20.37	8,330	21.89	9,235	23.93	9,899	25.18
	65–74	1,824	8.77	1,901	8.75	2,136	9.50	2,515	10.49	3,004	11.91
	≥75	1,333	7.10	1,293	6.97	1,357	7.18	1,369	7.15	1,425	7.31
Race¶	White	12,682	4.43								
	Black	2,908	7.80								
	Non-White, non-Black	663	3.61								
Race/ ethnicity**	White, NH (non-Hispanic)			10575	4.03	11,196	4.19	11839	4.35	12219	4.40
	Black, NH			2981	7.72	3,167	7.89	3232	7.81	3520	8.35
	Hispanic			2318	6.83	2,555	7.15	2668	7.19	2699	6.91
	Asian/Pacific Islander			440	3.30	455	3.14	472	3.15	495	3.09
	American Indian/Alaskan Native			248	9.90	275	10.61	313	11.81	324	12.22
Sex	Male	11,517	6.91	11,781	6.81	12,651	7.11	13,300	7.31	13,745	7.40
	Female	4,736	2.65	4,846	2.63	5,070	2.70	5,350	2.77	5,623	2.85
Overall		**16,253**	**4.70**	**16,627**	**4.65**	**17,721**	**4.82**	**18,650**	**4.96**	**19,368**	**5.03**

*Rates for race, sex, and overall total are age-adjusted per 100,000 U.S. standard population in 2000.
†Cause of death is defined as the underlying cause of death or one of the multiple causes of death and is based on the International Classification of Diseases, 10th Revision (ICD-10) codes B17.1, and B18.2 (hepatitis C).
§Two deaths in 2010, one death in 2011, two deaths in 2012, and two deaths in 2013 are not represented under the age category due to missing age data.
¶The race category "White" Included white, non-Hispanic and white Hispanic. The race category "Black" included black, non-Hispanic and black Hispanic. The race category "Non-White, non-Black" included all other races.
**The race/ethnicity category was added starting in 2010 to incorporate bridged race categories. 65 deaths in 2010, 73 deaths in 2011, 126 deaths in 2012, and 111 deaths in 2013 are not represented under the race/ethnicity category due to missing race and/or ethnicity data.
Source: CDC, National Vital Statistics System.

- Of the three types of viral hepatitis (hepatitis A, B, and C), hepatitis C accounted for the greatest number of deaths and the highest mortality rate of 5.0 deaths/100,000 population in 2013.
- The overall hepatitis C-related mortality rate increased from 4.7 deaths/100,000 population in 2009 to 5.0 deaths/100,000 population in 2013.

- From 2009-2013, the age group with the highest hepatitis C-related mortality rate was persons aged 55-64 years (25.2 deaths/100,000 population in 2013). This group accounted for 51.1% of hepatitis C-related deaths in 2013.
- In 2013, the racial/ethnic group with the highest hepatitis C-related mortality rate was among American Indians/Alaska Natives (12.2 deaths/100,000 population).
- From 2009-2013, the hepatitis C-related mortality rate among American Indians/Alaska Natives increased by 23.2%.
- In 2013, the hepatitis C-related mortality rate for males was approximately 2.6 times the rate for females.

DISCUSSION

National surveillance data for acute viral hepatitis provide essential information for identifying patterns and trends in viral hepatitis; providing data for national and local estimates of the health burden of hepatitis A, B, and C; targeting groups for whom public health intervention is needed; and evaluating intervention efforts. National rates for acute hepatitis A and B have been published since 1966, and national rates for acute hepatitis C (formerly non-A, non-B) have been published since 1992. Major changes in the epidemiology of these diseases have occurred since reporting of these infections was initiated, largely resulting from implementation of prevention strategies, including the introduction of effective vaccines against hepatitis A and hepatitis B.

NNDSS, the core of viral hepatitis surveillance, was designed to enable states to notify CDC of infectious diseases diagnosed with a single positive laboratory test. Cases of acute and chronic hepatitis B and C do not fit this pattern, as additional information beyond a single laboratory test is required to confirm a case (34). To better count and characterize cases of viral hepatitis and estimate the burden of disease, CDC supplements NNDSS data with data obtained from select funded sites, national surveys, and vital statistics.

Data from NNDSS reveal an increase of: 27.4% in the number of reported cases of hepatitis A from 2011-2013, 5.4% in the number of reported cases of acute hepatitis B from 2012-2013, and 151.5% in the number of reported cases of acute hepatitis C from 2010-2013. These increases are likely explained by the increases in foodborne outbreaks associated with hepatitis A and drug-related and healthcare-related outbreaks associated with acute hepatitis B and C. In 2013, after adjusting for under-ascertainment and under-reporting, the estimated number of cases of HAV, HBV, and HCV infections was 3,473, 19,764, and 29,718, respectively. As noted in "Adjustments to Reported Cases in NNDSS", these estimates cannot be compared directly with estimates from years prior to 2011, which were based on different methods of calculation.

In addition to the recent increases in reported cases of acute hepatitis A, B, and C, chronic hepatitis infection continues to affect millions of Americans (7, 32). In 2013, over 30,000 reports of chronic hepatitis B and over 132,000 reports of chronic hepatitis C were submitted to CDC through NNDSS. Of these, 16,044 reports of chronic hepatitis B infection and 79,542 reports of chronic hepatitis C infections were available for descriptive analyses. Mortality data from 2013 presented in this surveillance report show certain socio-demographic groups to be disproportionately dying with these infections, specifically, persons aged ≥55 years for hepatitis A; Asians/Pacific Islanders and persons aged 55-64 years for hepatitis B; and persons aged 55-64 years for hepatitis C. Mortality rates in 2013 were highest among persons infected with HCV (5.03 deaths per 100,000 population) and increased from the previous year, followed by HBV (0.52 deaths per 100,000 population), and HAV (0.02 deaths per 100,000 population).

CDC and state health departments rely on surveillance data to track the incidence of acute infection, guide development and evaluation of programs and policies designed to prevent infection and minimize the public health impact of viral hepatitis, and monitor progress towards achieving goals established for these programs and policies. Effective systems for conducting surveillance for chronic HBV and HCV infections are needed to ensure accurate reporting of all cases and to support and evaluate prevention activities. Additional investments in surveillance at

the local, state, and national levels are essential to build strong prevention programs that interrupt transmission of viral hepatitis and improve the health of those who are currently infected.

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ADDITIONAL RESOURCES

Epidemiology and Prevention of Vaccine-Preventable Diseases. The Pink Book: Course Textbook.

- Hepatitis A: http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/hepa.pdf [PDF - 14 Pages]
- Hepatitis B: http://www.cdc.gov/vaccines/pubs/pinkbook/downloads/hepb.pdf [PDF - 24 Pages]

Prevention of Hepatitis A through Active or Passive Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP): http://www.cdc.gov/mmwr/pdf/rr/rr5507.pdf [PDF - 30 Pages]

A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States — Part I: Immunization of Infants, Children, and Adolescents: http://www.cdc.gov/mmwr/PDF/rr/rr5416.pdf [PDF - 39 Pages]

A Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the United States — Part II: Immunization of Adults: http://www.cdc.gov/mmwr/PDF/rr/rr5516.pdf [PDF - 40 Pages]

Recommendations for Identification and Public Health Management of Persons with Chronic Hepatitis B Virus Infection: http://www.cdc.gov/mmwr/pdf/rr/rr5708.pdf [PDF - 28 Pages]

Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Chronic Disease: http://www.cdc.gov/mmwr/PDF/RR/RR4719.pdf [PDF - 54 Pages]

2005 Guidelines for Viral Hepatitis Surveillance and Case Management: http://www.cdc.gov/hepatitis/PDFs/2005Guidlines-Surv-CaseMngmt.pdf