Viral Hepatitis Surveillance

United States, 2014

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Surveillance of Viral Hepatitis – United States, 2014

SUMMARY

As part of the Centers for Disease Control and Prevention's (CDC) National Notifiable Diseases Surveillance System (NNDSS) (1), viral hepatitis case-reports are received electronically from U.S. 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 a weekly basis. Although the surveillance infrastructure was in place for states to report 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 not submitted by all states; in 2014, 40 states submitted reports of chronic HBV infection and 37 states submitted reports of chronic HCV infection.

The NNDSS data in this report should be interpreted with the understanding that "reported cases" of viral hepatitis represent persons who were tested for and diagnosed with viral hepatitis infection based on a relatively stringent case definition. Because most infections with viral hepatitis are asymptomatic, all cases are not identified or reported. As a result, this Summary is most useful in detecting trends over time for newly reported cases of hepatitis A virus (HAV), HBV, and HCV infections. However, to account for under-ascertainment and under-reporting, an estimation method was developed in 2011 to better quantify the number of new cases of hepatitis A, B, and C from the actual number of cases reported for each disease (2). The estimates in this report were derived from this methodology. We therefore caution the reader that estimates before 2011, which were obtained using a different, unpublished methodology, cannot be compared with those from 2011 to the present.

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 persons have increased in the past decade (3,4). Despite protection among young persons, many older adults have not been vaccinated and are therefore susceptible to infection. From 2011 to 2013, an increase in the number of reported cases of hepatitis A was observed. However in 2014, a total of 1,239 cases of hepatitis A were reported, representing a 30.4% decrease from 2013. This decline was the result of a large 2013 hepatitis A outbreak among persons who consumed imported pomegranate seeds in several southwestern states and Hawaii (5). After adjusting for under-ascertainment and under-reporting (2), the estimated number of new HAV infections in 2014 was 2,500.

Acute hepatitis B has been declining in incidence since 1990 mainly due to effective vaccination strategies. The number of reported cases of acute hepatitis B has remained relatively stable since 2009. A total of 2,953 acute cases were reported in 2014. However, chronic HBV infection remains a major public health challenge; recent CDC investigations report approximately 850,000 HBV-infected persons in the United States (6, 7), although other studies have estimated that as many as 2.2 million persons are living with HBV infection (8). Surveillance data from enhanced surveillance sites in this report indicate about one-half of chronic HBV infections were among Asians/Pacific Islanders, and 71.3% of chronic HBV infections were among persons born

outside of the United States. Other data indicate that approximately 47%–70% of persons with HBV infection living in the United States were born in other countries (9). Among foreign-born persons with chronic HBV infection, an estimated 58% migrated from Asia (8). Further, mortality data in this report show that disproportionate numbers of Asians/Pacific Islanders are dying with hepatitis B. Identifying these chronically infected persons and linking them to care is critical (10, 11). The U.S. Preventive Services Task Force (USPSTF) joined with CDC in 2014 to recommend HBV testing for persons born in countries where HBV infection is endemic (12). After adjusting for under-ascertainment and under-reporting (2), the estimated number of new HBV infections in 2014 was 19,200.

After receiving reports of cases of acute hepatitis C ranging from 781-877 during the years 2006–2010, reported cases of acute HCV infection increased more than 2.5 times from 2010–2014. Cases of acute HCV infection rose annually, from 850 in 2010 to 1,232 in 2011, 1,778 in 2012, 2,138 in 2013, and 2,194 in 2014. The increase from 2010–2014 is thought to reflect both true increases in incidence and, to a lesser extent, improved case ascertainment. Based on new epidemiologic studies, at least 4.6 million persons are HCV-antibody positive and approximately 3.5 million are currently infected with HCV (13). 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 (14). Improved case ascertainment by Florida, Massachusetts, and New York, which were funded by CDC to conduct enhanced surveillance, partially explains the increased incidence of acute HCV infection in these states. In other locations where the number of cases has increased markedly (e.g., Kentucky, Tennessee, Virginia, and West Virginia), increases have occurred without any federal support for investigation or follow-up, reflecting overall increases in incidence (15, 16). After adjusting for under-ascertainment and under-reporting (2), an estimated 30,500 new HCV infections occurred in 2014.

Mortality among HCV-infected persons—primarily adults aged 55–64 years—is increasing (17, 18). For the first time in the United States (17), in 2007 the number of HCV-related deaths (n=15,106) exceeded the number of HIV/AIDS-related deaths (n=12,734) (17) and has since continued to increase. The number of HCV-related deaths rose to 19,659 in 2014 and more than one-half of deaths occurred among persons aged 55-64 years. A key public health challenge is to increase the proportion of persons tested, and of those who are currently infected, increase the proportion referred for care and treatment (10, 11). To address this challenge the USPSTF joined with CDC in 2013 to recommend one-time testing for HCV infection among adults born during 1945–1965 (19).

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 (20). 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 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), persons who use drugs and persons who inject drugs (PWID), and children living in communities with high rates of disease (21). In 1999, ACIP expanded these recommendations to include children living in 11 states with average hepatitis A rates of ≥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 (22). In 2006, ACIP expanded these recommendations to include routine vaccination of children aged ≥1 year in all 50 states (4).

Hepatitis B

HBV is transmitted by percutaneous or mucosal exposure to blood or body fluids of an infected person, such as from an infected mother to her newborn during childbirth, through close personal 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 if they share diabetes-care equipment such as blood glucose meters, finger stick devices, syringes and/or insulin pens. Adults with diabetes aged <60 years are thus recommended to receive hepatitis B vaccination and those aged ≥60 years are to be considered for vaccination (23).

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, for whom approximately 5% of all acute HBV infections progress to chronic infection (24, 25).

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 (26, 27); the strategy was revised to include catch-up vaccination of older children, adolescents and other populations. The current vaccine-based strategy for the elimination of HBV transmission encompasses 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 provision of hepatitis B vaccine and immunoprophylaxis to infants born to hepatitis B surface antigen (HBsAg)-positive mothers;
- 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, MSM, and PWID).

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, 850,000–2.2 million persons are estimated to be living with HBV infection (7,8), many of whom are unaware of their infection status (10). To improve health outcomes for these persons, in 2008 CDC recommended HBV testing for populations at risk for HBV infection and public health management of persons living 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 among surgeons, other health-care workers, and students (29).

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 (30, 31), among persons who receive tattoos in unregulated settings (31), and among infants born to HCV-infected mothers (32). After adjustment for populations not sampled in the NHANES household surveys, such as incarcerated and homeless populations, an estimated 3.5 million persons are living with HCV infection in the United States (28).

A single positive anti-HCV result cannot distinguish between acute and chronic HCV infection or between current or resolved (cleared) HCV infection. Approximately 75%–85% of newly infected adults and adolescents develop chronic HCV infection (33). A revised CDC algorithm for HCV testing includes anti-HCV testing and if positive, a nucleic acid test (NAT) to detect current HCV infection (34). For reporting purposes, making the distinction between an acute and chronic HCV infection requires a health department to have data to detect the conversion from anti-HCV negative to anti-HCV positive or follow-up with a provider to determine if there were symptoms or signs of liver disease meeting the criteria for acute HCV infection. Laboratory criteria in the 2012 definition for cases of “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 NAT positive, or anti-HCV screening-test positive with an assay-specific signal-to-cutoff ratio predictive of a true case. This assessment requires, on average, review of at least four records by hepatitis surveillance staff in health departments (35). No clinical symptoms are required; however, the case must be known to not be acute. It should also be noted that in 2013, the RIBA test was phased out in the United States.

National recommendations (36) for preventing HCV infection include screening and testing donors of blood, other tissues and organs, inactivating HCV in plasma-derived products, testing persons at risk for HCV infection and providing risk-reduction counseling and recommended care and treatment, access to safe injection equipment for persons who inject drugs, and consistently implementing and practicing infection control in health-care settings. In 2010, FDA approved point-of-care tests for HCV infection that yield prompt results available to patients during the same clinical visit (37). In 2012, CDC augmented existing recommendations for HCV screening based on risk to include recommendations for one-time screening for HCV infection among all those born during 1945–1965 (38). It is estimated that persons born during these years have a 3% prevalence of HCV antibodies, which is six times higher than the prevalence seen in adults born in other years (38). 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 (39). The goal of birth-cohort HCV testing is to identify unrecognized infections among the segment of the population at highest risk for 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 major advancements that have been made in HCV treatments. For patients infected with HCV, treatment previously consisted of pegylated interferon (PEG_INF) combined with oral doses of ribavirin (40). Approximately 40%-50% of HCV-infected patients receiving this therapy cleared their infection (40). However, HCV treatment improved drastically in 2011 with development of the initial direct-acting oral agents, telaprevir and boceprevir, which were capable of achieving a sustained virologic response (SVR) rate of ≥80% (40, 41). These two drugs were available during the reporting period in 2013 covered by this Surveillance Report, but they are now discontinued in the United States and replaced with newer, all-oral direct-acting antiviral agents. In 2013, FDA approved use of simeprevir and sofosbuvir (42). When given in combination with PEG-INF and ribavirin or as an all-oral combination regimen for a shorter duration of 8-12 weeks, these agents increase SVR rates to ≥90% (43, 44). In 2014, two all-oral regimens, Harvoni (ledipasvir/sofosbuvir) and Viekira Pak (ombitasvir, paritaprevir, and ritonavir tablets; dasabuvir tablets), were licensed for the treatment of HCV, and newer all oral agents are being continually added, such as ZEPATIER (elbasvir and grazoprevir) in 2016. These direct-acting, short-course (8 to12 week for most patients), all-oral, largely (≥90%) curative 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 (45). 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 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 states that gave CDC permission 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 notifying CDC of cases of 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 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: https://wwwn.cdc.gov/nndss/conditions/notifiable/2014/. 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. Updated CSTE Case definitions are available at the CSTE website: https://wwwn.cdc.gov/nndss/case-definitions.html.

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 developed a model to account for under-ascertainment and under-reporting of cases of hepatitis A, B, and C. The model factored in the probabilities of an infected person developing symptoms such as jaundice (I), referral to care and treatment (II), and rates of reporting to local and state health departments (III). Results of the analysis estimated that reported cases represent 1 of every 2 hepatitis A cases, 1 of every 6.5 acute hepatitis B cases, and 1 of every 13.9 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 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 3-year, extended to 4 years, CDC funding agreement. All chronic cases of viral hepatitis obtained through these sites are de-duplicated. Additionally, for a sample of cases (and all cases in some sites such as New York State), follow-up case investigation is conducted by health departments to obtain clinical, laboratory, and epidemiologic information, including risk exposures and behaviors. Each quarter, a dataset of cumulative cases from each site was sent to CDC through the CDC Secure Access Management System (SAMS), a secure electronic file transfer portal.

Methods

CDC funded five states (Florida, Massachusetts, Michigan, New York, and Washington) and two cities (Philadelphia and San Francisco) to conduct "enhanced," or "active" viral hepatitis surveillance, representing a combined population of approximately 55.7 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 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 2014. Rates were calculated using appropriate jurisdiction-specific (state, county, or city) 2014 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 exposures and behaviors 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) (46), information from death certificates is compiled by CDC's National Center for Health Statistics (NCHS) to produce national multiple-cause-of-death (MCOD) data (45); causes of death are coded in accordance with the International Classification of Diseases, Tenth Revision (ICD-10) (47). 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 in 2007, the annual number of deaths associated with HCV-infection exceeded the annual number of deaths associated with HIV infection (17). A more recent study using death certificate data from 2003-2013 showed that the number of deaths associated with HCV infection continued to increase since 2007, and in 2012, surpassed the combined number of deaths associated with 60 other nationally notifiable infectious conditions that are routinely reported to CDC (48). The HCV mortality burden is likely much greater than these numbers suggest because death certificate validation studies have concluded that only a fraction of HCV-infected decedents have HCV listed on their death certificate, even when pre-mortem evidence of serious liver disease is present (18).

Methods

We obtained and analyzed 2010–2014 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 was divided into the following categories: white, non-Hispanic; black, non-Hispanic; Hispanic; Asian/Pacific Islander (API); and American Indian/Alaska Native (AI/AN). 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 (49).

Interpretation of Mortality Data (Limitations)

- 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.
- HBV and HCV infections are often underreported as causes of death on death certificates. These 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 2014, CDC participated in two state-based investigations of healthcare-associated outbreaks of HBV infection and four state-based investigations of healthcare-associated outbreaks of 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

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 2014, a total of 1,239 cases of hepatitis A were reported from 50 states to CDC (Table 2.1), a 30.4% decrease from 2013. This decrease reflects cases identified during a large hepatitis A outbreak from imported pomegranate seeds consumed by persons in several southwestern states and Hawaii in 2013 (6). The overall incidence rate in 2014 was 0.4 cases per 100,000 population. After adjusting for under-ascertainment and under-reporting, an estimated 2,500 hepatitis A cases occurred in 2014. (Data for 2014 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 or jurisdiction — United States, 2010–2014

State	2010		2011		2012		2013		2014	
	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*	No.	Rate*
Alabama	8	0.2	8	0.2	19	0.4	10	0.2	15	0.3
Alaska	5	0.7	4	0.6	1	0.1	1	0.1	1	0.1
Arizona	61	1.0	77	1.2	93	1.4	66	1.0	29	0.4
Arkansas	2	0.1	3	0.1	8	0.3	9	0.3	2	0.1
California	242	0.6	186	0.5	209	0.5	255	0.7	142	0.4
Colorado	36	0.7	21	0.4	28	0.5	51	1.0	23	0.4
Connecticut	29	0.8	18	0.5	23	0.6	19	0.5	23	0.6
Delaware	7	0.8	2	0.2	9	1.0	4	0.4	1	0.1
District of Columbia	1	0.2	U	U	U	U	U	U	U	U
Florida	139	0.7	87	0.5	87	0.5	115	0.6	90	0.5
Georgia	40	0.4	27	0.3	46	0.5	36	0.4	24	0.2
Hawaii	8	0.6	8	0.6	5	0.4	16	1.1	5	0.4
Idaho	8	0.5	6	0.4	11	0.7	8	0.5	7	0.4
Illinois	48	0.4	73	0.6	67	0.5	79	0.6	82	0.6
Indiana	12	0.2	24	0.4	11	0.2	32	0.5	20	0.3
Iowa	11	0.4	8	0.3	7	0.2	17	0.6	12	0.4
Kansas	14	0.5	4	0.1	15	0.5	11	0.4	7	0.2
Kentucky	26	0.6	10	0.2	25	0.6	24	0.5	19	0.4
Louisiana	11	0.2	5	0.1	7	0.2	14	0.3	5	0.1
Maine	7	0.5	6	0.5	9	0.7	10	0.8	8	0.6
Maryland	23	0.4	26	0.4	28	0.5	29	0.5	27	0.5
Massachusetts	48	0.7	39	0.6	40	0.6	43	0.6	43	0.6
Michigan	73	0.7	70	0.7	100	1.0	83	0.8	45	0.5
Minnesota	37	0.7	27	0.5	29	0.5	32	0.6	19	0.3
Mississippi	2	0.1	7	0.2	11	0.4	5	0.2	3	0.1
Missouri	21	0.4	13	0.2	20	0.3	8	0.1	20	0.3
Montana	4	0.4	3	0.3	6	0.6	6	0.6	5	0.5
Nebraska	14	0.8	5	0.3	16	0.9	13	0.7	9	0.5
Nevada	14	0.5	5	0.2	10	0.4	19	0.7	5	0.2
New Hampshire	2	0.2	0	0	6	0.5	9	0.7	5	0.4
New Jersey	76	0.9	79	0.9	60	0.7	68	0.8	59	0.7
New Mexico	5	0.2	7	0.3	10	0.5	20	1.0	8	0.4
New York	147	0.8	113	0.6	111	0.6	167	0.8	84	0.4

North Carolina	48	0.5	31	0.3	34	0.3	46	0.5	38	0.4
North Dakota	4	0.6	0	0	2	0.3	9	1.2	9	1.2
Ohio	47	0.4	39	0.3	36	0.3	59	0.5	32	0.3
Oklahoma	6	0.2	11	0.3	12	0.3	14	0.4	17	0.4
Oregon	17	0.4	11	0.3	9	0.2	29	0.7	13	0.3
Pennsylvania	53	0.4	60	0.5	62	0.5	53	0.4	48	0.4
Rhode Island	9	0.9	8	0.8	3	0.3	4	0.4	8	0.8
South Carolina	26	0.6	11	0.2	6	0.1	14	0.3	6	0.1
South Dakota	1	0.1	2	0.2	0	0	4	0.5	3	0.4
Tennessee	12	0.2	23	0.4	23	0.4	20	0.3	12	0.2
Texas	139	0.6	138	0.5	134	0.5	109	0.4	124	0.5
Utah	12	0.4	8	0.3	4	0.1	12	0.4	8	0.3
Vermont	0	0	6	1.0	2	0.3	7	1.1	1	0.2
Virginia	52	0.6	30	0.4	49	0.6	36	0.4	27	0.3
Washington	21	0.3	31	0.5	29	0.4	45	0.6	26	0.4
West Virginia	15	0.8	8	0.4	8	0.4	4	0.2	12	0.6
Wisconsin	23	0.4	8	0.1	21	0.4	37	0.6	7	0.1
Wyoming	4	0.7	2	0.4	1	0.2	0	0	1	0.2
U.S.	**1670**	**0.5**	**1398**	**0.4**	**1562**	**0.5**	**1781**	**0.6**	**1239**	**0.4**

*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 1,670 reported cases in 2010 to 1,239 reported cases in 2014.
- Of the 50 states that reported hepatitis A cases in 2014, a total of 21 had rates below the national rate.
- In 2014, the case rate ranged from 0.1 cases per 100,000 in seven states to 1.2 cases per 100,000 population in North Dakota.
- There are 21 states (42%) that met the Healthy People 2020 goal (https://www.healthypeople.gov/) of reducing hepatitis A incidence to ≤0.3 cases/100,000 population : Alabama, Alaska, Arkansas, Delaware, Georgia, Indiana, Kansas, Louisiana, Minnesota, Mississippi, Missouri, Nevada, Ohio, Oregon, South Carolina, Tennessee, Utah, Vermont, Virginia, Wisconsin, and Wyoming.

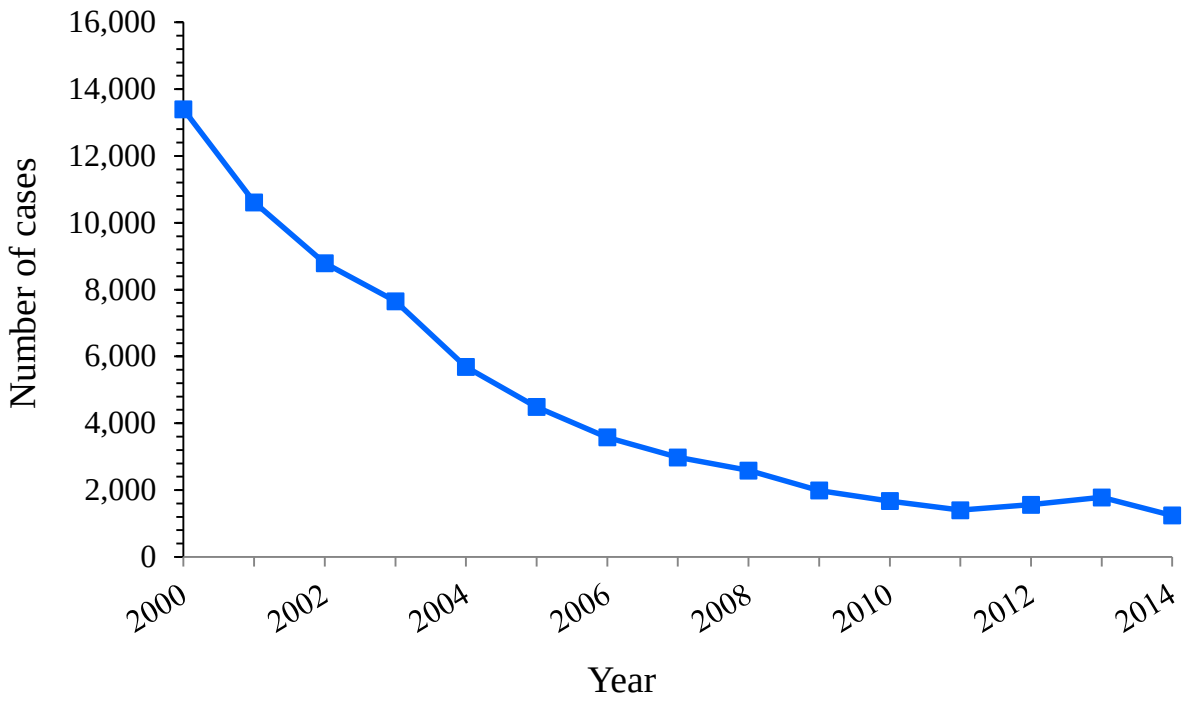
Table 2.2. Clinical characteristics of reported cases of hepatitis A* — United States, 2014

Clinical characteristic	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	757	61.1	456	60.2
Hospitalized for hepatitis A	757	61.1	344	45.4
Died from hepatitis A	671	54.2	0	0

*A total of 1,239 hepatitis A cases were reported during 2014.
†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 1,239 case-reports of hepatitis A received during 2014, 61.1% included information about whether the patient had jaundice, 61.1% included information regarding hospitalization caused by hepatitis A, and 54.2% included information on death from hepatitis A.
- Jaundice was reported for 456 (60.2%) of the 757 hepatitis A case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis A was reported for 344 (45.4 %) of the 757 hepatitis A case-reports that included information about hospitalization.
- There were no deaths reported for hepatitis A.

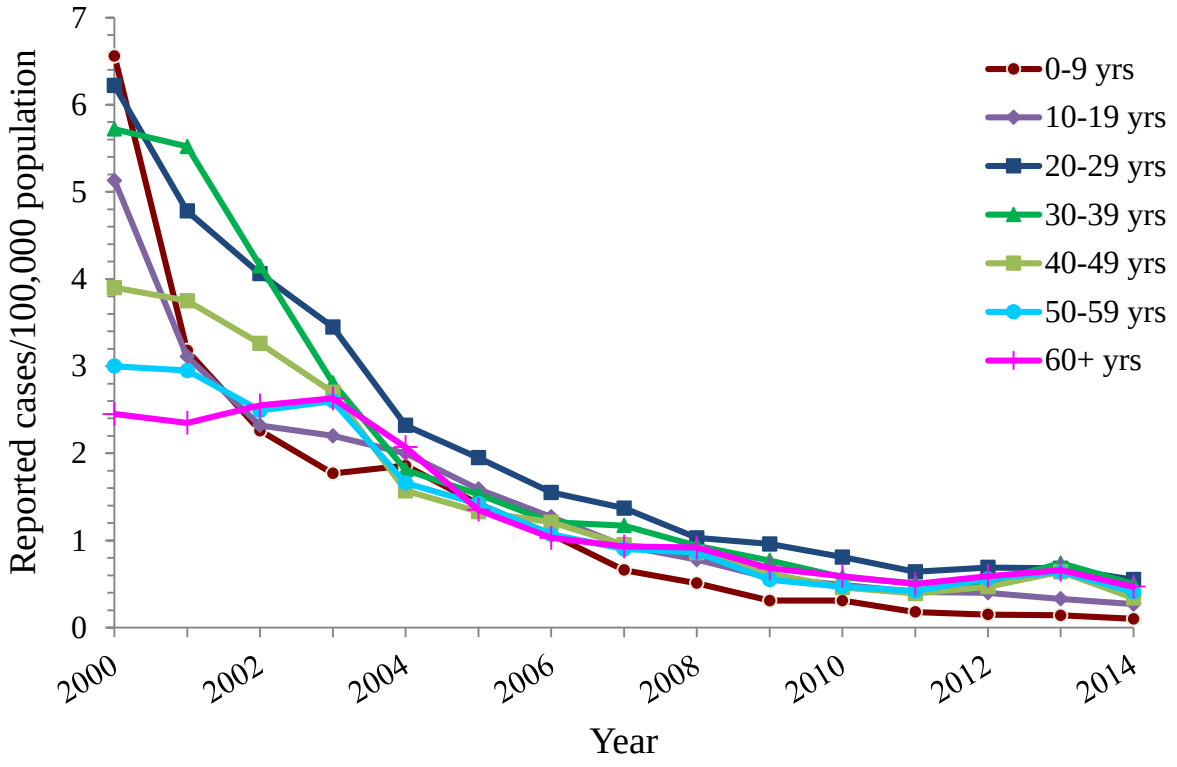
Figure 2.1. Reported number of hepatitis A cases — United States, 2000-2014



Source: CDC, National Notifiable Diseases Surveillance System.

- The number of hepatitis A cases declined by 90.8%, from 13,397 in 2000 to 1,239 in 2014.
- From 2010 through 2014, the number of hepatitis A cases decreased by 25.8% (from 1,670 to 1,239); this number decreased 20.7% over the years 2012–2014, from 1,562 to 1,239.

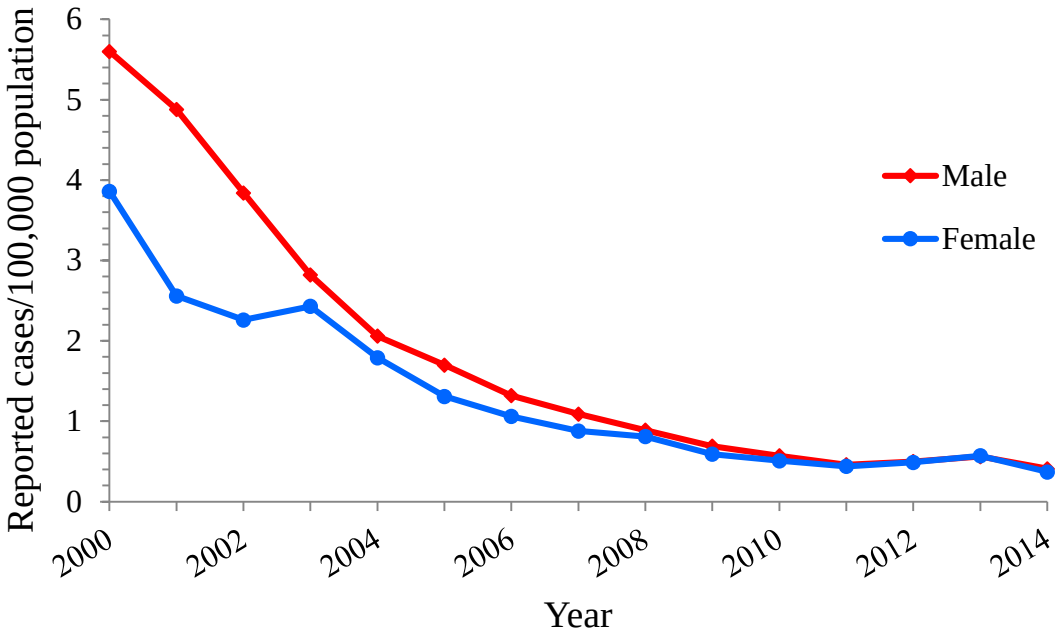
Figure 2.2. Incidence of hepatitis A, by age group — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000–2014, rates of hepatitis A declined, except for an increase in 2012 and 2013 among all age groups excluding those aged 0–9 and 10–19 years.
- When comparing the 2014 hepatitis A rates of all age groups, persons aged 20–29 years had the highest rate (0.55 cases per 100,000 population); persons aged 0–9 years had the lowest rate (0.10 cases per 100,000 population).

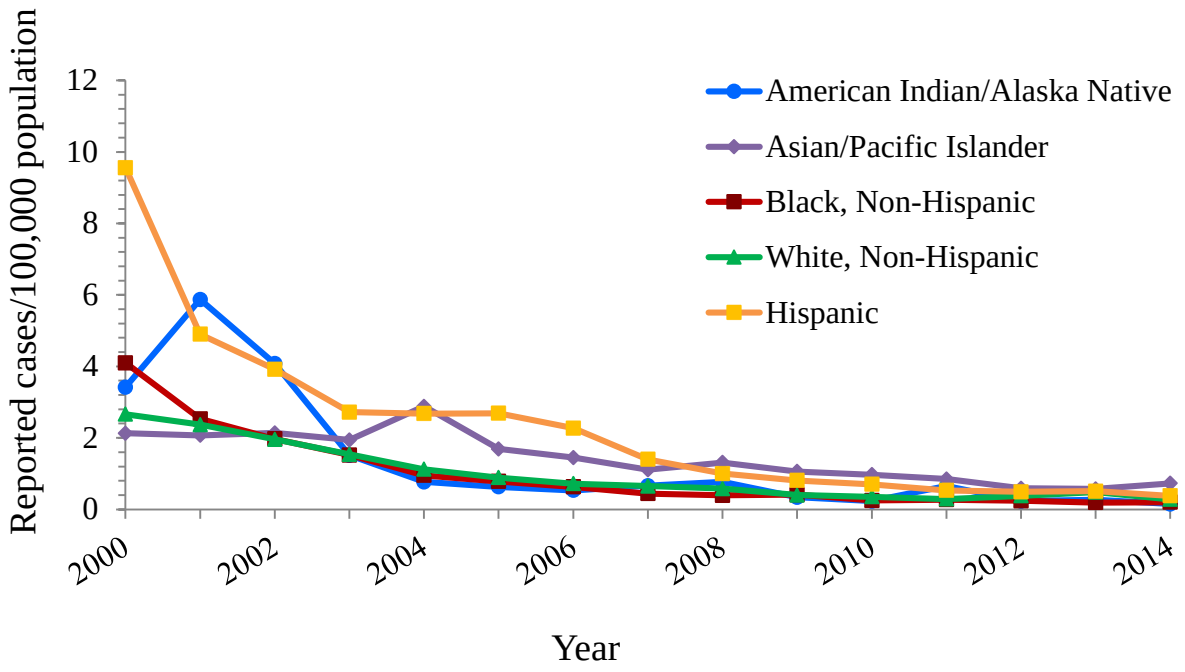
Figure 2.3. Incidence of hepatitis A, by sex — United States, 2000–2014



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.
- In 2014, the incidence rate was 0.4 cases per 100,000 population for males and females.

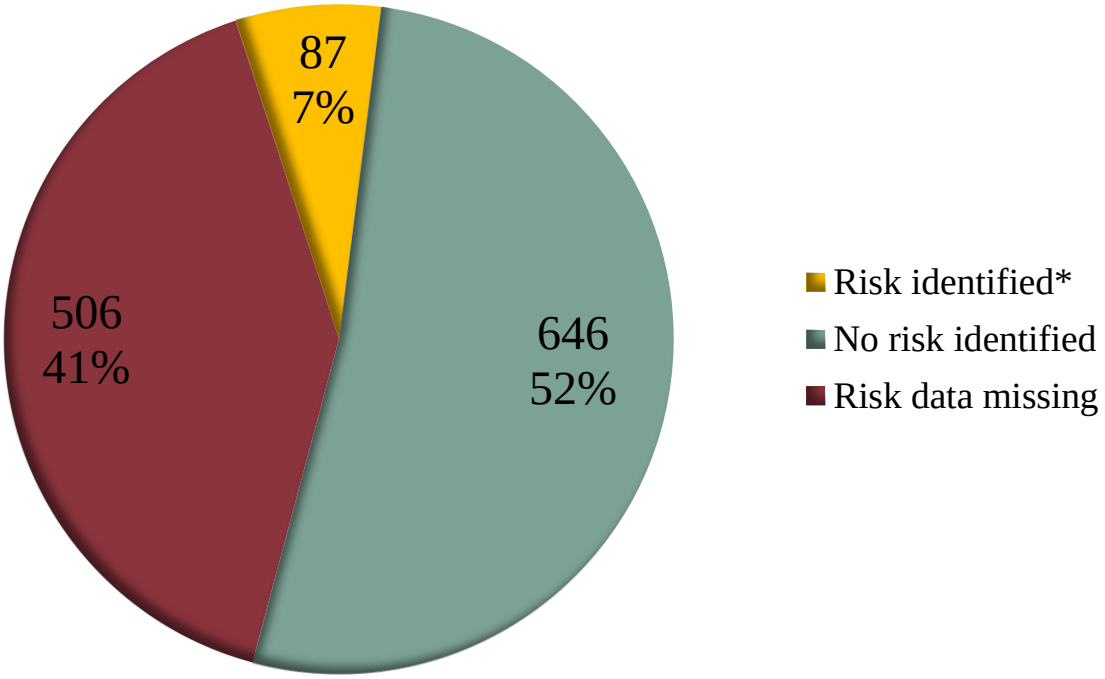
Figure 2.4. Incidence of hepatitis A, by race/ethnicity — United States, 2000–2014



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 (0.73 cases per 100,000 population in 2014) than for other race/ethnic groups.

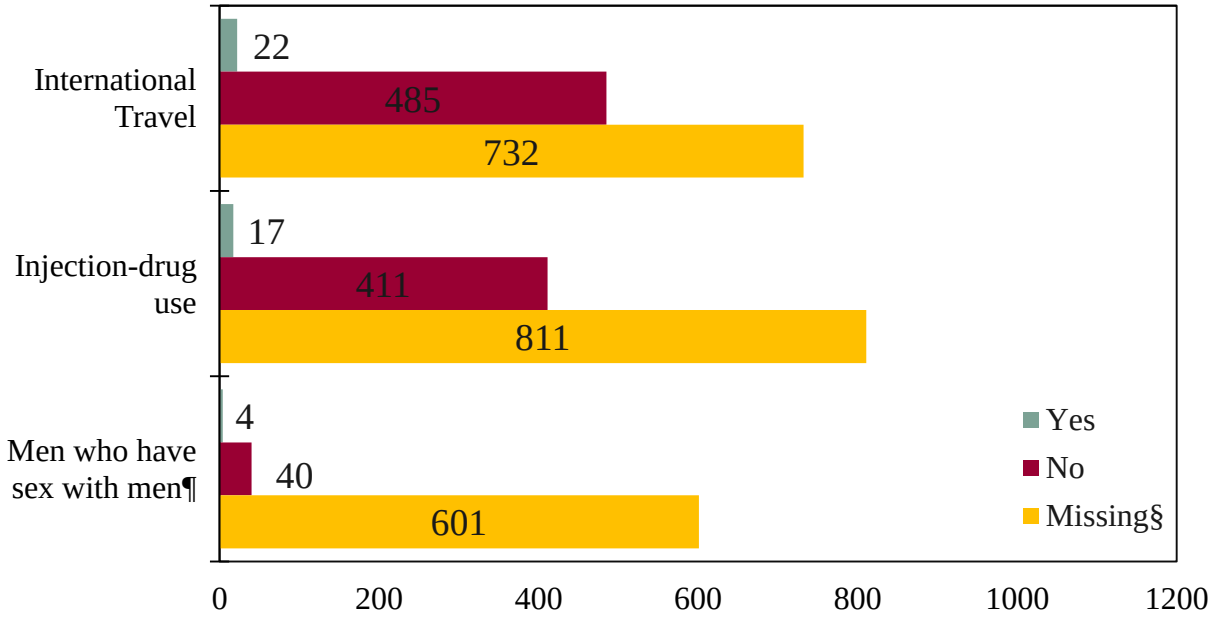
Figure 2.5. Availability of information on risk exposures/behaviors associated with hepatitis A — United States, 2014



*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 1,239 case-reports of hepatitis A received by CDC during 2014, a total of 506 (41%) 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 733 case-reports that had risk exposure/behavior information:
    - 646 (88.1%) indicated no risk exposures/behaviors for hepatitis A and
    - 87 (11.9%) 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, 2014

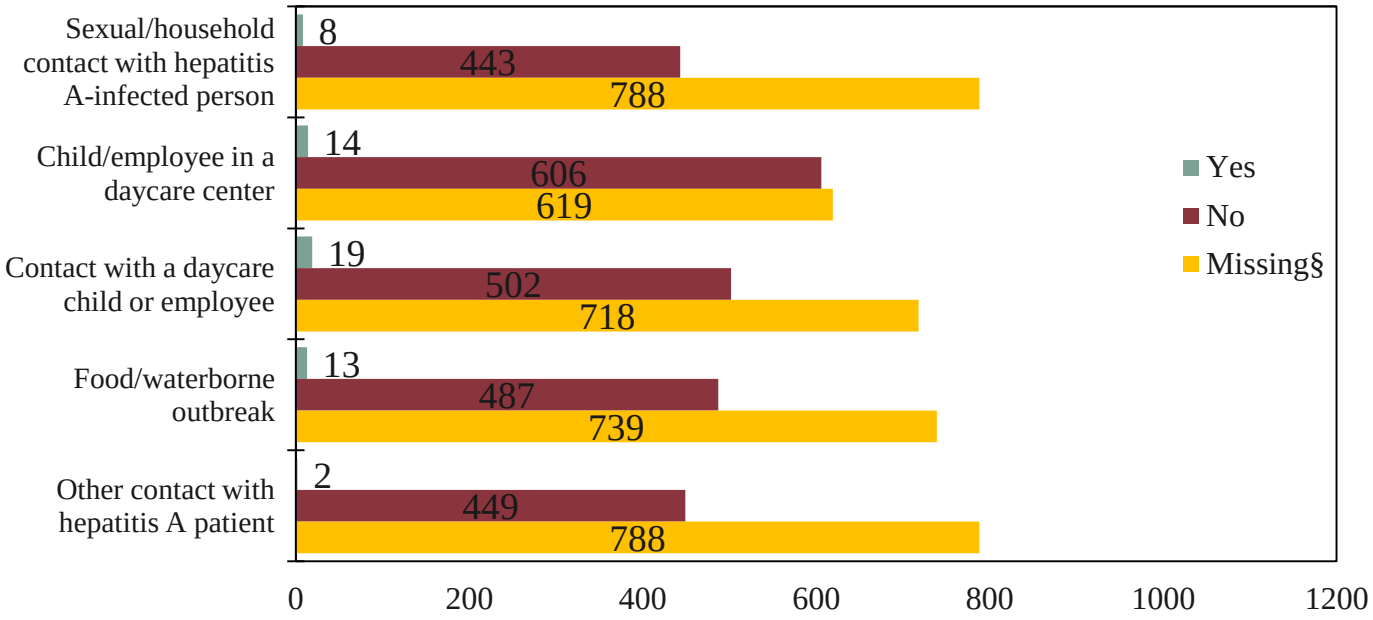


*A total of 1,239 case-reports of hepatitis A were received in 2014.
†More than one risk exposure/behavior may be indicated on each case-report.
§No risk data reported.
¶A total of 645 hepatitis A cases were reported among males in 2014.
Source: CDC, National Notifiable Diseases Surveillance System.

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 507 case-reports that included information about travel, 4.3% (n= 22) indicated traveling outside of the United States or Canada.
- Of the 428 case-reports that included information about injection-drug use, 4.0% (n=17) indicated use of injection drugs.
- Of the 44 case-reports from males that included information about sexual preference/practices, 9.1% (n=4) indicated having sex with another man.

Figure 2.6b. Hepatitis A reports*, by risk exposure/behavior† — United States, 2014



*A total of 1,239 case-reports with hepatitis A were received in 2014.
†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 451 case-reports that contained information about contact with a hepatitis A-infected person, 1.8% (n=8) indicated sexual or household contact with a person confirmed or suspected of having hepatitis A.
- Of the 620 case-reports that included information about employment or attendance at a nursery, day-care center, or preschool, 2.3% (n=14) indicated working at or attending a nursery, day care center, or preschool.
- Of the 521 case-reports that included information about household contact with an employee of or a child attending a nursery, day-care center, or preschool, 3.6% (n=19) indicated such contact.
- Of the 500 case-reports that included information about linkage to an outbreak, 2.6% (n=13) indicated exposure that may have been linked to a common-source foodborne or waterborne outbreak.
- Of the 451 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, 0.4% (n=2) indicated such contact.

Table 2.3. Number and rate* of hepatitis A-related deaths, by demographic characteristics and year — United States, 2010–2014

Demographic characteristic		2010		2011		2012		2013		2014	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)	0–34	3	0.00	0	0.00	2	0.00	2	0.00	0	0.00
	35–44	7	0.02	1	0.00	5	0.01	2	0.00	4	0.01
	45–54	25	0.06	11	0.02	12	0.03	13	0.03	7	0.02
	55–64	34	0.09	16	0.04	23	0.06	30	0.08	28	0.07
	65–74	10	0.05	12	0.05	17	0.07	19	0.08	19	0.07
	≥75	16	0.09	29	0.15	18	0.09	14	0.07	18	0.09
Race/ethnicity†	White, NH (non-Hispanic)	65	0.03	44	0.02	51	0.02	63	0.02	51	0.02
	Black, NH	15	0.04	10	0.03	8	0.02	6	0.01	11	0.03
	Hispanic	12	0.03	6	0.02	8	0.02	8	0.02	10	0.02
	Asian/Pacific Islander	2	0.02	8	0.06	7	0.05	3	0.02	2	0.01
	American Indian/Alaska Native	1	0.05	1	0.04	2	0.08	0	0.00	2	0.10
Sex	Male	73	0.05	37	0.02	46	0.03	50	0.03	42	0.02
	Female	22	0.01	32	0.02	31	0.02	30	0.01	34	0.02
Overall		**95**	**0.03**	**69**	**0.02**	**77**	**0.02**	**80**	**0.02**	**76**	**0.02**

Source: CDC, National Vital Statistics System.
*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.
One death in 2012 is not represented under the race/ethnicity category due to missing race and/or ethnicity data.

- In 2014, the overall hepatitis A-related mortality rate was 0.02 deaths per 100,000 population (n=76).
- From 2010–2014, 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 2014, age-specific mortality rates for hepatitis A increased with increasing age groups: 0.00 deaths/100,000 population among persons aged 0–34 years, 0.01 deaths/100,000 population among persons aged 35–44 years, 0.02 deaths/100,000 population among persons aged 45-54 years, 0.07 deaths/100,000 population among persons 55–74 years, and 0.09 deaths/100,000 population among persons aged ≥75 years.
- In 2014, American Indians/Alaska Natives had the highest hepatitis A-related mortality rates at 0.1 deaths/100,000 population.
- In 2014, hepatitis A-related mortality rates were similar for both females and males (0.02 deaths/100,000 population).

HEPATITIS B

Acute Hepatitis B

In 2014, a total of 2,953 cases of acute hepatitis B were reported from 48 states to CDC (Table 3.1). The overall incidence rate for 2014 was 0.9 cases per 100,000 population. After adjusting for under-ascertainment and under-reporting, an estimated 19,200 acute hepatitis B cases occurred in 2014. (Data for 2014 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 or jurisdiction — United States, 2010–2014

	2010		2011		2012		2013		2014	
State	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***
Alabama	68	1.4	119	2.5	79	1.6	90	1.9	117	2.4
Alaska	5	0.7	3	0.4	1	0.1	1	0.1	3	0.4
Arizona	26	0.4	14	0.2	14	0.2	28	0.4	31	0.5
Arkansas	66	2.3	57	1.9	74	2.5	50	1.7	28	0.9
California	252	0.7	157	0.4	136	0.4	138	0.4	110	0.3
Colorado	46	0.9	23	0.4	24	0.5	24	0.5	29	0.5
Connecticut	22	0.6	19	0.5	15	0.4	8	0.2	9	0.3
Delaware	U	U	13	1.4	11	1.2	14	1.5	8	0.9
District of Columbia	3	0.5	U	U	U	U	U	U	U	U
Florida	297	1.6	213	1.1	247	1.3	323	1.7	313	1.6
Georgia	165	1.7	142	1.4	109	1.1	104	1.0	103	1.0
Hawaii	6	0.4	6	0.4	5	0.4	4	0.3	6	0.4
Idaho	6	0.4	2	0.1	5	0.3	13	0.8	6	0.4
Illinois	135	1.1	85	0.7	86	0.7	94	0.7	58	0.5
Indiana	75	1.2	70	1.1	90	1.4	101	1.5	126	1.9
Iowa	15	0.5	15	0.5	13	0.4	11	0.4	9	0.3
Kansas	11	0.4	15	0.5	9	0.3	11	0.4	11	0.4
Kentucky	136	3.1	151	3.5	180	4.1	214	4.9	164	3.7
Louisiana	55	1.2	62	1.4	44	1.0	82	1.8	87	1.9
Maine	13	1.0	8	0.6	9	0.7	11	0.8	12	0.9
Maryland	67	1.2	62	1.1	52	0.9	43	0.7	40	0.7
Massachusetts	13	0.2	67	1.0	75	1.1	71	1.1	30	0.4
Michigan	122	1.2	91	0.9	81	0.8	53	0.5	50	0.5
Minnesota	23	0.4	20	0.4	17	0.3	19	0.4	16	0.3
Mississippi	33	1.1	57	1.9	78	2.6	55	1.8	48	1.6
Missouri	67	1.1	60	1.0	48	0.8	61	1.0	31	0.5
Montana	0	0.0	0	0.0	2	0.2	4	0.4	0	0.0
Nebraska	12	0.7	12	0.7	10	0.5	9	0.5	8	0.4
Nevada	41	1.5	29	1.1	28	1.0	29	1.0	21	0.7
New Hampshire	5	0.4	3	0.2	4	0.3	2	0.2	4	0.3
New Jersey	77	0.9	73	0.8	70	0.8	65	0.7	77	0.9
New Mexico	5	0.2	10	0.5	3	0.1	3	0.1	2	0.1
New York	139	0.7	134	0.7	113	0.6	117	0.6	95	0.5

North Carolina	113	1.2	109	1.1	73	0.7	75	0.8	100	1.0
North Dakota	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Ohio	95	0.8	90	0.8	178	1.5	225	1.9	171	1.5
Oklahoma	115	3.1	100	2.6	79	2.1	40	1.0	57	1.5
Oregon	42	1.1	32	0.8	25	0.6	32	0.8	32	0.8
Pennsylvania	72	0.6	84	0.7	63	0.5	43	0.3	68	0.5
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	59	1.3	39	0.8	37	0.8	58	1.2	37	0.8
South Dakota	2	0.2	2	0.2	2	0.2	5	0.6	3	0.4
Tennessee	150	2.4	192	3.0	240	3.7	262	4.0	232	3.5
Texas	394	1.6	204	0.8	170	0.7	142	0.5	122	0.5
Utah	8	0.3	10	0.4	13	0.5	5	0.2	11	0.4
Vermont	2	0.3	0	0.0	2	0.3	2	0.3	4	0.6
Virginia	97	1.2	84	1.0	84	1.0	72	0.9	61	0.7
Washington	50	0.7	35	0.5	34	0.5	33	0.5	44	0.6
West Virginia	88	4.7	113	6.1	141	7.6	195	10.5	186	10.1
Wisconsin	54	0.9	17	0.3	22	0.4	9	0.2	173	3.0
Wyoming	3	0.5	0	0.0	0	0.0	U	U	U	U
Total	**3350**	**1.1**	**2903**	**0.9**	**2895**	**0.9**	**3050**	**1.0**	**2953**	**0.9**

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

- The number of acute hepatitis B cases declined by 11.9%, from 3,350 in 2010 to 2,953 in 2014. While the number of reported cases of acute hepatitis B has declined since 2010, the rate has remained stable, with one small increase from 3030 cases in 2013 to 2953 cases in 2014, a 3.2% decrease in the number of reported cases if acute hepatitis B.
- The rate of acute hepatitis B remained fairly stable from 2010 to 2014, ranging from 1.1 cases/100,000 population in 2010 to 0.9 cases/100,000 population in 2014.
- Rates of acute hepatitis B in 2014 ranged from no cases reported in Montana and North Dakota to 10.1 cases per 100,000 population in West Virginia.
- Of the 48 states that reported acute hepatitis B cases in 2014, 31 states had rates below the national rate of 0.9 per 100,000 population.
- The Healthy People 2020 goal (https://www.healthypeople.gov/) of reducing hepatitis B incidence to ≤1.5 cases/100,000 population among adults was reached by 39 (81%) states: Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Texas, Utah, Vermont, Virginia, and Washington.

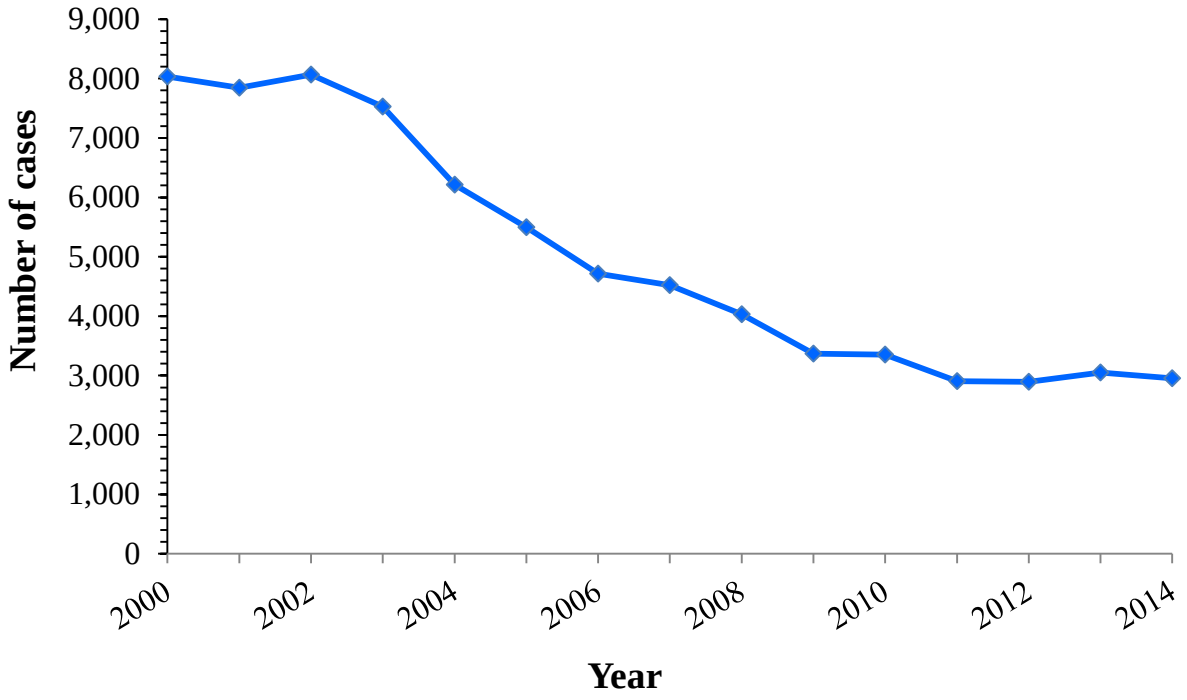
Table 3.2. Clinical characteristics of reported cases of acute hepatitis B* — United States, 2014.

Clinical characteristic†	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	2021	68.4	1544	76.4
Hospitalized for hepatitis B	2014	68.2	1240	61.6
Died from hepatitis B	1806	61.2	13	0.7

Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,953 hepatitis B cases were reported during 2014.
†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.

- Of the 2,953 case-reports of acute hepatitis B received in 2014, 68.4% included information regarding whether the patient had jaundice, 68.2% included information regarding hospitalization caused by hepatitis B, and 61.2% included information on death from hepatitis B. (Note: more severe cases are likely to be ascertained and reported.)
- Jaundice was reported for 1,544 (76.4%) of the 2,021 acute hepatitis B case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis B was reported for 1,240 (61.6%) of the 2,014 acute hepatitis B case-reports that included information about hospitalization.
- Death from hepatitis B was reported for 13 (0.7%) of the 1,806 acute hepatitis B case-reports that included information about death.

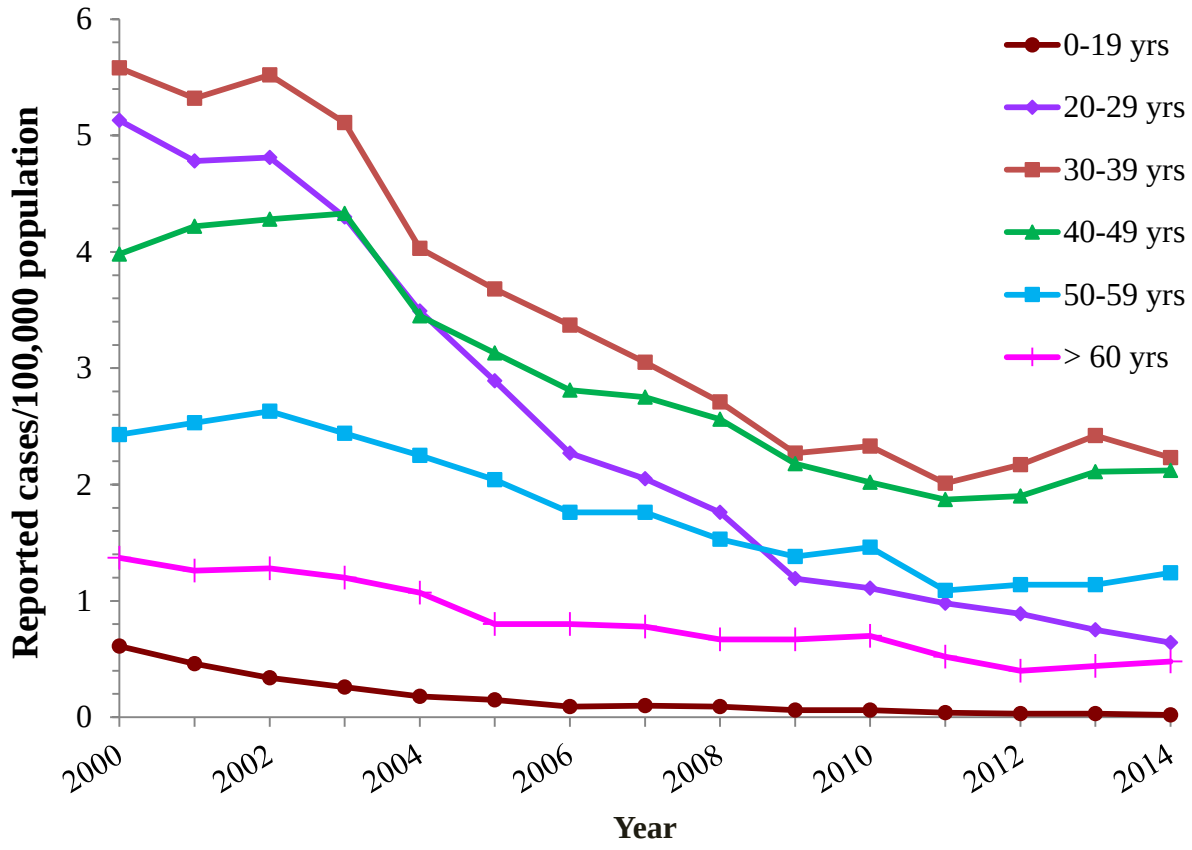
Figure 3.1. Reported number of acute hepatitis B cases — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- The number of reported cases of acute hepatitis B decreased by 63.3%, from 8,036 in 2000 to 2,953 in 2014.
- Acute hepatitis B cases have remained fairly stable from 2009-2014, decreasing only 3.2%, from 2013 to 2014.

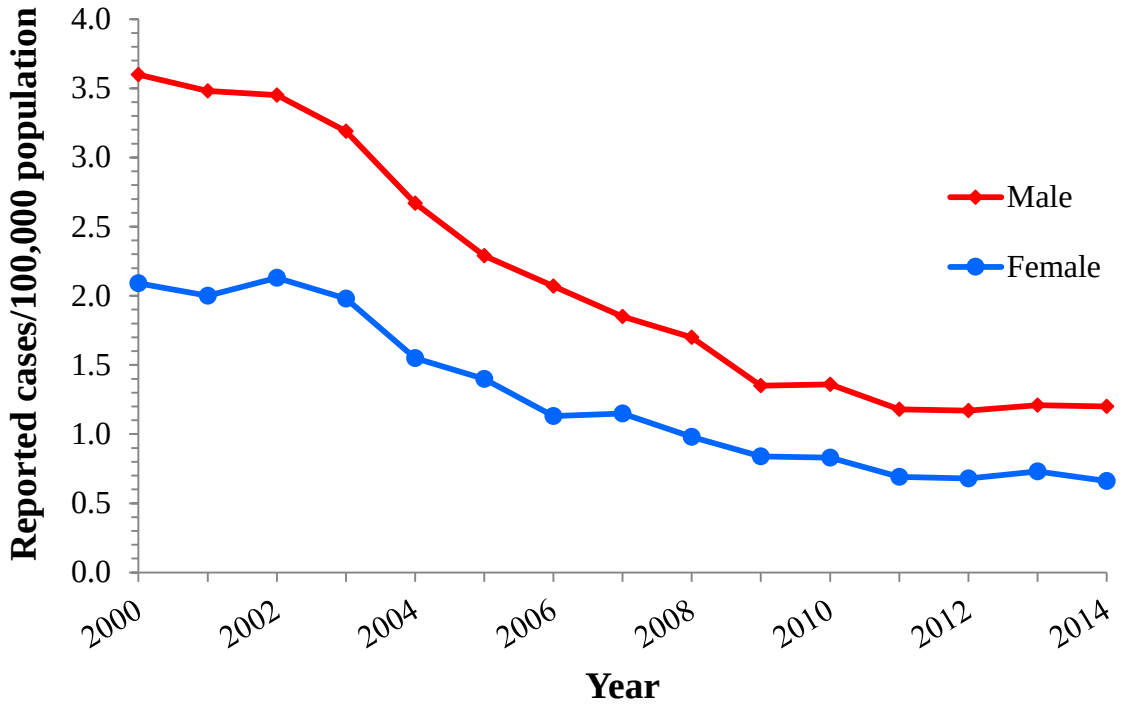
Figure 3.2. Incidence of acute hepatitis B, by age group — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2003–2009, rates of acute hepatitis B declined among all age groups.
- Rates of acute hepatitis B increased slightly among the 30-39 year-old age group from 2011–2013, and decreased slightly from 2013 to 2014.
- From 2010-2014 rates of acute hepatitis B increased slightly among the 40-49 and 50-59 year-old age groups.
- Rates for all other age groups decreased or stayed roughly the same among all other age groups.
- In 2014, rates were highest for persons aged 30–39 years (2.23 cases/100,000 population); the lowest rates were among children and adolescents aged ≤19 years (0.02 cases/100,000 population).

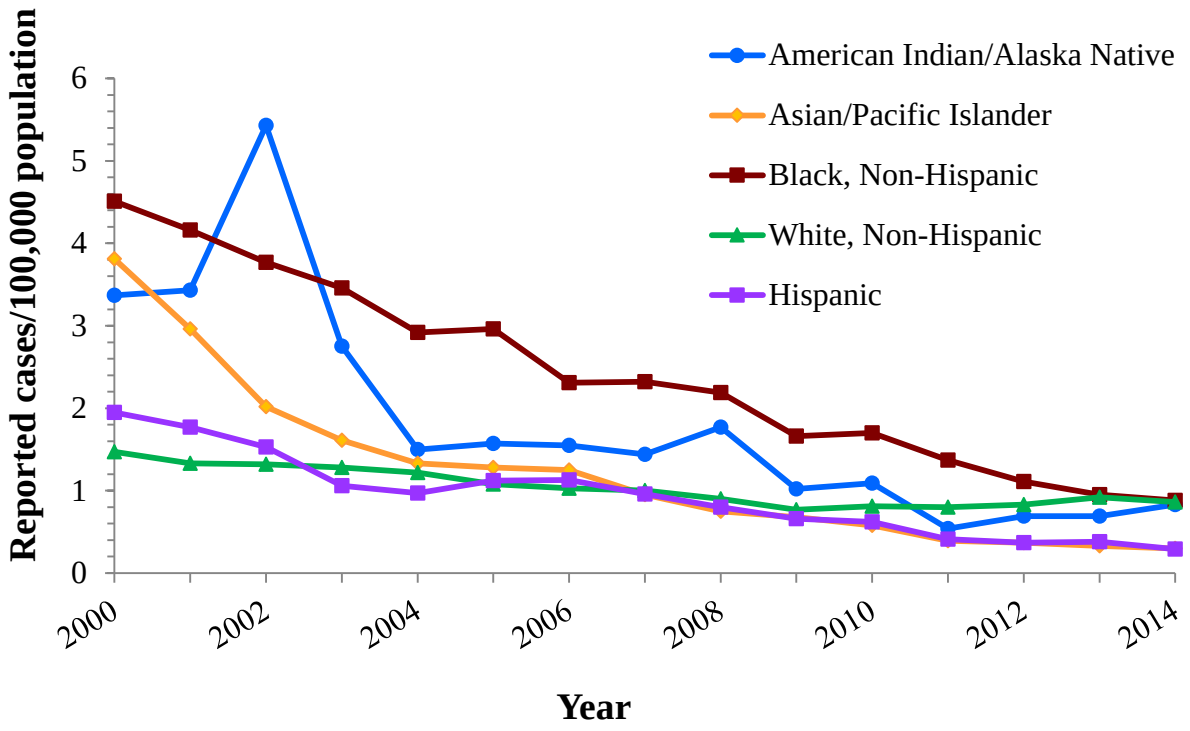
Figure 3.3. Incidence of acute hepatitis B, by sex — United States, 2000–2014



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 2002–2014.
- In 2014, the rate for males was approximately 1.8 times higher than that for females (1.20 cases and 0.66 cases per 100,000 population, respectively).

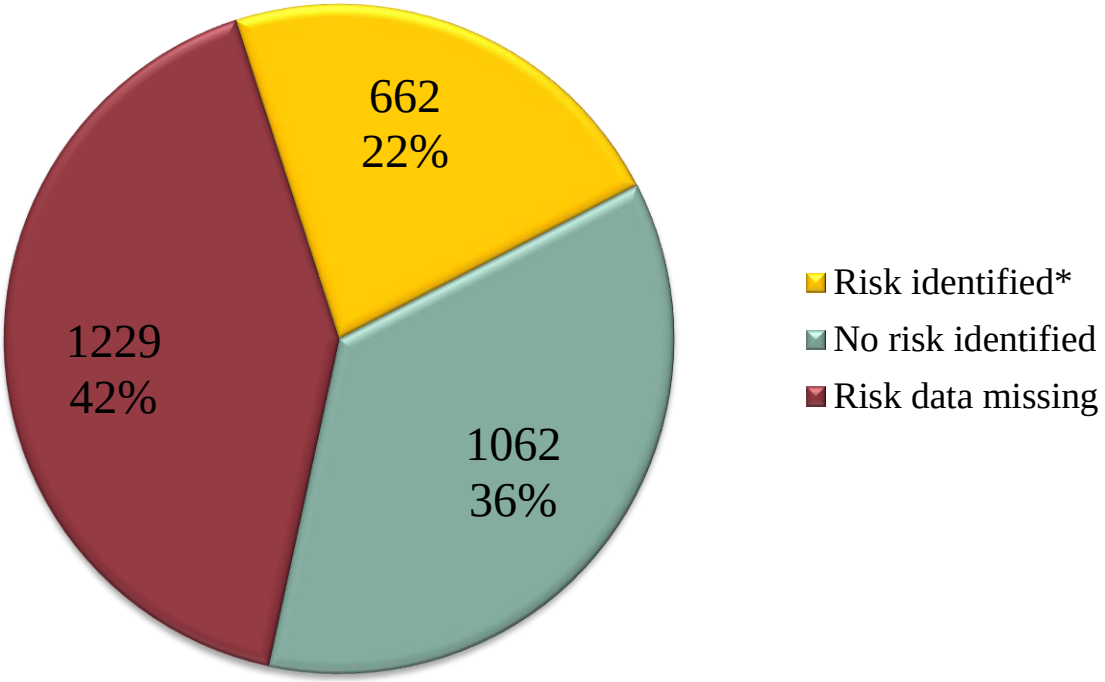
Figure 3.4. Incidence of acute hepatitis B, by race/ethnicity — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2000–2014, the rate of acute hepatitis B declined among Asian/Pacific Islanders, non-Hispanic Blacks, and Hispanics.
- After declining from 2000-2011, rates of acute hepatitis B increases 15% from 2011-2013 and remained stable from 2013 to 2014 for non-Hispanic Whites.
- Acute hepatitis B rates for American Indians/Alaska Native have been unstable from 2000- 2011. Rates increased sharply from 2001to 2002, declined from 2002 to 2004, remained stable until another increase in 2008, declined in 2009 through 2011, and has remained stable from 2012 to 2014.
- In 2014, the rate of acute hepatitis B was lowest among Hispanics and Asian/Pacific Islanders (0.29 cases per 100,000 population, each) and highest for non-Hispanic Blacks (0.88 cases per 100,000 population).

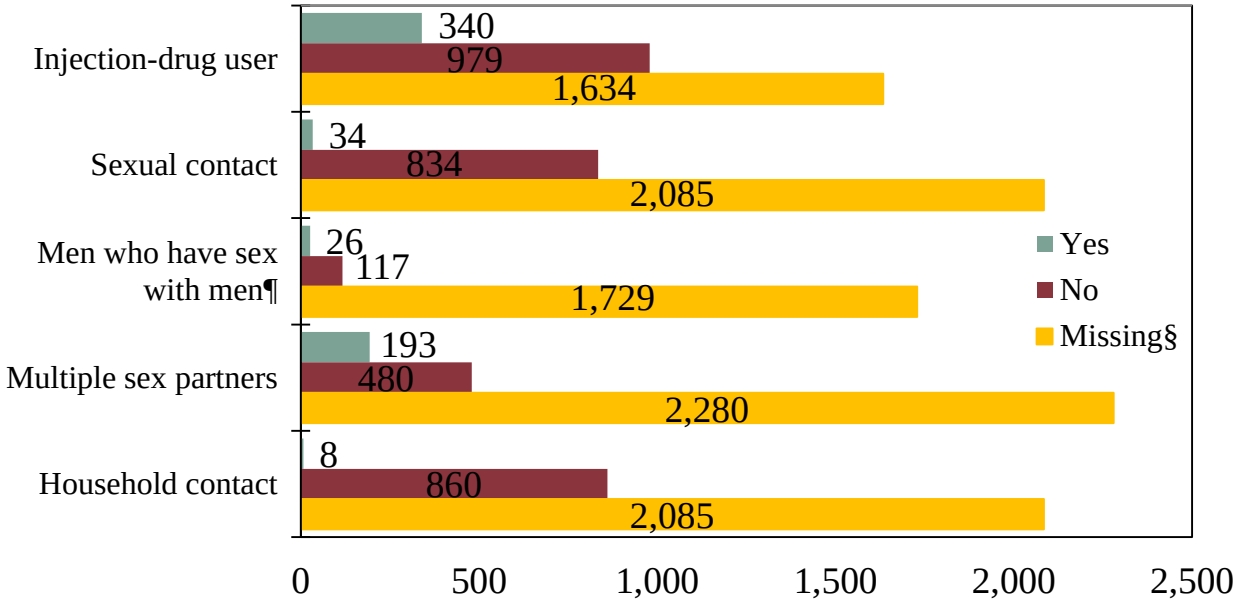
Figure 3.5. Availability of information on risk exposures/behaviors associated with acute hepatitis B — United States, 2014



Source: CDC, National Notifiable Diseases Surveillance System.
*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.

- Of the 2,953 case-reports of acute hepatitis B received by CDC during 2014, a total of 1,229 (42%) 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 1,724 case-reports that had risk exposure/behavior information:
  - 1,062 (61.6%) indicated no risk exposure/behavior for acute hepatitis B.
  - 662 (38.4%) 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, 2014

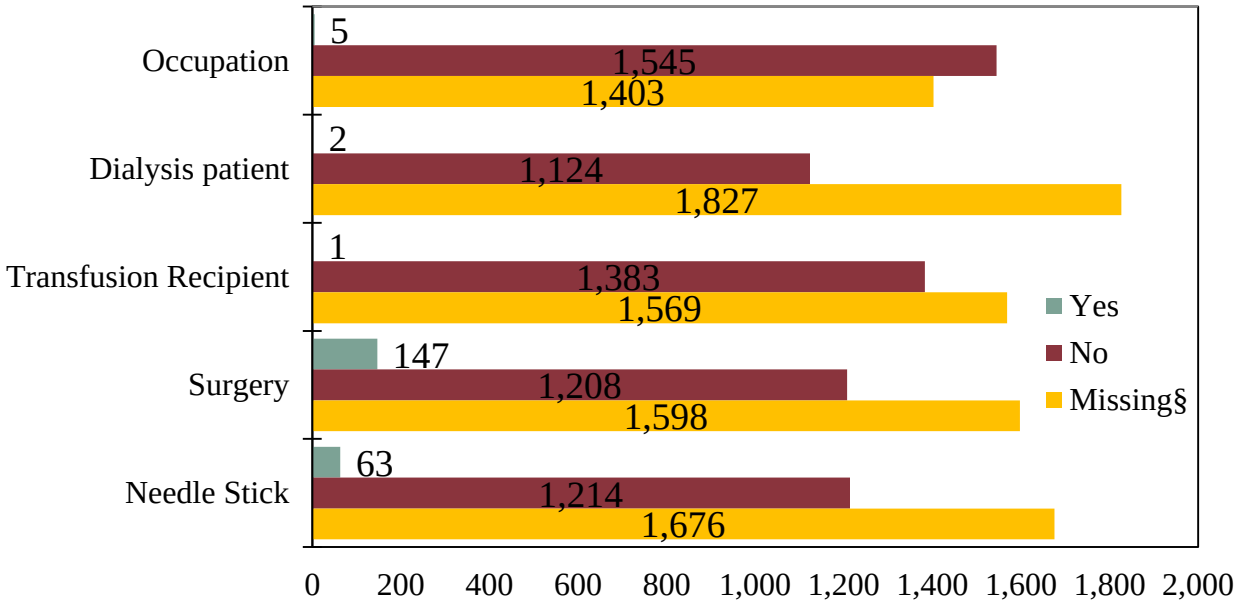


Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,953 case-reports of acute hepatitis B were received in 2014.
†More than one risk exposure/behavior may be indicated on each case-report.
§No risk data reported.
¶A total of 1,872 acute hepatitis B cases were reported among males in 2014.

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 1,319 case-reports that included information about injection-drug use, 25.8% (n=340) indicated use of injection drugs.
- Of the 868 case-reports that included information about sexual contact, 3.9% (n=34) indicated sexual contact with a person with confirmed or suspected hepatitis B.
- Of the 143 case-reports from males that included information about sexual preference/practices, 18.2% (n=26) indicated sex with another man.
- Of the 673 case-reports that had information about number of sex partners, 28.7% (n=193) indicated having ≥2 sex partners.
- Of the 868 case-reports that included information about household contact, 0.9% (n=8) indicated household contact with someone with confirmed or suspected hepatitis B.

Figure 3.6b. Acute hepatitis B reports*, by risk exposure/behavior† — United States, 2014



Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,953 case-reports of hepatitis B were received in 2014.
†More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.

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

- Of the 1,550 case-reports that included information about occupational exposures, 0.3% (n=5) indicated employment in a medical, dental, or other field involving contact with human blood.
- Of the 1,126 case-reports that included information about receipt of dialysis or kidney transplant, 0.2% (n=2) indicated patient receipt of dialysis or a kidney transplant.
- Of the 1,384 case-reports that included information about receipt of blood transfusion, 0.07% (n=1) indicated patient receipt of a blood transfusion.
- Of the 1,355 case-reports that included information about surgery, 10.8% (n=147) indicated having surgery.
- Of the 1,277 case-reports that included information about needle-stick injury, 4.9% (n=63) 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 case-reports* of confirmed chronic hepatitis B submitted by states and jurisdictions, 2014

State/Jurisdiction	No. chronic hepatitis B case reports submitted †
Alabama	N§
Alaska	N
Arizona	98
Arkansas	N
California	1,114
Colorado	144
Connecticut	72
Delaware	88
District of Columbia	U¶
Florida	1,137
Georgia	N
Hawaii	182
Idaho	51
Illinois	972
Indiana	U
Iowa	66
Kansas	116
Kentucky	N
Louisiana	125
Maine	44
Maryland	498
Massachusetts	233
Michigan	475
Minnesota	197
Mississippi	N
Missouri	431
Montana	26
Nebraska	110
Nevada	N
New Hampshire	28
New Jersey	487
New Mexico	50

New York State	2,255
North Carolina	447
North Dakota	83
Ohio	214
Oklahoma	86
Oregon	97
Pennsylvania	927
Rhode Island	U
South Carolina	145
South Dakota	10
Tennessee	625
Texas	N
Utah	34
Vermont	34
Virginia	341
Washington	93
West Virginia	218
Wisconsin	1
Wyoming	46
Total	12,400

Source: CDC, National Notifiable Diseases Surveillance System.
*For case-definition, see https://wwwn.cdc.gov/nndss/conditions/notifiable/2016/
†Reports may not reflect unique cases.
§ N= Not Reportable, past/present hepatitis C infection is not reportable in the listed state.
¶ Cases reported by California through NNDSS were all from San Francisco County. Differences in the number o cases in this table and table 3.4 is because NNSDSS and CDC's Secure Access Management System (SAMS) have different deadline dated for which all annual data must be submitted.
**U=No data available for reporting

- In 2014, 40 states provided 12,400 case-reports of chronic hepatitis B.
- Eleven states (California, Florida, Illinois, Maryland, Michigan, Missouri, New York State, New Jersey, North Carolina, Pennsylvania, and Tennessee) account for 75.5% of the chronic hepatitis B cases reported through the NNDSS in 2014.
- New York State submitted the largest number of cases-reports (n= 2,255 or 18.2%) of chronic hepatitis B in 2014.

Table 3.4. Reported cases of chronic hepatitis B, by demographic characteristics and laboratory tests — Enhanced Viral Hepatitis Surveillance Sites*, 2014

Category	MA No. %	MI No. %	NYS[†] No. %	Phil No. %	SF No. %	WA No. %	Total No. %[§]
Sex							
Female	110 49.1%	240 49.5%	253 42.7%	32 34.4%	588 50.5%	28 31.1%	1,251 47.2%
Male	114 50.9%	245 50.5%	337 56.8%	60 64.5%	575 49.4%	62 68.9%	1,393 52.6%
Unknown/ missing	0 0.0%	0 0.0%	3 0.5%	1 1.1%	2 0.2%	0 0.0%	6 0.2%
Race/Ethnicity							
American Indian/ Alaska Native, NH	0 0.0%	3 0.6%	0 0.0%	0 0.0%	4 0.3%	0 0.0%	7 0.3%
Asian/Pacific Islander, NH	66 29.5%	139 28.7%	209 35.2%	35 37.6%	603 51.8%	22 24.4%	1,074 40.5%
Black, NH	35 15.6%	75 15.5%	81 13.7%	25 26.9%	20 1.7%	6 6.7%	242 9.1%
White, NH	28 12.5%	149 30.7%	96 16.2%	5 5.4%	20 1.7%	11 12.2%	309 11.7%
Hispanic	24 10.7%	9 1.9%	24 4.1%	2 2.2%	19 1.6%	1 1.1%	79 3.0%
Other, NH	16 7.1%	25 5.2%	21 3.5%	2 2.2%	7 0.6%	2 2.2%	73 2.8%
Unknown/ missing	55 24.6%	85 17.5%	162 27.3%	24 25.8%	492 42.2%	48 53.3%	866 32.7%
Age group, years							
0-14	1 0.4%	8 1.6%	4 0.7%	3 3.2%	5 0.4%	0 0.0%	21 0.8%
15-24	13 5.8%	49 10.1%	38 6.4%	8 8.6%	35 3.0%	9 10.0%	152 5.7%
25-39	94 42.0%	149 30.7%	205 34.6%	31 33.3%	373 32.0%	29 32.2%	881 33.2%

40-54	68 30.4%	143 29.5%	195 32.9%	33 35.5%	422 36.2%	31 34.4%	892 33.7%
55+	48 21.4%	136 28.0%	151 25.5%	18 19.4%	329 28.2%	21 23.3%	703 26.5%
Unknown/ missing	0 0.0%	0 0.0%	0 0.0%	0 0.0%	1 0.1%	0 0.0%	1 0.0%
Place of Birth							
United States	19 8.5%	114 23.5%	3 0.5%	42 45.2%	12 1.0%	1 1.1%	191 7.2%
Outside United States	103 46.0%	168 34.6%	10 1.7%	44 47.3%	113 9.7%	36 40.0%	474 17.9%
Unknown/ missing	102 45.5%	203 41.9%	580 97.8%	7 7.5%	1040 89.3%	53 58.9%	1,985 74.9%
Hepatitis B laboratory testing¶							
HBV surface antigen +	190 84.8%	326 67.2%	524 88.4%	65 69.9%	1053 90.4%	21 23.3%	2,179 82.2%
[IgM anti-HBc] -	71 31.7%	80 16.5%	111 18.7%	0 0.0%	0 0.0%	44 48.9%	306 11.5%
HBV "e" antigen +	70 31.3%	30 6.2%	97 16.4%	15 16.1%	71 6.1%	4 4.4%	287 10.8%
HBV NAT +	155 69.2%	50 10.3%	268 45.2%	86 92.5%	999 85.8%	17 18.9%	1,577 59.4%
Total no. cases	224	485	593	93	1,165	90	2,650
2014 Estimated population total**	6,745,408	9,909,877	11,255,148	1,560,297	852,469	7,061,530	37,384,729
Rate per 100,000 population	3.3	4.9	5.3	6.0	136.7	1.3	7.1

Source: CDC, Enhanced Viral Hepatitis Surveillance Sites.
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.
†New York City was not included in the case count for New York State, therefore cases and population estimates from New York excluded those who resided in New York City
§The denominator used to calculate proportions was the total number of cases reported for each site.
¶Cases can be reported with more than one laboratory test result.
**Population estimates for the United States: https://wonder.cdc.gov/bridged-race-population.html.

- In 2014, a total of 2,650 chronic hepatitis B cases were reported by six funded sites.

- San Francisco reported the greatest number (n=1,165; 43.9%) and highest rate (136.7 cases/100,000 population) of cases of chronic hepatitis B compared with the other sites.
- Among the 2,644 cases for which sex was known, 52.6% were male. By site, the proportion of cases that were male ranged from 49.4% in San Francisco to 68.9% in Washington.
- Among the 1,784 cases for which race/ethnicity was known, 60.2% were non-Hispanic Asians/Pacific Islanders. By site, the proportion of non-Hispanic Asians/Pacific Islanders ranged from 34.8% in Washington to 89.6% in San Francisco.
- Most (n=1,773; 66.9%) cases of chronic hepatitis B were among persons aged 25–54 years.
- Among the 665 cases for which place of birth was known (n=665), those born outside of the United States accounted for the greatest number of chronic hepatitis B cases (n=474, 71.3%). By site, among the cases for which place of birth was known, the proportion of reported chronic hepatitis B cases born outside of the United States ranged from 51.2% in Philadelphia to 97.3% in Washington.

Table 3.5. Number and rate* of hepatitis B-related deaths†, by demographic characteristics and year — United States, 2010–2014

Demographic characteristic		2010		2011		2012		2013		2014	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)	**0–34**	48	0.03	41	0.03	38	0.03	40	0.03	35	0.02
	35–44	142	0.35	143	0.35	123	0.30	146	0.36	126	0.31
	45–54	448	1.00	421	0.94	428	0.97	389	0.89	384	0.88
	55–64	610	1.67	645	1.69	639	1.66	704	1.79	684	1.71
	65–74	296	1.36	285	1.27	314	1.31	343	1.36	358	1.36
	≥75	248	1.34	269	1.42	229	1.20	251	1.29	256	1.29
Race/ ethnicity§	**White, NH (non-Hispanic)**	856	0.34	832	0.32	818	0.31	868	0.33	853	0.32
	Black, NH	356	0.94	373	0.98	322	0.81	384	0.98	330	0.80
	Hispanic	136	0.43	161	0.48	139	0.39	149	0.39	155	0.38
	Asian/Pacific Islander	421	2.95	422	2.72	469	2.93	451	2.64	478	2.71
	American Indian/Alaska Native	17	0.73	9	0.38	18	0.74	14	0.55	11	0.43
Sex	**Male**	1,316	0.81	1,321	0.80	1,272	0.75	1,375	0.79	1,307	0.74
	Female	476	0.27	483	0.26	499	0.27	498	0.26	536	0.27
Overall		**1,792**	**0.52**	**1,804**	**0.52**	**1,771**	**0.50**	**1,873**	**0.52**	**1,843**	**0.50**

*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).
§ Six deaths in 2010, seven deaths in 2011, five deaths in 2012, seven deaths in 2013, and 16 deaths in 2014 are not represented under the race/ethnicity category due to missing race and/or ethnicity data.
Source: CDC, National Vital Statistics System.

- In 2014, the hepatitis B-related mortality rate was 0.5 deaths/100,000 population (n=1,843).
- From 2010–2014, the hepatitis B-related mortality rate remained stable at 0.5 deaths/100,000 population.
- In 2014, Asians/Pacific Islanders had the highest hepatitis B-related mortality rate of 2.7 deaths/100,000 population compared to other racial/ethnic groups. Persons aged 55–64 years had the highest age-specific mortality rate, 1.7 deaths/100,000 population.
- In 2014, 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 (0.7 deaths/100,000 population vs. 0.3 deaths/100,000 population). From 2010–2014, the hepatitis B-related mortality rate remained relatively stable for males and females.

HEPATITIS C

Acute Hepatitis C

In 2014, a total of 2,194 cases of acute hepatitis C were reported to CDC from 40 states (Table 4.1). The overall incidence rate for 2014 was 0.7 cases per 100,000 population, an increase from 2010–2012. After adjusting for under-ascertainment and under-reporting, an estimated 30,500 acute hepatitis C cases occurred in 2014. (Data for 2014 were unavailable for Alaska, Arizona, Connecticut, Delaware, 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

Positive on one or more of the following three tests:

- Antibodies to hepatitis C virus (anti-HCV) screening test 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)
  OR
- Nucleic acid test (NAT) for HCV RNA (including qualitative, quantitative or genotype testing)

AND meets the following two criteria (if additional testing is performed):

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

*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 and jurisdiction — United States, 2010-2014

	2010		2011		2012		2013		2014	
State	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***	**No.**	**Rate***
Alabama	7	0.1	23	0.5	24	0.5	30	0.6	35	0.7
Alaska	U	U	U	U	U	U	U	U	U	U
Arizona	U	U	U	U	U	U	U	U	U	U
Arkansas	1	0	0	0	5	0.2	30	1.0	13	0.4
California	32	0.1	48	0.1	63	0.2	72	0.2	73	0.2
Colorado	20	0.4	28	0.5	42	0.8	21	0.4	33	0.6
Connecticut	37	1.0	47	1.3	34	0.9	U	U	U	U
Delaware	U	U	3	0.3	U	U	U	U	U	U
District of Columbia	2	0.3	U	U	U	U	U	U	U	U
Florida	56	0.3	64	0.3	107	0.6	134	0.7	93	0.5
Georgia	32	0.3	53	0.5	82	0.8	48	0.5	57	0.6
Hawaii	U	U	U	U	U	U	U	U	U	U
Idaho	11	0.7	12	0.8	11	0.7	14	0.9	6	0.4
Illinois	1	0	6	0	26	0.2	37	0.3	27	0.2
Indiana	27	0.4	84	1.3	110	1.7	175	2.7	122	1.8
Iowa	0	0	0	0	3	0.1	U	U	U	U
Kansas	2	0.1	8	0.3	16	0.6	17	0.6	28	1.0
Kentucky	109	2.5	142	3.2	178	4.1	226	5.1	176	4.0
Louisiana	4	0.1	7	0.2	11	0.2	19	0.4	22	0.5
Maine	2	0.2	12	0.9	8	0.6	8	0.6	31	2.3
Maryland	24	0.4	35	0.6	39	0.7	53	0.9	42	0.7
Massachusetts	13	0.2	23	0.3	37	0.6	174	2.6	228	3.4
Michigan	45	0.5	32	0.3	76	0.8	74	0.7	78	0.8
Minnesota	16	0.3	17	0.3	32	0.6	47	0.9	40	0.7
Mississippi	U	U	U	U	U	U	U	U	U	U
Missouri	6	0.1	8	0.1	4	0.1	6	0.1	6	0.1
Montana	4	0.4	9	0.9	9	0.9	16	1.6	13	1.3
Nebraska	2	0.1	2	0.1	3	0.2	2	0.1	2	0.1
Nevada	7	0.3	10	0.4	12	0.4	9	0.3	6	0.2
New Hampshire	U	U	U	U	U	U	U	U	U	U
New Jersey	28	0.3	53	0.6	71	0.8	106	1.2	113	1.3
New Mexico	14	0.7	14	0.7	21	1.0	12	0.6	16	0.8
New York	50	0.3	52	0.3	93	0.5	131	0.7	126	0.6

North Carolina	39	0.4	60	0.6	63	0.6	79	0.8	111	1.1
North Dakota	0	0	0	0	0	0	4	0.6	0	0
Ohio	10	0.1	6	0.1	7	0.1	116	1.0	105	0.9
Oklahoma	41	1.1	53	1.4	80	2.1	40	1.0	45	1.2
Oregon	19	0.5	20	0.5	37	0.9	14	0.4	15	0.4
Pennsylvania	26	0.2	35	0.3	66	0.5	81	0.6	69	0.5
Rhode Island	U	U	U	U	U	U	U	U	U	U
South Carolina	1	0	1	0	1	0	0	0	4	0.1
South Dakota	U	U	U	U	U	U	1	0.1	0	0
Tennessee	46	0.7	83	1.3	129	2	98	1.5	123	1.9
Texas	35	0.1	37	0.1	44	0.2	28	0.1	47	0.2
Utah	10	0.4	10	0.4	17	0.6	11	0.4	38	1.3
Vermont	2	0.3	6	1.0	6	1.0	3	0.5	4	0.6
Virginia	13	0.2	25	0.3	76	0.9	41	0.5	54	0.6
Washington	25	0.4	41	0.6	54	0.8	63	0.9	82	1.2
West Virginia	21	1.1	46	2.5	55	3.0	58	3.1	62	3.4
Wisconsin	10	0.2	15	0.3	26	0.5	40	0.7	49	0.9
Wyoming	0	0	2	0.4	U	U	U	U	U	U
Total	**850**	**0.3**	**1232**	**0.4**	**1778**	**0.6**	**2138**	**0.7**	**2194**	**0.7**

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

- The number of acute cases of hepatitis C reported in the United States increased by 44.9% from 2010 to 2011, by 44.3% from 2011 to 2012, by 20.2% from 2012 to 2013, and by 2.6% (2,138 cases to 2,194 cases) from 2013 to 2014.
- The national rate of acute cases of hepatitis C has increased each year from 2010-2013, and remained stable at 0.7 cases per 100,000 population in 2013 and 2014.
- Of the 40 states that submitted reports of acute hepatitis C in 2014, 20 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 North Dakota and South Dakota to 4.0 cases per 100,000 population reported in Kentucky.
- Of the 40 reporting states, 16 —California, Florida, Georgia, Indiana, Kentucky, Massachusetts, Michigan, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, Washington, West Virginia—accounted for over 76% of acute hepatitis C cases reported in 2014.
- Of the 40 reporting states, nine (22.5%) have reached the Healthy People 2020 (https://www.healthypeople.gov/) goal of an HCV incidence ≤0.25 cases/100,000 population: California, Illinois, Missouri, Nebraska, Nevada, North Dakota, South Carolina, South Dakota, and Texas.

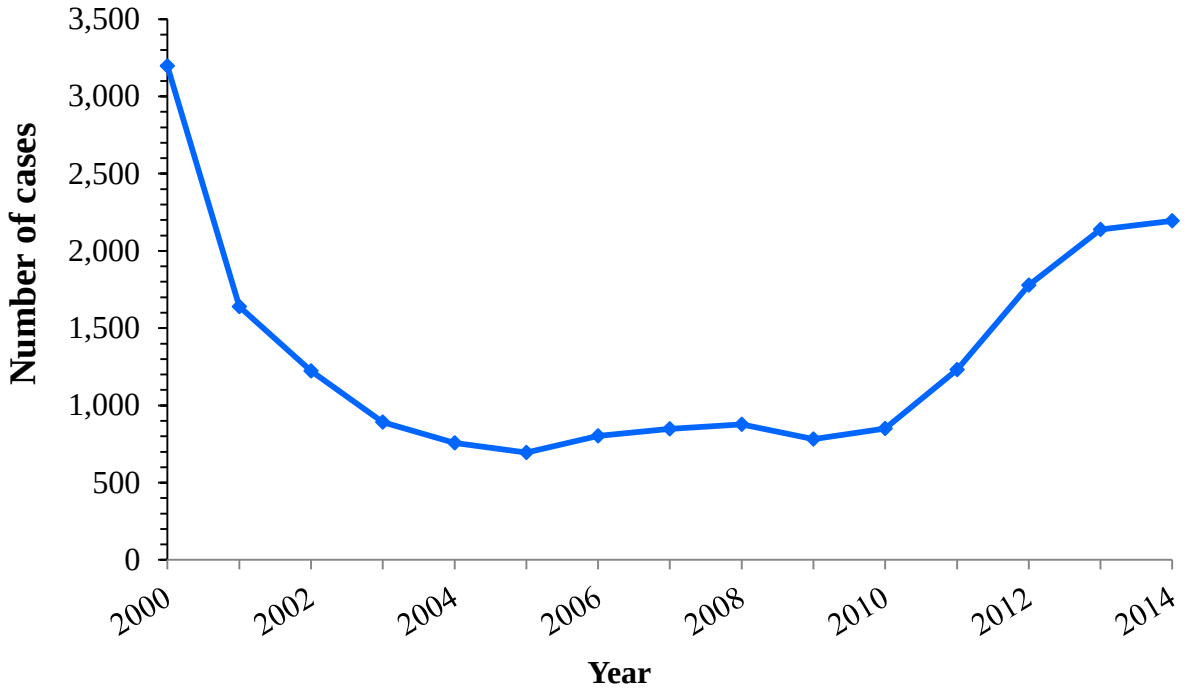
Table 4.2. Clinical characteristics of reported cases of acute hepatitis C* — United States, 2014

Clinical characteristic	Availability of valid data† for clinical characteristic		Cases with clinical characteristic§	
	No.	%	No.	%
Jaundice	1,527	69.6	917	60.1
Hospitalized for hepatitis C	1,371	62.5	733	53.5
Died from hepatitis C	1,242	56.6	6	0.5

Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,194 acute hepatitis C cases were reported during 2014.
†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.

- Of the 2,194 acute hepatitis C cases received during 2014, 69.6% (n=1,527) included information about whether the case-patient had jaundice, 62.5% (n=1,371) included information regarding hospitalization caused by hepatitis C, and 56.6% (n=1,242) included information on death from hepatitis C. (Note: more severe cases are likely to be ascertained and reported.)
- Jaundice was reported for 917 (60.1%) of the 1,527 acute hepatitis C case-reports that included information about jaundice.
- Hospitalization as the result of hepatitis C was reported for 733 (53.5%) of the 1,371 acute hepatitis C case-reports that included information about hospitalization.
- Death from hepatitis C was reported for 6 (0.5%) of the 1,242 acute hepatitis C case-reports that included information about death.

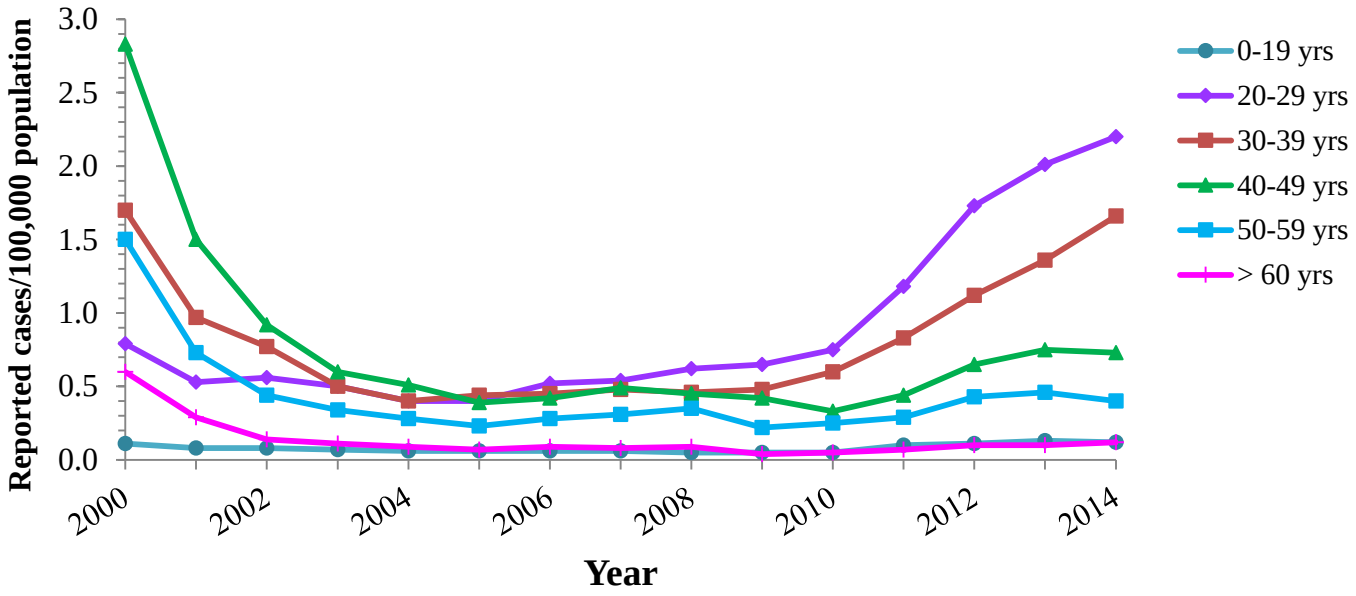
Figure 4.1. Reported number of acute hepatitis C cases — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- Acute hepatitis C cases declined from 2000 through 2005, and remained stable from 2005 until 2010.
- From 2010–2014, there was an approximate 2.6-fold increase in the number of reported acute hepatitis C cases from 850 to 2,194 cases, respectively.

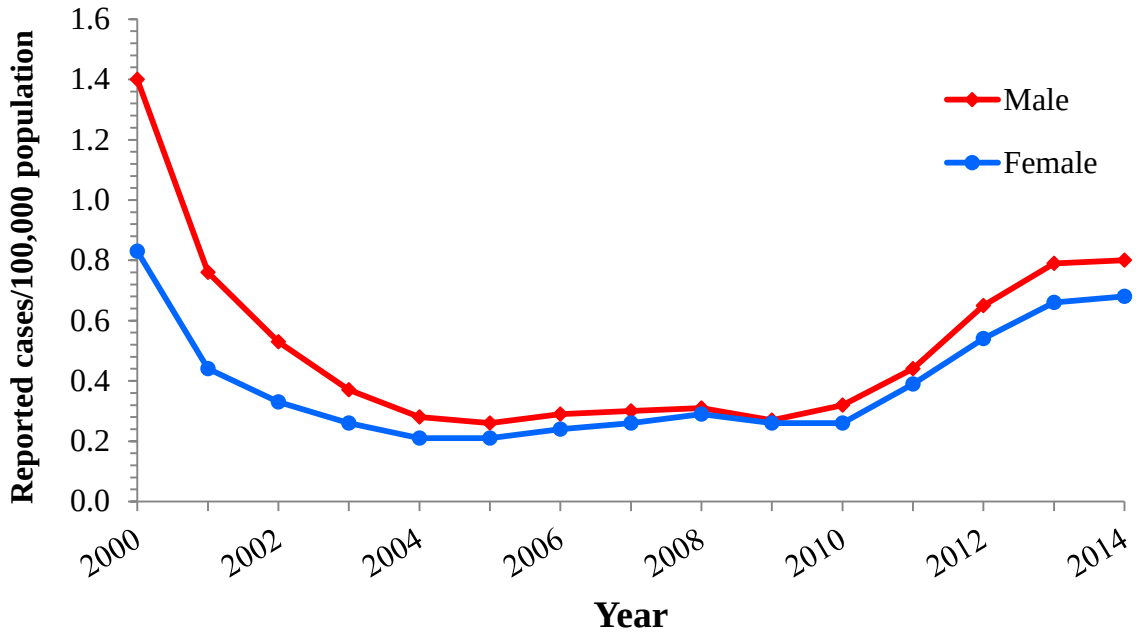
Figure 4.2. Incidence of acute hepatitis C, by age group — United States, 2000–2014



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.
- From 2010 to 2014, the rate of acute hepatitis C increased among persons aged 20–29, 30–39 and ≥60 years.
- The largest increases were among persons aged 20–29 years (from 0.75 cases per 100,000 population in 2010 to 2.20 cases per 100,000 population in 2014) and persons aged 30–39 years (from 0.60 cases per 100,000 population in 2010 to 1.66 cases per 100,000 population in 2014).
- In 2014, among all age groups, persons aged 20–29 years had the highest rate (2.20 cases per 100,000 population) and persons aged 0–19 and ≥60 years had the lowest rate (0.12 cases per 100,000 population) of acute hepatitis C.

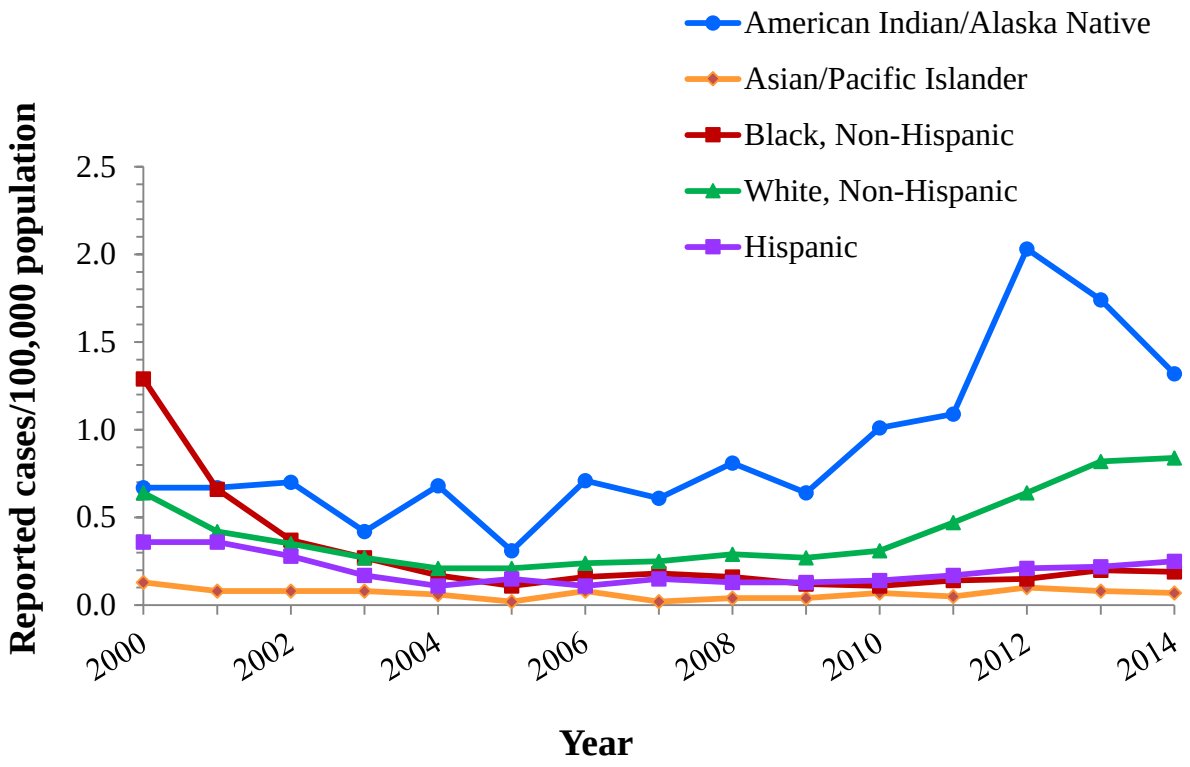
Figure 4.3. Incidence of acute hepatitis C, by sex — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- Rates of acute hepatitis C decreased among males and females from 2000–2003 and remained fairly constant from 2004–2010.
- From 2010–2014, rates of acute hepatitis C increased among males and females; in 2014, rates among males and females were 0.8 and 0.7 cases per 100,000 population, respectively.

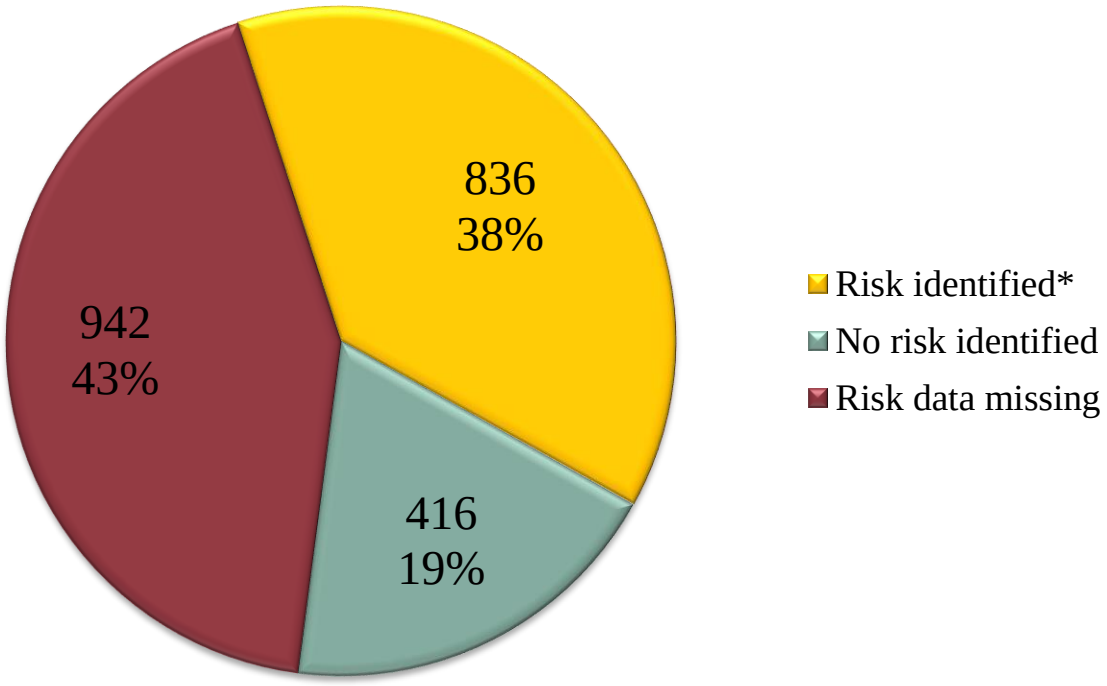
Figure 4.4. Incidence of acute hepatitis C, by race/ethnicity — United States, 2000–2014



Source: CDC, National Notifiable Diseases Surveillance System.

- From 2002–2010, the incidence rate of acute hepatitis C for American Indians/Alaska Natives remained high relative to other racial/ethnic groups. Incidence rates have since increased for all racial/ethnic populations.
- From 2010–2014, acute hepatitis C rates increased among all racial/ethnic groups except among Asian and Pacific Islanders.
- In 2014, rates of acute hepatitis C among American Indians/Alaska Natives; Asians/Pacific Islanders; Black, non-Hispanic; White, non-Hispanic; and Hispanics were 1.32, 0.07, 0.19, 0.84, and 0.25 cases per 100,000 population, respectively.

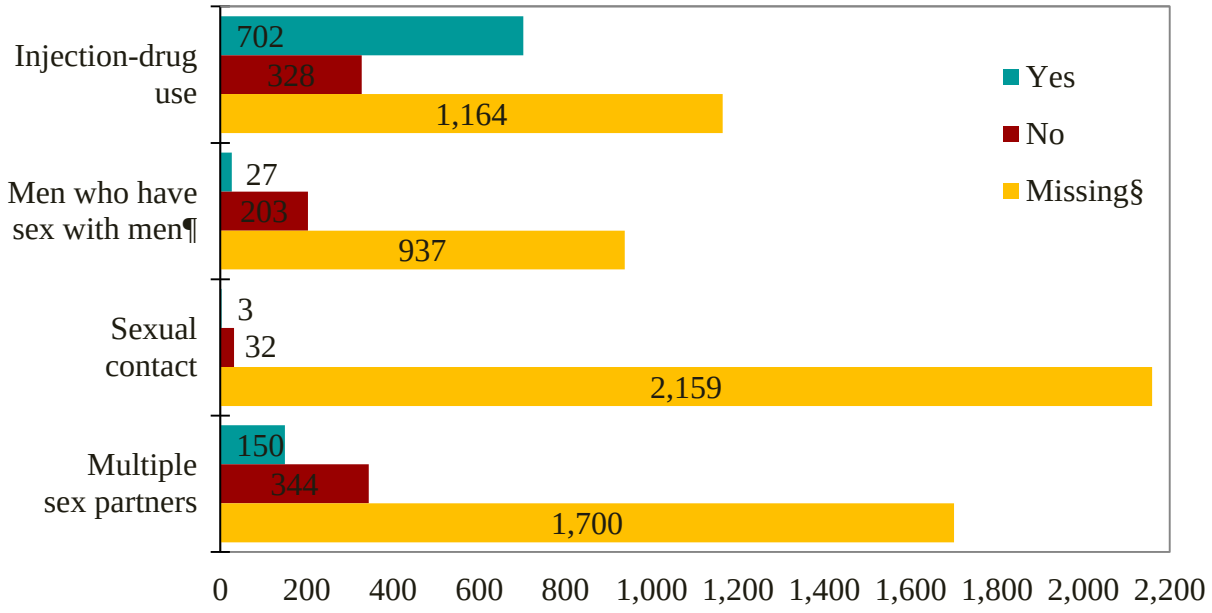
Figure 4.5. Availability of information on risk exposures/behaviors associated with acute hepatitis C — United States, 2014



Source: CDC, National Notifiable Diseases Surveillance System.
*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.

- Of the 2,194 case-reports of acute hepatitis C received by CDC during 2014, 942 (42.9%) 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 1,252 case-reports that had risk exposure/behavior information, 416 (33.2%) indicated no risk exposure/behavior for hepatitis C and 836 (66.8%) 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, 2014

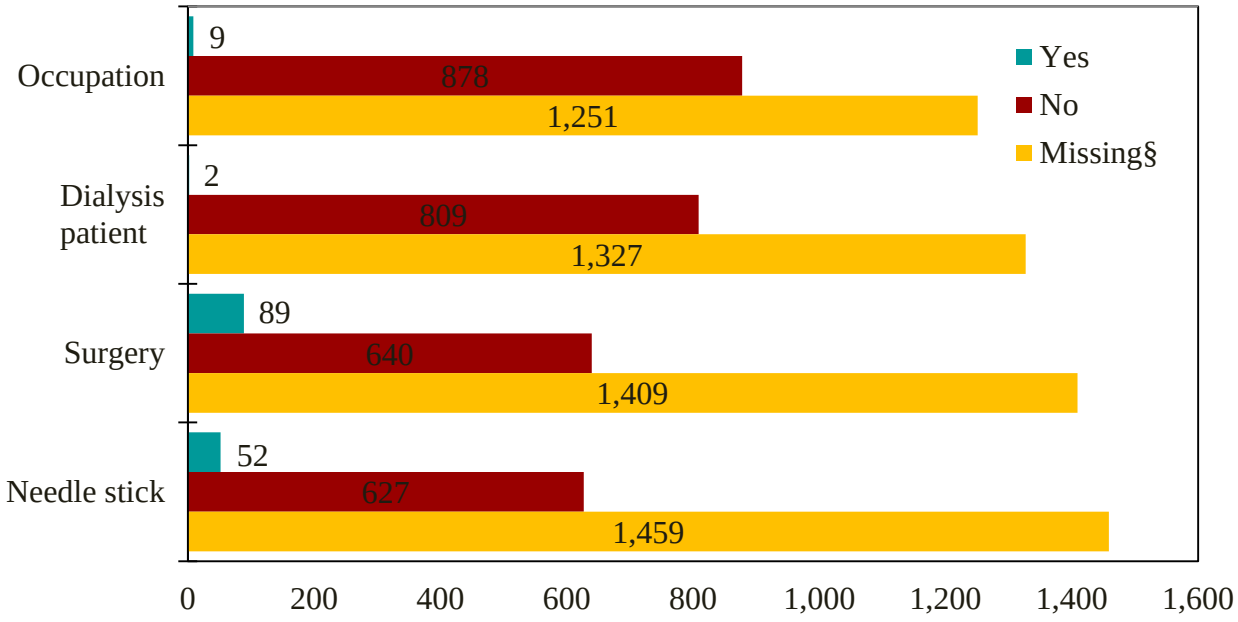


Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,194 case-reports of acute hepatitis C were received in 2014.
† More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.
¶A total of 1,174 acute hepatitis C cases were reported among males in 2014.

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 1,030 case-reports that had information about injection drug use, 68.2% (n=702) indicated use of injection drugs.
- Of the 230 case-reports from males that included information about sexual preferences/practices, 11.7% (n=27) indicated sex with another man.
- Of the 35 case-reports that had information about sexual contact, 8.6% (n=3) reported sexual contact with a person with confirmed or suspected hepatitis C.
- Of the 494 case-reports that had information about number of sex partners, 30.4% (n=150) indicated having ≥2 sex partners.

Figure 4.6b. Acute hepatitis C reports*, by risk exposure/behavior† — United States, 2014



Source: CDC, National Notifiable Diseases Surveillance System.
*A total of 2,194 case-reports of acute hepatitis C were received in 2014.
†More than one risk exposure/behavior may be indicated on each case-report.
§Risk data not reported.

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 <18 months of age, for whom only the third criteria would satisfy the case classification):

- 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 case-reports* of confirmed past or present hepatitis C infection submitted by states, 2014

State/Jurisdiction	No. past/present hepatitis C case-reports submitted†
Alabama	N§
Alaska	U¶
Arizona	U
Arkansas	N
California**	1,317
Colorado	3,644
Connecticut	3,263
Delaware	U
District of Columbia	U
Florida	22,253
Georgia	4,237
Hawaii	11
Idaho	932
Illinois	8,777
Indiana	U
Iowa	U
Kansas	1,560
Kentucky	N
Louisiana	2,116
Maine	1,423
Maryland	7,041
Massachusetts	5,639
Michigan	7,572
Minnesota	1,899
Mississippi	N
Missouri	6,278
Montana	1,413
Nebraska	926
Nevada	N
New Hampshire	N
New Jersey	7,765
New Mexico	2,316
New York State	15,787
North Carolina	N

North Dakota	848
Ohio	15,755
Oklahoma	541
Oregon	5,002
Pennsylvania	10,395
Rhode Island	U
South Carolina	3,586
South Dakota	522
Tennessee	N
Texas	N
Utah	1,492
Vermont	902
Virginia	5,590
Washington	4,928
West Virginia	6,631
Wisconsin	U
Wyoming	502
Total	**162,863**

Source: CDC, 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.
§N=Not Reportable, past/present hepatitis C is not reportable in the listed state.
¶U= No data available for reporting
** Cases reported by California through NNDSS were all from San Francisco County. Differences in the number o cases in this table and table 3.4 is because NNSDSS and CDC's Secure Access Management System (SAMS) have different deadline dated for which all annual data must be submitted.

- In 2014, a total of 34 states notified CDC of 162,863 case-reports of past or present hepatitis C.
- Thirteen states (Florida, Illinois, Maryland, Massachusetts, Michigan, Missouri, New Jersey, New York State, Ohio, Oregon, Pennsylvania, Virginia, and West Virginia) accounted for 76.4% of the past/present hepatitis C case-reports submitted through NNDSS in 2014.
- The largest number of reports was received from Florida (n=22,253 or 13.7%).

Table 4.4. Reported cases of past or present hepatitis C, by demographic characteristics and laboratory tests — Enhanced Viral Hepatitis Surveillance Sites, 2014

Category	FL No. %	MA No. %	MI No. %	NYS* No. %	Phil No. %	SF No. %	WA No. %	Total No. %†
Sex								
Female	572 54.1%	2,031 38.6%	2,748 36.5%	3,008 40.9%	488 35.5%	503 30.1%	1,945 39.9%	11,295 38.8%
Male	484 45.8%	3,212 61.0%	4,769 63.3%	4,293 58.3%	849 61.7%	1158 69.2%	2,878 59.0%	17,643 60.5%
Unknown/missing	1 0.1%	20 0.4%	16 0.2%	58 0.8%	39 2.8%	12 0.7%	55 1.1%	201 0.7%
Race/ethnicity								
American Indian/ Alaska Native, NH	2 0.2%	10 0.2%	62 0.8%	32 0.4%	1 0.1%	9 0.5%	0 0.0%	116 0.4%
Asian/Pacific Islander, NH	6 0.6%	67 1.3%	48 0.6%	92 1.3%	13 0.9%	67 4.0%	49 1.0%	342 1.2%
Black, NH	65 6.1%	171 3.2%	1,457 19.3%	735 10.0%	217 15.8%	274 16.4%	115 2.4%	3,034 10.4%
White, NH	705 66.7%	1,953 37.1%	3,875 51.4%	3,443 46.8%	196 14.2%	549 32.8%	1,102 22.6%	11,823 40.6%
Hispanic	84 7.9%	254 4.8%	149 2.0%	401 5.4%	76 5.5%	134 8.0%	70 1.4%	1,168 4.0%
Other, NH	6 0.6%	127 2.4%	103 1.4%	111 1.5%	11 0.8%	21 1.3%	43 0.9%	422 1.4%
Unknown/ missing	189 17.9%	2,681 50.9%	1,839 24.4%	2,545 34.6%	862 62.6%	619 37.0%	3,499 71.7%	12,234 42.0%
Age group, years								
0-14	5 0.5%	45 0.9%	26 0.3%	16 0.2%	5 0.4%	0 0.0%	15 0.3%	112 0.4%
15-24	246 23.3%	679 12.9%	587 7.8%	776 10.5%	40 2.9%	44 2.6%	367 7.5%	2,739 9.4%
25-39	450 42.6%	1,874 35.6%	1,728 22.9%	1,824 24.8%	224 16.3%	286 17.1%	981 20.1%	7,367 25.3%
40-54	157 14.9%	1,295 24.6%	1,797 23.9%	1,756 23.9%	416 30.2%	493 29.5%	1,591 32.6%	7,505 25.8%

55+	199 18.8%	1,370 26.0%	3,395 45.1%	2,969 40.3%	691 50.2%	832 49.7%	1,924 39.4%	11,380 39.1%
Unknown/ missing	0 0.0%	0.0% 0.0%	0 0.0%	18 0.2%	0 0.0%	18 1.1%	0 0.0%	36 0.1%
Hepatitis C laboratory testing§								
Anti-HCV+	761 72.0%	3,050 58.0%	5,308 70.5%	5,014 68.1%	644 46.8%	986 58.9%	1,271 26.1%	17,034 58.4%
HCV RNA +	535 50.6%	3,206 60.9%	2,310 30.7%	4,865 66.1%	1,334 96.9%	1,128 67.4%	2,952 60.5%	16,330 56.0%
Total no. cases	1,057	5,263	7,533	7,359	1,376	1,673	4,878	29,139
2014 Estimated population total¶	19,893,297	6,745,408	9,909,877	11,255,148	1,560,297	852,469	5,470,019	55,686,515
Rate per 100,000 population	5.3	78.0	76.0	65.4	88.2	196.3	89.2	52.3

Source: CDC, Enhanced Viral Hepatitis Surveillance Sites.
Abbreviations: MA, Massachusetts; MI, Michigan; NYS, New York State; Phil, Philadelphia; SF, San Francisco; WA, Washington State
*Cases and population estimates from New York excluded those who resided in New York City because New York City was not included in the reported case counts.
†The denominator used to calculate proportions was the total number of cases reported for each site.
§Cases can be reported with more than one laboratory test result.
¶Population estimates for the United States: https://wonder.cdc.gov/bridged-race-population.html

- In 2014, a total of 29,139 past or present hepatitis C cases were reported by the funded sites.
- Michigan reported more cases of past or present hepatitis C (n=7,533, 25.9%) compared with the other sites. However, San Francisco had the highest rate of past or present hepatitis C, with 196.3 cases per 100,000 population reported.
- Among the 29,139 cases, most (60.5%) were among males. By site, the proportion of cases among males ranged from 45.8% in Florida to 69.2% in San Francisco.
- Among the 16,905 cases for which race/ethnicity was known, non-Hispanic Whites accounted for the greatest proportion (69.9%) of past or present hepatitis C. By site, among cases for which race/ethnicity was known, the proportion of non-Hispanic Whites ranged from 38.1% in Philadelphia to 81.2% in Florida.
- Among the 29,103 cases for which age was known, 64.9% were among persons aged ≥40 years.
- 58.4% 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 26.1% in Washington to 72.0% in Florida.

- 56.0% of cases had a positive hepatitis C RNA test result reported. The proportion with a positive hepatitis C RNA test result ranged from 30.7% in Michigan to 96.9% in Philadelphia

Table 4.5. Number and rate* of hepatitis C-related deaths†, by demographic characteristic and year — United States, 2010-2014

Demographic characteristic		2010		2011		2012		2013		2014	
		No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Age Group (years)§	0–34	117	0.08	128	0.09	158	0.11	121	0.08	162	0.11
	35–44	712	1.73	696	1.71	622	1.54	573	1.42	552	1.36
	45–54	5,171	11.49	5,073	11.34	4,749	10.73	4,344	9.93	4,118	9.48
	55–64	7,431	20.37	8,330	21.89	9,235	23.93	9,899	25.18	9,999	24.95
	65–74	1,901	8.75	2,136	9.50	2,515	10.49	3,004	11.91	3,390	12.84
	≥75	1,293	6.97	1,357	7.18	1,369	7.15	1,425	7.31	1,433	7.22
Race/ ethnicity¶	White, NH (non-Hispanic)	10,575	4.03	11,196	4.19	11,839	4.35	12,219	4.40	12,455	4.46
	Black, NH	2,981	7.72	3,167	7.89	3,232	7.81	3,520	8.35	3,540	8.12
	Hispanic	2,318	6.83	2,555	7.15	2,668	7.19	2,699	6.91	2,767	6.81
	Asian/Pacific Islander	440	3.30	455	3.14	472	3.15	495	3.09	438	2.56
	American Indian/Alaska Native	248	9.90	275	10.61	313	11.81	324	12.22	317	11.20
Sex	Male	11,781	6.81	12,651	7.11	13,300	7.31	13,745	7.40	13,998	7.39
	Female	4,846	2.63	5,070	2.70	5,350	2.77	5,623	2.85	5,661	2.81
Overall		**16,627**	**4.65**	**17,721**	**4.82**	**18,650**	**4.96**	**19,368**	**5.03**	**19,659**	**5.01**

Source: CDC, National Vital Statistics System.
*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, two deaths in 2013, and five deaths in 2014 are not represented under the age category due to missing age data.
¶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, 111 deaths in 2013, and 142 deaths in 2014 are not represented under the race/ethnicity category due to missing race and/or ethnicity data.

- 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, at 5.0 deaths/100,000 population in 2014.
- The overall hepatitis C-related mortality rate increased from 4.7 deaths/100,000 population in 2010 to 5.0 deaths/100,000 population in 2014.
- From 2010–2014, the age group with the highest hepatitis C-related mortality rate was persons aged 55–64 years (25.0 deaths/100,000 population in 2014). This group accounted for 50.9% of hepatitis C-related deaths in 2014.
- In 2014, the racial/ethnic group with the highest hepatitis C-related mortality rate was among American Indians/Alaska Natives (11.2 deaths/100,000 population).
- From 2010–2014, the hepatitis C-related mortality rate among American Indians/Alaska Natives increased by 13%.
- In 2014, 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 (35). 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 that from 2010 through 2014 there was a decrease of 25.8% in the number of reported cases of hepatitis A and an 11.9% decrease in the number of reported cases of acute hepatitis B; however, over that 5-year period there was a 158.1% increase in the number of reported cases of acute hepatitis C. Early decreases in acute hepatitis A and B reflect declining numbers of outbreaks reported to and known by CDC and the effects of increasing vaccination. The relatively stable low rates of acute hepatitis A and the recent slight increase in hepatitis B reflect the need to vaccinate a portion of the population that is perhaps harder to reach. In contrast, an “emerging epidemic” of acute hepatitis C has resulted from growing numbers of young, non-urban (rural and Appalachian) white youth who have transitioned from oral prescription opioid abuse to injection of these opioids and heroin (15). In 2014, after adjusting for under-ascertainment and under-reporting, the estimated number of cases of HAV, HBV, and HCV infections were 2,500, 19,200, and 30,500, 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.)

Chronic hepatitis infection continues to affect millions of Americans (7, 38). In 2014, over 12,000 reports of chronic hepatitis B and over 162,000 reports of past or current hepatitis C were submitted to CDC through NNDSS. Mortality data from 2014 presented in this surveillance report show certain socio-demographic groups to be disproportionately dying with these infections, specifically persons aged ≥55 years and American Indian/Alaska Natives (for hepatitis A); persons aged > 55 years of age, especially those 55-64 years of age, and Asians/Pacific Islanders (for hepatitis B); and persons aged 55–64 years and American Indians/Alaska Native (for hepatitis C). Mortality rates in 2014 were highest among persons infected with HCV (5.01 deaths per 100,000 population), followed by HBV (0.50 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