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CENTERS FOR DISEASE CONTROL AND PREVENTION

HEPATITIS SURVEILLANCE

HIGHLIGHTS

Diagnostic testing for hepatitis E virus infection

Diagnostic testing for agents of non-A-E hepatitis

Internet access to CDC viral hepatitis information

National surveillance through 1995

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service

Preface

This report summarizes information from state health departments, university investigators, virology laboratories, and other pertinent sources, domestic and foreign, about acute viral hepatitis. Much of the information is preliminary. It is intended primarily for persons responsible for disease control. Contributions to the Hepatitis Surveillance Report are most welcome; send them to:

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HEPATITIS
Surveillance

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I. Introduction

With this issue, we are introducing a revised format for our description of surveillance data, which focuses on presentation of data with figure and tables and limited text. We invite readers to send us comments (see Preface for address). A copy of this report is available on the CDC Internet site at http://www.cdc.gov/hepatitis.

This report summarizes surveillance data collected during 1994-1995 for acute viral hepatitis. With a total of 46,963 cases reported to CDC in 1995, acute viral hepatitis was exceeded only by AIDS (71,547 cases), chlamydia (477,638 cases), gonorrhea (392,848 cases), and syphilis (68,953 cases) among reportable diseases in the United States. After declining from 1989-1993, the overall case count has increased from 1994-1995 as a result of a cyclic increase in hepatitis A. In 1995, a total of 31,582 cases of hepatitis A were reported, which was the highest yearly total since 1989. Hepatitis B has declined steadily since 1985.

The objective of national surveillance of acute viral hepatitis is to provide serologic, demographic, and epidemiologic information that will aid in formulating strategies and policies for the prevention and control of these diseases. The hepatitis surveillance report interprets and disseminates this information, presents new developments in the field, and clarifies issues related to viral hepatitis.

Nationwide information on hepatitis is obtained by two surveillance systems. In one, incidence data are collected from cases reported to the CDC National Notifiable Diseases Surveillance System (NNDSS) by each state and territory. The etiologic classification is made by physician diagnosis; confirmation by serologic testing is not required. The number of cases and date reported of hepatitis A, hepatitis B and hepatitis C/non-A, non-B appear in the *Morbidity and Mortality Weekly Report (MMWR)* and the *MMWR Annual Summary of Notifiable Diseases*, and are summarized in this report as well.

In the other system, clinical, serologic and epidemiologic data pertaining to risk factors for disease acquisition are obtained from the Viral Hepatitis Surveillance Program (VHSP), a separate reporting system operated by the Hepatitis Branch, Division of Viral and Rickettsial Diseases, National Center for Infectious Diseases, CDC, Atlanta, Georgia. The VHSP obtains its information from the viral hepatitis case record, a copy of which appears in the Appendix. This form (CDC 53.1) can be obtained from the Hepatitis Branch. In addition, in 1991 several states began submitting their case reports via electronic surveillance through the National Electronic Telecommunications System for Surveillance (NETSS). By 1995, 67% of VHSP cases were submitted electronically. For states interested in using NETSS to report hepatitis case investigations (core data plus extended record for serologic and risk factor data), the Hepatitis Branch and CDC's Epidemiology Program Office will provide technical support.

A third surveillance system referenced in this report is the Sentinel Counties Study of Acute Viral Hepatitis, a more intensive study of viral hepatitis in six counties representative of the United States as a whole. This surveillance system has provided nationally representative data on acute viral hepatitis since 1982, and has been a resource for detecting emerging infections and performing more in-depth studies. Data from the Sentinel Counties have been included for comparison with the other surveillance systems in this issue.

Surveillance data such as those reported here are dependent on the cooperation of state and local health departments, public health practitioners, and medical care persons reporting the diseases from their hospitals, clinics, and offices. In 1995, some 20 states reported VHSP data on at least 60% of their total cases.

CDC's ability to accurately analyze and interpret nationwide trends and patterns, identify high-risk groups, and determine mechanisms of transmission for each type of hepatitis depends on the cooperation of the state and local health departments in reporting laboratory and epidemiologic data to the VHSP. Key to these tasks is the accurate determination of the specific agent causing the viral hepatitis. Five distinct agents are responsible for viral hepatitis diseases worldwide; four have been identified as endemic in the United States: hepatitis types A, B, C, and D. The last type, Delta hepatitis, is not a reportable disease in the United States, and occurs only as a coinfection or superinfection with hepatitis B virus.

Hepatitis E virus (HEV) is the major etiologic agent of enterically transmitted, non-A, non-B hepatitis worldwide. Hepatitis E is most commonly recognized to occur in outbreaks associated with fecally contaminated drinking water. In many areas in which hepatitis E outbreaks have been reported,

HEV infection accounts for a substantial proportion of acute sporadic hepatitis in both children and adults. Virtually all cases of acute hepatitis E in the United States have been reported among travelers returning from high HEV-endemic areas. Recently, however, several cases of clinical acute hepatitis E have been reported among persons with no history of travel outside the United States.

The hepatitis G virus (HGV) and TT virus (TTV) are agents recently identified in patients with viral hepatitis. However, studies conducted to date have shown no association between these agents and acute or chronic hepatitis.

We thank those who have been actively contributing to the viral hepatitis surveillance program and encourage others to participate.

II. Issues and Answers

What diagnostic tests for hepatitis E virus infection are available?

In the United States, hepatitis E is rare, and most reported cases have been associated with travel to HEV-endemic regions (1, 2). However, several cases of acute hepatitis E have been reported among persons with no recent history of travel outside the United States (3, 4). In addition, a new virus has recently been discovered in pigs in the United States that is closely related to human HEV isolates, which raises the possibility of zoonotic transmission of HEV (5).

HEV infection should be considered in patients with signs and symptoms of acute viral hepatitis who are negative for serologic markers of acute hepatitis A (immunoglobulin M [IgM] antibody to hepatitis A virus), acute hepatitis B (IgM antibody to hepatitis B core antigen), and hepatitis C (antibody to hepatitis C virus). No serologic tests for hepatitis E are commercially available in the United States, but serologic assays that detect IgM-and IgG-specific antibody to HEV and polymerase chain reaction tests that detect HEV RNA are available in research laboratories. Health-care professionals who need information on serologic testing of persons with evidence of acute non-ABC hepatitis may contact CDC's Hepatitis Branch, Division of Viral and Rickettsial Diseases, National Centers for Infectious Diseases, telephone (404) 371-5910.

References

1. De Cock KM, Bradley DW, Sandford NL, et al. Epidemic non-A, non-B hepatitis in patients from Pakistan. Ann Intern Med 1987;106:227-30.
2. Centers for Disease Control and Prevention. Hepatitis E among U.S. travelers, 1989-1992. MMWR 1993; 42:1-4.
3. Kwo PY, Balan VJ, Carpenter HA, et al. Acute hepatitis E acquired in the United States. Hepatology 1995;22:182A (abstract 304).
4. Munoz SJ, Bradley DW, Martin P, Krawczynski K, Purdy MA, Westerbarg S. Hepatitis E virus found in patients with apparent fulminant non-A, non-B hepatitis. Hepatology 1992;16:76A (abstract 128).
5. Meng XJ, Purcell RH, Halbur PG, et al. A novel virus in swine is closely related to the human hepatitis E virus. Proc Natl Acad Sci USA 1997;94:9860-5.

What diagnostic tests for agents of acute non-A-E hepatitis are available?

Recently two isolates of a new virus designated hepatitis G virus (HGV) or hepatitis GB virus C (GBV-C) were identified in patients with viral hepatitis (6,7). In addition, a new virus named TT virus (TTV) was identified in patients with post-transfusion hepatitis and in patients with chronic liver disease of unknown etiology (8). Both of these viruses appear to be transmitted by transfusion; however, studies conducted to date have not implicated either of these viruses as an agent of acute or chronic hepatitis (8,9). No tests for HGV (GBV-C) or TTV infection are commercially available in the United States, but polymerase chain reaction tests that detect nucleic acid of these viruses are available in research laboratories. Until further studies demonstrate that these, or other viruses, are a cause of acute or chronic viral hepatitis and suitable diagnostic tests are developed, testing for these agents will not be routinely performed in the CDC's Hepatitis Branch Laboratory.

References

6. Linnen J, Wages J Jr, Zhang-Keck ZY, et al. Molecular cloning and disease association of hepatitis G virus: a transfusion-transmissible agent. Science 1996;271:505-8.
7. Simons JN, Leary TP, Dawson GJ, et al. Isolation of novel virus-like sequences associated with human hepatitis. Nat Med 1995;1:564-9.
8. Okamoto H, Nisizawa T, Kato N, et al. Molecular cloning and characterization of a novel DNA virus (TTV) associated with posttransfusion hepatitis of unknown etiology. Hepatol Res 1998;10:1-16.
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III. New Horizons

Internet Access to CDC Viral Hepatitis Information

In recent years, public health practitioners, epidemiologists and state and local health department personnel have taken advantage of the Internet to create easy and timely access to information critical to the public health, including surveillance data on reported diseases. CDC provides Internet access to public documents, tables, and data sets for downloading via the CDC home page (http://www.cdc.gov) and links to CDC program-specific sites. The following provides a brief description of the information accessible through the Hepatitis Branch Internet site and the current Internet browser address. Check Internet sites frequently; new information is posted on a regular basis.

Hepatitis Branch Home Page (http://www.cdc.gov/hepatitis)

The Hepatitis Branch home page provides recent documents, brochures, announcements, and slide sets, as well as the toll-free number for accessing information on viral hepatitis . Links to information specific to each type of viral hepatitis are provided, including fact sheets, frequently asked questions, disease burden details, and recommendations (usually published in the MMWR).

To provide access to documents directly, the Home Page provides a link titled "Resource Center." Clicking on this link will open a page listing surveillance reports, slide sets, MMWR articles containing recommendations and guidelines, brochures, and other items. For those looking for additional information on viral hepatitis, links to other sites including —the National Digestive Diseases Information Clearinghouse, the National Institutes of Health and non-governmental organizations— are provided on this page.

If you have any questions or comments on the Hepatitis Branch Internet site, or have suggestions for additional information or links, please send them to Chief, Viral Hepatitis Surveillance, Hepatitis Branch, CDC, 1600 Clifton Road, Mail Stop G37, Atlanta, GA 30333

IV. National Surveillance for Acute Viral Hepatitis through 1995

Table IV-1. Reported Cases of Viral Hepatitis, by Type and Year, United States, 1966-1995

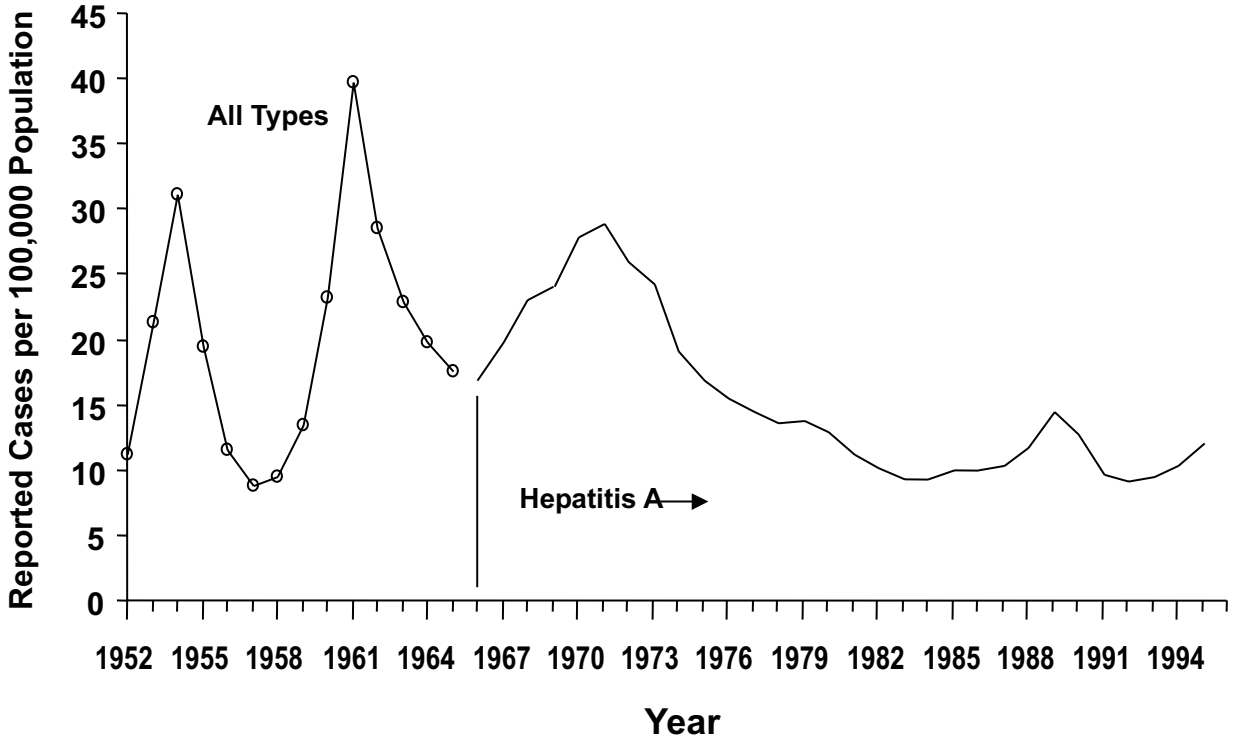
	Types of Hepatitis									
	Hepatitis A		Hepatitis B		Hepatitis C/NANB*		Unspecified		Total	
Year	No.	Rate**	No.	Rate	No.	Rate	No.	Rate	No.	Rate
1966	32,859	16.77	1,497	0.79	***	***	†	†	34,356	17.56
1967	38,909	19.67	2,458	1.28	***	***	†	†	41,367	20.95
1968	45,893	22.96	4,829	2.49	***	***	†	†	50,722	25.45
1969	48,416	23.98	5,909	3.02	***	***	†	†	54,325	27.00
1970	56,797	27.87	8,310	4.08	***	***	†	†	65,107	31.95
1971	59,606	28.90	9,556	4.74	***	***	†	†	69,162	33.64
1972	54,074	25.97	9,402	4.52	***	***	†	†	63,476	30.49
1973	50,749	24.18	8,451	4.03	***	***	†	†	59,200	28.21
1974	40,358	19.54	10,631	5.15	***	***	8,351	3.95	59,340	28.07
1975	35,855	16.82	13,121	6.30	***	***	7,158	3.44	56,134	26.34
1976	33,288	15.51	14,973	7.14	***	***	7,488	3.57	55,749	25.97
1977	31,153	14.40	16,831	7.78	***	***	8,639	3.99	56,623	26.17
1978	29,500	13.53	15,016	6.89	***	***	8,776	4.02	53,292	24.44
1979	30,407	13.82	15,452	7.02	***	***	10,524	4.79	56,393	25.62
1980	29,087	12.84	19,015	8.39	***	***	11,894	5.25	59,996	26.49
1981	25,802	11.25	21,152	9.22	***	***	10,975	4.79	57,929	25.26
1982	23,403	10.11	22,177	9.58	2,629	1.14	8,564	3.40	56,773	24.52
1983	21,532	9.20	24,318	10.39	3,470	1.48	7,149	3.05	56,469	24.12
1984	22,040	9.33	26,115	11.06	3,871	1.64	5,531	2.34	57,557	24.37
1985§	23,257	10.04	26,654	11.51	4,192	1.81	5,530	2.39	59,633	25.76
1986§	23,430	10.02	26,107	11.17	3,634	1.55	3,940	1.69	57,111	24.43
1987	25,280	10.39	25,916	10.65	2,999	1.23	3,102	1.27	57,297	23.54
1988	28,507	11.59	23,177	9.42	2,619	1.07	2,470	1.00	56,773	23.10
1989	35,821	14.43	23,419	9.43	2,529	1.02	2,306	0.93	64,075	25.81
1990	31,441	12.64	21,102	8.48	2,553	1.03	1,671	0.67	56,767	22.81
1991	24,378	9.67	18,003	7.14	3,582	1.42	1,260	0.50	47,223	18.73
1992	23,112	9.06	16,126	6.32	6,010	2.36	884	0.35	46,132	18.09
1993	24,238	9.39	13,361	5.18	4,786	1.86	627	0.24	43,012	16.68
1994	26,796	10.29	12,517	4.81	4,470	1.78	444	0.17	44,227	17.05
1995	31,582	12.02	10,805	4.16	4,576	1.76	‡	‡	46,963	18.00

* Number and rates shown for hepatitis C/Non-A, non-B hepatitis are unreliable-see note p. xx of this report.
** Rate per 100,000 population
*** Not reported until 1982
† Not reported until 1974
§ Excludes cases from New York City; data not available for 1985 or 1986.
‡ No longer reported as of 1995.

Source: National Notifiable Diseases Surveillance System

Hepatitis A

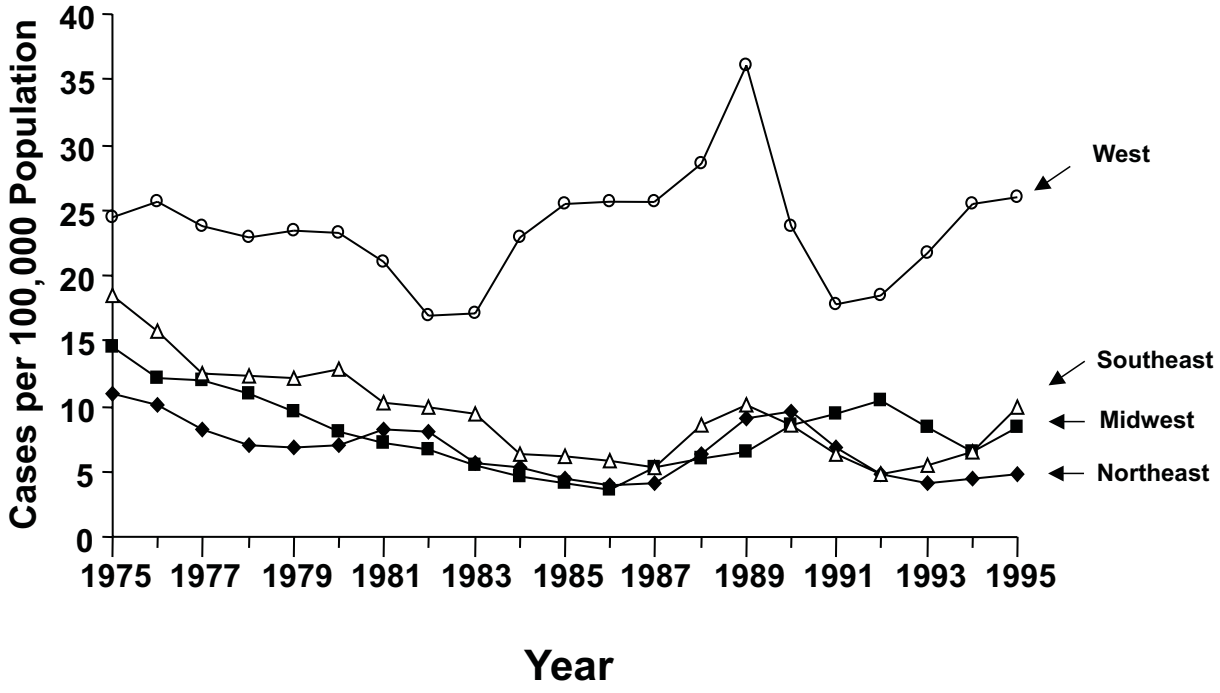
Figure IV-1. Hepatitis A by Year, United States, 1952-1995



Source: National Notifiable Diseases Surveillance System

Hepatitis A incidence varies cyclically, with an interepidemic period of 7 to 10 years. The most recent increase, which began in 1993, continued through 1995, when a total of 31,582 cases were reported.

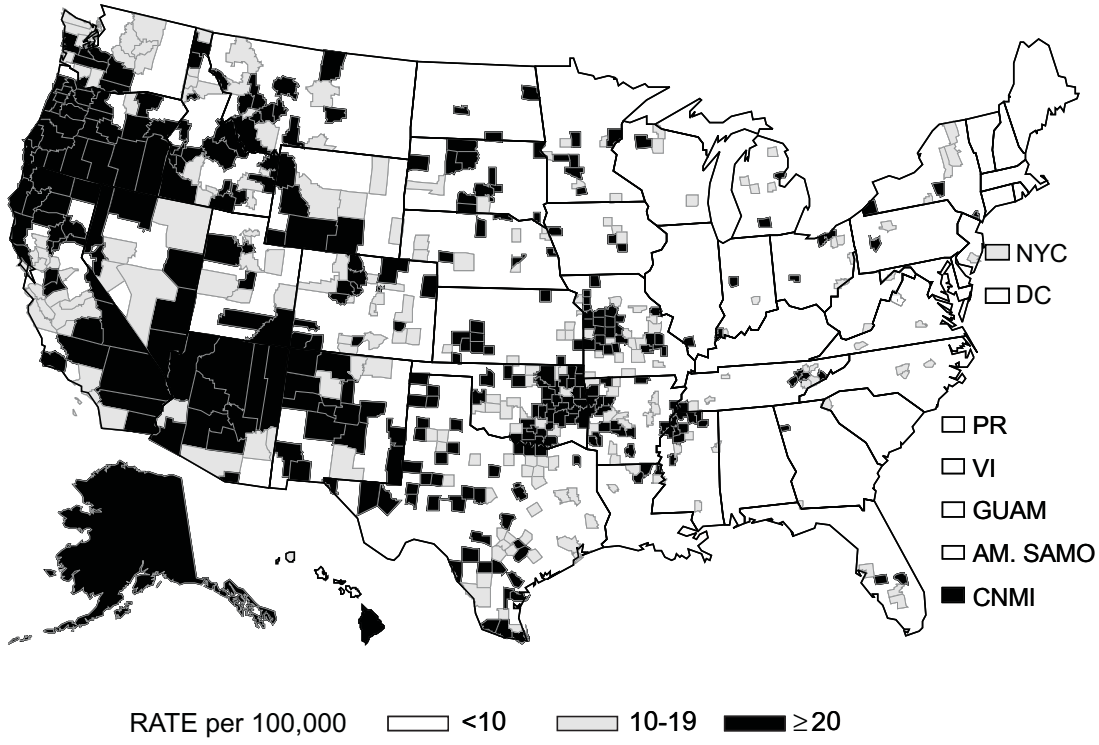
Figure IV-2. Reported Cases of Hepatitis A, by Region, United States, 1975 - 1995



Source: National Notifiable Diseases Surveillance System

The incidence of hepatitis A varies regionally: rates in the West are 2-5 times higher than in the rest of the nation. The underlying reason for these differences has not been determined; the regions do not differ substantially with respect to the distribution of known risk factors. However, higher incidence rates in the West do correlate with demographic factors (e.g., counties with 10% or more of the population classified as American Indian had average rates 3.5 times higher than counties where less than 10% of the population are American Indians; counties with 15% or more of the population classified as Hispanic had average rates 2.1 times higher than counties with less than 15% classified Hispanic).

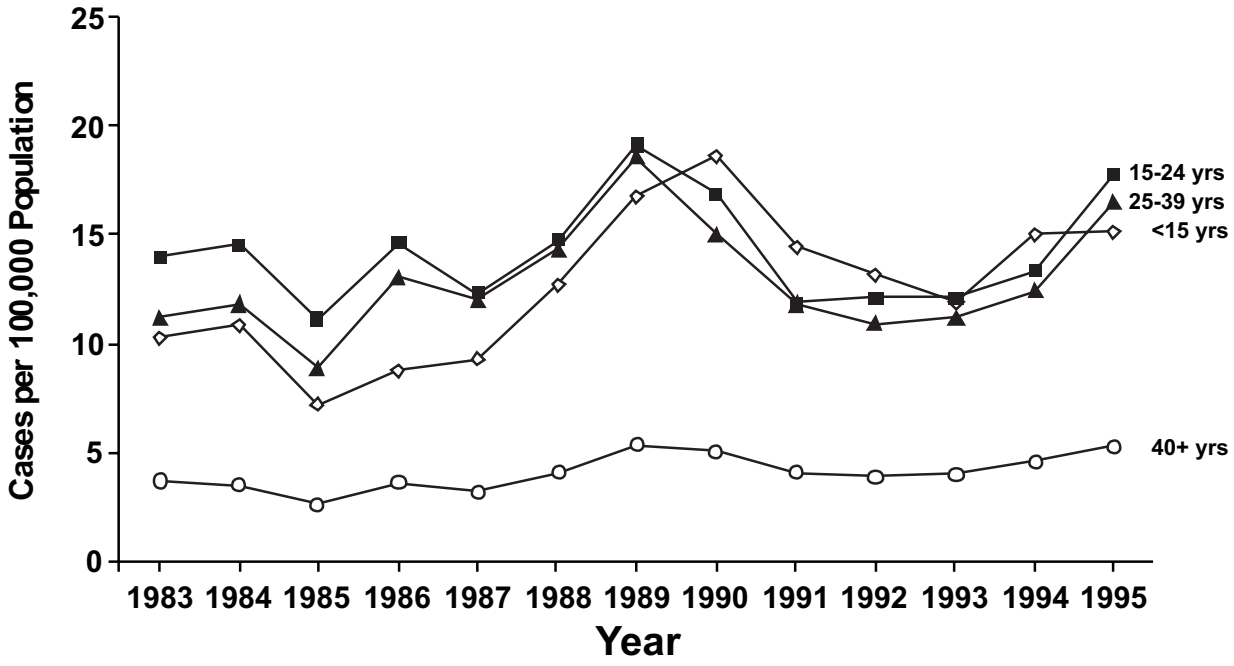
Figure IV-3. Reported Cases of Hepatitis A by County, United States, 1995



Source: National Notifiable Diseases Surveillance System

States in the West have a higher proportion of counties with moderate-to-high hepatitis A rates. Children living in states or communities including counties or groups of counties that have hepatitis A rates consistently higher than the national average should be vaccinated. In states where the average annual hepatitis A rate over the past 10 years was at least 20/100,000 (i.e., approximately twice the national average), routine vaccination of children is recommended; in addition, it should be considered in states where the average annual rate for the same period while less than 20/100,000 was as at least 10/100,000. (MMWR 1999: 48[No. RR-12])

Figure IV-4. Reported Cases of Hepatitis A by Age, United States, 1983-1995



Source: National Notifiable Diseases Surveillance System

The incidence rates of acute hepatitis A are substantially higher in persons less than 40 years of age than for older age-groups. However, the incidence rates for different age-groups among persons under 40 are similar: no single age-group predominates. The incidence of hepatitis A varies cyclically in all age-groups.

Table IV-2. Clinical Characteristics of Patients Reported with Hepatitis A, by Age-Group, United States, 1994-1995

	Percentage of Patients by Age (years)*			
1994	**Total N=11,741**	**<1-14 N=3,638**	**15-39 N=5,610**	**40 N=2.386**
Jaundice	84.8	84.5	86.8	80.4
Hospitalized for hepatitis	17.9	8.9	18.7	29.5
Death as a result of hepatitis	0.8	0.1	0.8	1.7
1995	**N=14,229**	**N=3,426**	**N=7,887**	**N=2,762**
Jaundice	83.6	80.6	86.3	79.6
Hospitalized for hepatitis	19.4	9.3	20.3	28.8
Death as a result of hepatitis	0.3	0.1	0.3	0.8

* Percentages exclude patients with missing data for age (2% of total), jaundice (14%-17% of total), hospitalization (15%-16% of total), and death (19% of total).

Source: Viral Hepatitis Surveillance Program, CDC.

Clinical Characteristics

The overall rate of hospitalization of patients with hepatitis A was similar to that of previous years (18.5% to 20.4% for 1990-1993) and the overall case-fatality rate was less than 1%. The rate of hospitalization and the case-fatality rate for hepatitis A patients both increase with increasing age.

Table IV-3. Reported Cases of Hepatitis A by Age, Sex, and Race/Ethnicity, United States, 1994-95

	1994 N=11,741		1995 N=14,229	
CHARACTERISTIC	**No.**	**%***	**No.**	**%***
Age (Years)				
<5	792	6.8	724	5.1
5-9	1,754	15.1	1,596	11.3
10-14	1,100	9.4	1,106	7.8
15-19	918	7.9	1,146	8.1
20-29	2,526	21.7	3,688	26.1
30-39	2,175	18.7	3,053	21.6
40-49	1,136	9.7	1,477	10.5
50-59	506	4.3	605	4.3
60+	745	6.4	715	5.1
Sex				
Male	6,494	56.0	7,975	56.7
Female	5,093	44.0	6,078	43.3
Race/Ethnicity				
White, non-Hispanic	6,786	62.3	8,736	68.6
Black, non-Hispanic	1,026	9.4	1,450	11.4
Hispanic	1,378	12.7	1,309	10.3
American Indian or Alaskan Native	1,477	13.6	1,061	8.3
Asian or Pacific Islander	217	2.0	180	1.4

*A total of 11,741 and 14,229 cases of hepatitis A were reported to VHSP in 1994 and 1995 respectively. Percentages in this table exclude patients with missing data.

Source: Viral Hepatitis Surveillance Program, CDC.

Demographic Characteristics

As in previous years,

- children and adolescents (<20 years of age) accounted for approximately one-third cases in both 1994 and 1995,
- a higher proportion of cases occurred among males than among females, and
- the majority of cases occurred in non-Hispanic whites.

Table IV-4. Epidemiologic Characteristics* during the 2 to 6 Weeks Prior to Illness of Patients Reported with Hepatitis A, by Age-Group, United States, 1994-1995

	Percentage of Patients by Age (years)**			
1994	**Total N = 11,741**	**<1-14 N = 3,638**	**15-39 N = 5,610**	**40 N = 2,386**
Child/employee in day-care center	7.8	18.2	3.3	2.4
Contact of day-care child/employee	8.3	7.3	10.2	5.1
Sexual contact with hepatitis A patient	1.8	0.0	2.8	2.1
Household contact of hepatitis A patient	7.8	11.3	6.7	5.0
Other contact of hepatitis A patient	10.6	13.5	10.7	6.0
Suspected food- or waterborne outbreak	2.6	1.7	2.7	4.1
International travel	7.3	6.0	7.6	8.4
Homosexual activity	4.7	0.5	8.3	3.3
Injection drug use	3.2	0.1	7.3	2.5
Unknown	45.9	41.4	40.4	59.9
1995	**N=14,229**	**N=3,425**	**N=7,885**	**N=2,797**
Child/employee in day-care center	6.1	17.1	2.2	3.0
Contact of day-care child/employee	8.7	8.2	9.9	6.1
Sexual contact with hepatitis A patient	2.4	0.1	3.5	2.1
Household contact of hepatitis A patient	8.8	13.8	7.8	5.6
Other contact of hepatitis A patient	11.3	10.9	12.7	8.0
Suspected food- or waterborne outbreak	2.2	1.3	2.5	2.5
International travel	6.8	7.7	6.0	7.9
Homosexual activity	5.1	0.8	6.6	5.3
Injection drug use	5.0	0.1	7.8	3.4
Unknown	43.6	40.1	41.0	56.1

* Mutually exclusive groups, in decreasing order of most probable source.
**A total of 11,741 and 14,229 cases of hepatitis A were reported to VHSP in 1994 and 1995 respectively. Percentages in this table exclude patients with missing risk factor data.

Source: Viral Hepatitis Surveillance Program, CDC.

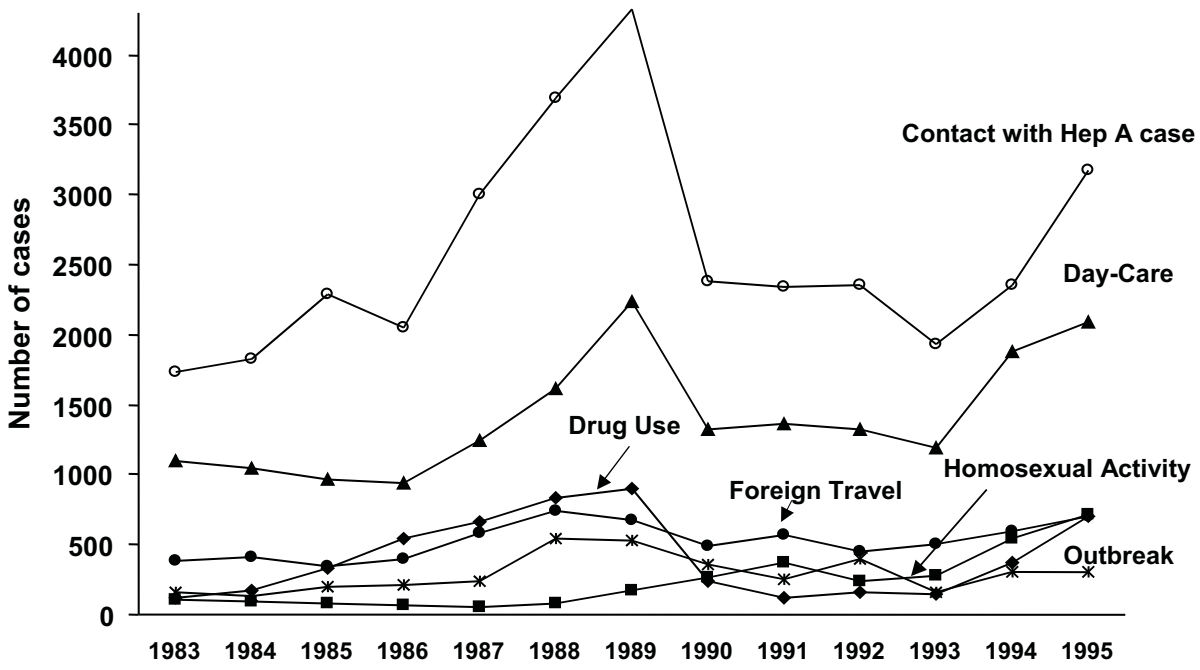
Risk factor analysis

Among cases for whom a risk factor was identified, contact with another person with hepatitis A was overall the most frequently identified risk factor. Among cases occurring in persons less than 15 years of age, attending day-care was the most frequently identified risk factor, and for cases in persons 15-39 years of age, contact with a day-care child or employee was the 2nd most commonly identified risk factor. However, information is not routinely collected to determine whether the day-care contact is infected with hepatitis A virus, and although day-care centers might be the source of outbreaks of hepatitis A within some communities, disease within day-care centers more commonly reflects extended transmission in the community.

International travel was reported for 7% of hepatitis A cases in 1995. Of these travel-related cases, 51% were associated with trips to South and Central America and 11% to travel in Asia and the South Pacific. Some 70% of these travel-related hepatitis A cases were associated with trips of more than 7 days, 15% were associated with trips of 4-7 days, and 15% were associated with trips of <3 days. Among cases associated with travel of less than 4 days' duration, 90% involved travel to South/Central America.

Nearly one-half of hepatitis A case-patients in both 1994 and 1995 reported no known risk factor. However, evidence from epidemiologic studies indicates that asymptomatic infections, particularly in children, play an important role as unrecognized sources of infection.

Figure IV-5. Trends in Selected Risk Factors for Patients Reported with Hepatitis A, by Mutually Exclusive Groups, United States, 1983-1995



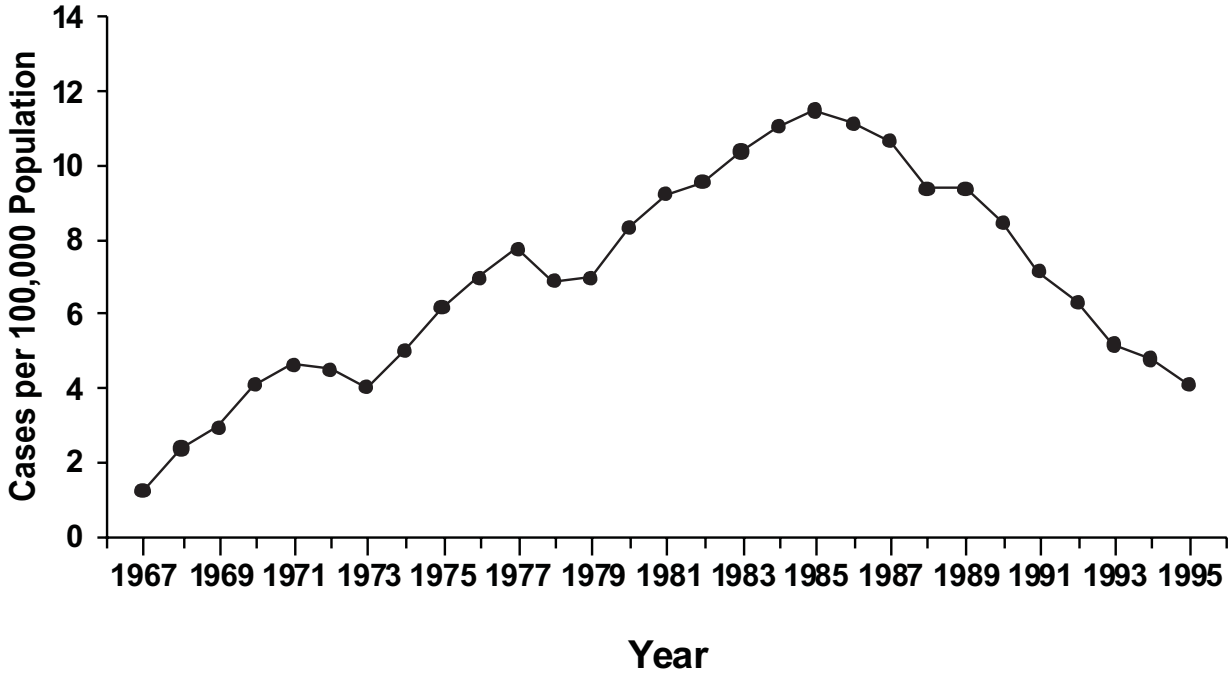
Source: Viral Hepatitis Surveillance Program, CDC.

Cyclical increases in hepatitis A in the 1980s and 1990s have been primarily associated with an increase in cases among persons with personal contact with another person with hepatitis A, and an increase in cases associated with child day-care. The increase in hepatitis A incidence from 1994-1995 has been associated with an increase in cases among men who have sex with men, and among injecting drug users with outbreaks among these groups reported in several states. The number of cases associated with common-source outbreaks is relatively small (<500) and remained stable during 1983-1995.

Similar trends in risk factors for hepatitis A were found in data from the Sentinel Countries Study of Viral Hepatitis. However, in contrast to the VHSP data, Sentinel Counties data show no appreciable increase in day-care-associated or foreign travel-associated hepatitis A for 1994-1995.

Hepatitis B

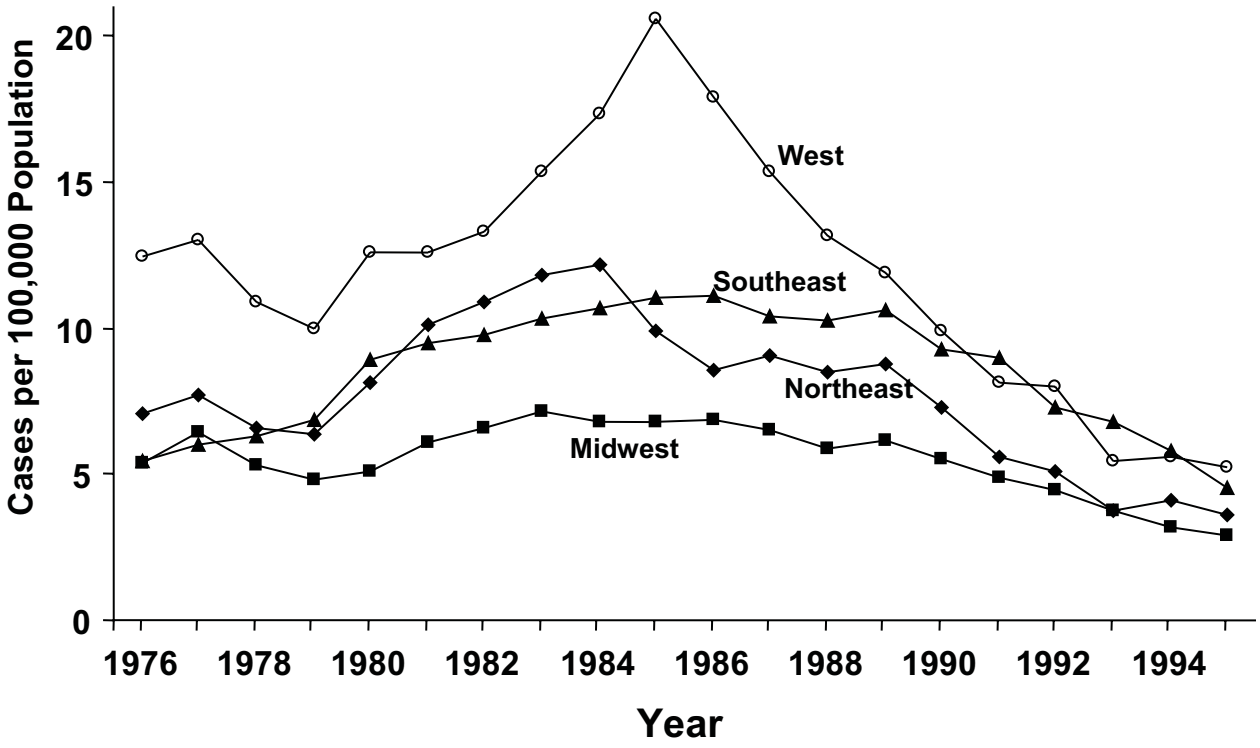
Figure IV-6. Hepatitis B by Year, United States, 1966-1995



Source: National Notifiable Diseases Surveillance System

Hepatitis B incidence increased from 1966 through 1985. This increase was at least partially due to increased use of serologic testing and also to erroneous reporting of chronically infected persons. From 1985 to 1995, the incidence of hepatitis B declined by more than 60%.

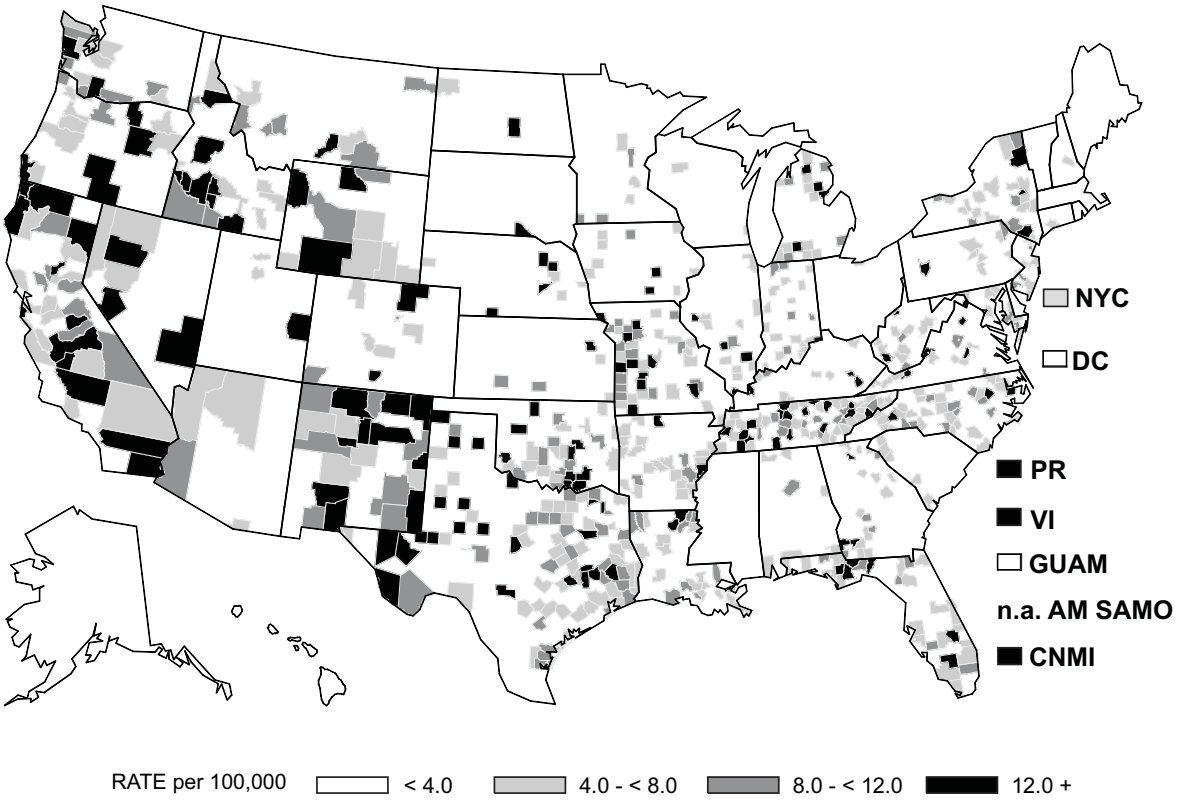
Figure IV-7. Reported Cases of Hepatitis B, by Region, United States, 1975-1995



Source: National Notifiable Diseases Surveillance System

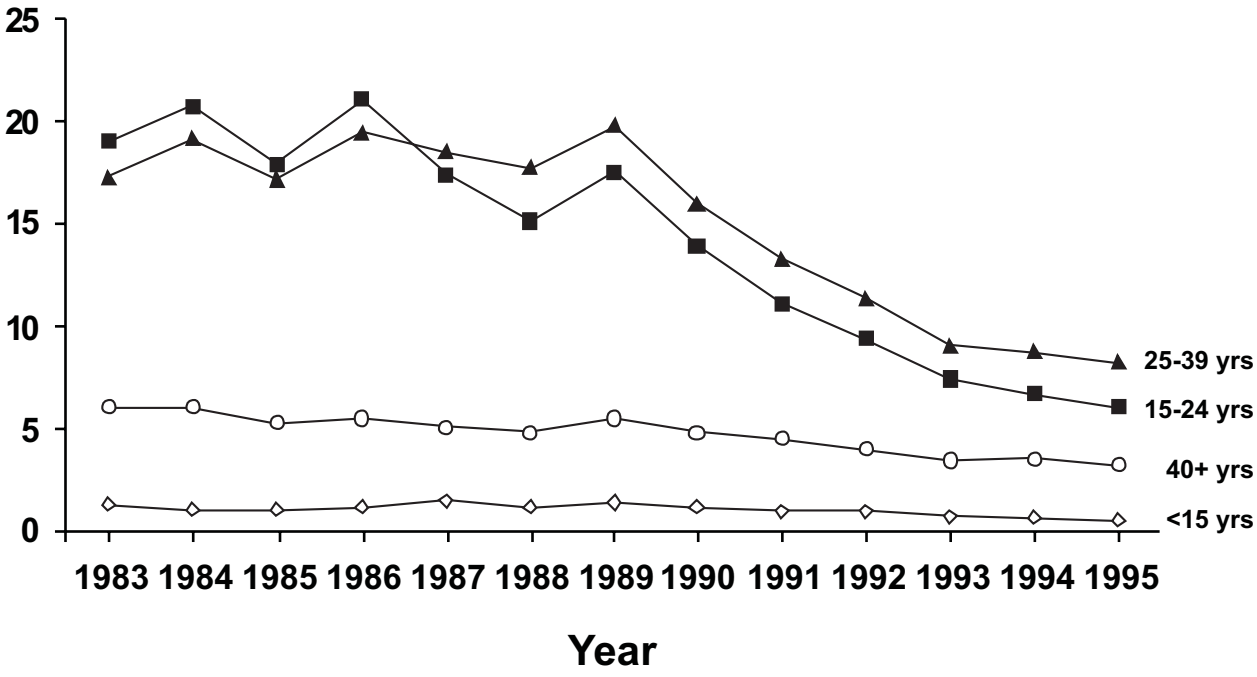
In recent years, incidence rates across the United States have declined. They are now similar in all regions.

Figure IV-8. Reported Incidence of Hepatitis B Per 100,000 Population, United States, 1995



Source: National Notifiable Diseases Surveillance System

Figure IV-9. Reported Cases of Hepatitis B, by Age, United States, 1983-1995



Source: National Notifiable Diseases Surveillance System

Incidence rates have declined in all age-groups from 1989-1995, but the most dramatic occurred in those 15-39 years of age, in whom the number of reported cases has decreased by more than 50%. The decline in the number of cases occurring in this age-group accounted for most of the decline in overall incidence and is primarily attributed to unexplained reductions in incidence among injection drug users. The extent to which routine vaccination of health-care workers has affected the overall declining incidence of acute hepatitis B among persons 15 to 39 years of age is not known but is thought to be small.

Table IV-5. Distribution of Hepatitis B by Age, Sex, and Race/Ethnicity, United States, 1994-95.

	1994 N=4,426		1995 N=4,929	
CHARACTERISTIC	No.	%*	No.	%
Age (Years)				
<5	22	0.5	16	0.3
5-9	38	0.9	34	0.7
10-14	55	1.3	60	1.2
15-19	314	7.1	356	7.3
20-29	1,403	31.9	1,427	29.2
30-39	1,326	30.2	1,550	31.7
40-49	691	15.7	796	16.3
50-59	278	6.3	344	7.0
60+	271	6.2	302	6.2
Sex				
Male	2,641	60.3	2,999	61.4
Female	1,737	39.7	1,884	38.6
Race/Ethnicity				
White, non-Hispanic	2,391	58.1	2,361	53.6
Black, non-Hispanic	1,263	30.7	1,453	33.0
Hispanic	295	7.2	380	8.6
American Indian or Alaskan Native	51	1.2	58	1.3
Asian or Pacific Islander	114	2.8	153	3.5

* A total of 4,426 and 4,929 cases of hepatitis B were reported to VHSP in 1994 and 1995 respectively; however, this table excludes patients with missing risk factor data.

Source: Viral Hepatitis Surveillance Program, CDC.

Demographic Characteristics

The demographic profile of hepatitis B cases in 1994 and 1995 was similar to that of previous years.

- 60% of reported cases occurred in persons 20-39 years of age.
- The male:female case ratio was 1.6:1
- Non-Hispanic blacks accounted for a higher percentage of total hepatitis B cases compared to the percentage of this ethnic group in the United States (12%).

Table IV-6. Clinical Characteristics of Patients Reported with Hepatitis B, by Age-Group, United States, 1994-1995

	Percentage* of Patients by Age			
1994	**Total N=4,426**	**<1-14 N=115**	**15-39 N=3,042**	**40 N=1,240**
Jaundice	82.7	70.7	85.0	78.0
Hospitalized for hepatitis	30.1	29.7	27.7	36.2
Death as a result of hepatitis	1.4	1.0	0.8	2.9
1995	**N=4,885**	**N=110**	**N=3,333**	**N=1,442**
Jaundice	77.7	69.2	81.9	68.3
Hospitalized for hepatitis	27.9	23.3	24.7	35.8
Death as a result of hepatitis	1.1	0.0	0.8	1.9

* A total of 4,426 and 4,929 cases of hepatitis B were reported to VHSP in 1994 and 1995 respectively; however, percentages in this table exclude patients with missing data for age (1% of total), jaundice (10%-22% of total), hospitalization (9%-19% of total), and death (10%-18% of total).

Source: Viral Hepatitis Surveillance Program, CDC.

Clinical Characteristics

The clinical profile of cases of acute hepatitis B reported in 1994 and 1995 was similar to that reported in previous years

- Jaundice was reported in approximately 80% of hepatitis B cases.
- Overall, approximately 28% of cases were hospitalized in 1995, a decrease from 30% in 1994. Hospitalization rates increased with increasing age.
- Death as a result of acute hepatitis B was reported in approximately 1% of cases.

Table IV-7. Epidemiologic Characteristics* of Patients Reported with Hepatitis B, by Age Group, United States, 1994-95

1994	Percentage† of Patients by Age (Years)			
	Total N = 4,426	<1-14 N = 115	15-39 N = 3,042	40 N = 1,240
Injection drug use	12.1	4.3	14.1	7.8
Homosexual activity	9.6	6.6	11.3	5.7
Employed in medical/dental field	0.8	6.1	0.8	0.8
Hemodialysis	0.3	0.0	0.3	0.5
Sexual contact of hepatitis B patient	5.0	1.0	5.9	3.2
Household contact with hepatitis B patient	1.5	4.4	1.4	1.5
Other contact with hepatitis B patient	1.1	1.0	1.0	0.8
Multiple sex partners	11.6	2.6	13.8	7.1
Blood transfusion	1.8	1.0	0.6	4.6
Unknown	56.2	73.3	50.7	67.8
1995	**Total N = 4,929**	**<1-14 N = 110**	**15-39 N = 3,333**	**≥40 N = 1,442**
Injection drug use	12.9	5.8	15.1	8.4
Homosexual activity	10.7	1.4	12.7	6.7
Employed in medical/dental field	0.6	0.0	0.5	1.1
Hemodialysis	0.3	0.9	0.2	0.6
Sexual contact of hepatitis B patient	4.3	2.7	4.7	3.5
Household contact with hepatitis B patient	1.2	11.8	1.1	0.7
Other contact with hepatitis B patient	1.3	1.8	1.4	1.0
Multiple sex partners	9.5	1.8	11.2	6.1
Blood transfusion	1.6	0.0	0.7	4.0
Unknown	57.5	72.8	52.4	67.6

* Mutually exclusive groups, in decreasing order of most probable source.
† A total of 4,426 and 4,929 cases of hepatitis B were reported to VHSP in 1994 and 1995, respectively. Percentages above exclude patients with missing risk factor data.

Source: Viral Hepatitis Surveillance Program, CDC

Risk factors

Injection drug use was the predominant known risk factor reported in 1994 and 1995, followed by sexual exposures. A total of 4%-5% of cases reported sexual contact with a person known to be infected with hepatitis B virus. Another 20% of case-patients are attributed to other sexual exposures, including 10% who report homosexual activity and 10% who had multiple sexual partners.

Employment in the medical or dental field, blood transfusions, and dialysis accounted for less than 3% of cases. The widespread use of hepatitis B vaccine among health-care workers has reduced their incidence of disease markedly; in 1985, these workers accounted for 9% of reported cases, compared to 0.8% in 1994-1995.

Although more than one-half of case-patients reported in 1994 and 1995 denied a recognized exposure, data from the Sentinel Counties study indicate that most persons who deny a specific exposure have some lifetime history of high-risk drug or sexual behaviors.

Figure IV-10. Trends in Selected Risk Factors for Males Reported with Hepatitis B, by Mutually Exclusive Groups, Selected States,* 1983-1995

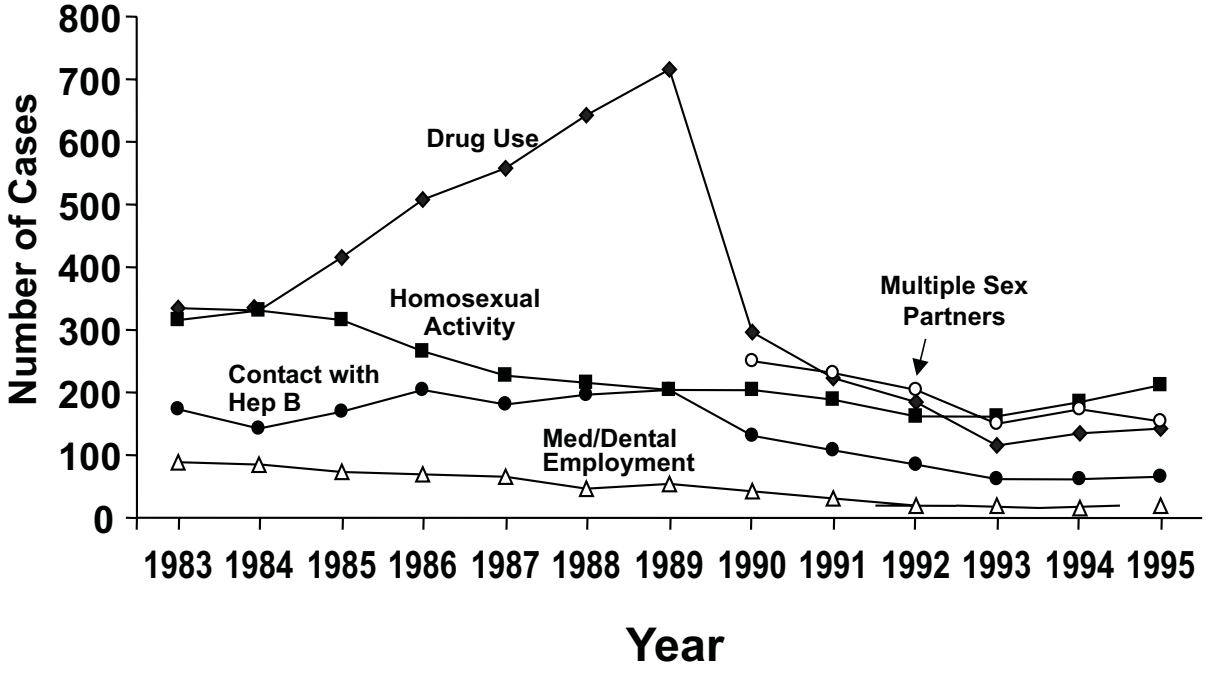
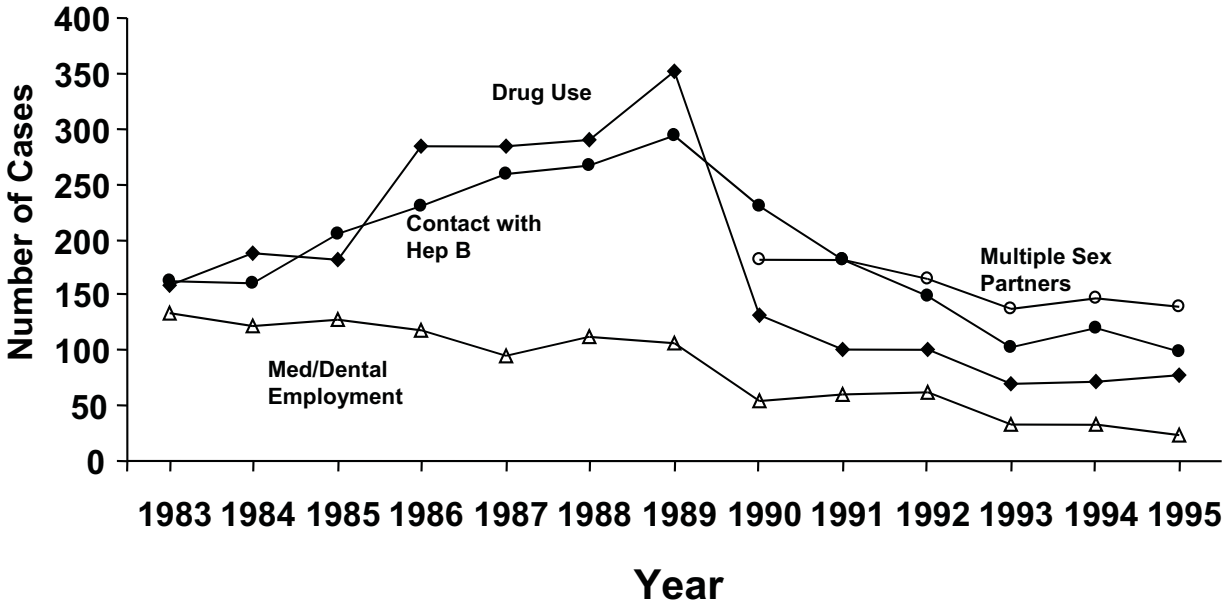


Figure IV-11. Trends in Selected Risk Factors for Females Reported with Hepatitis B, by Mutually Exclusive Groups, Selected States,* 1983-1995



* Cases from 15 selected states with high reporting levels
Source: Viral Hepatitis Surveillance Program, CDC

Men

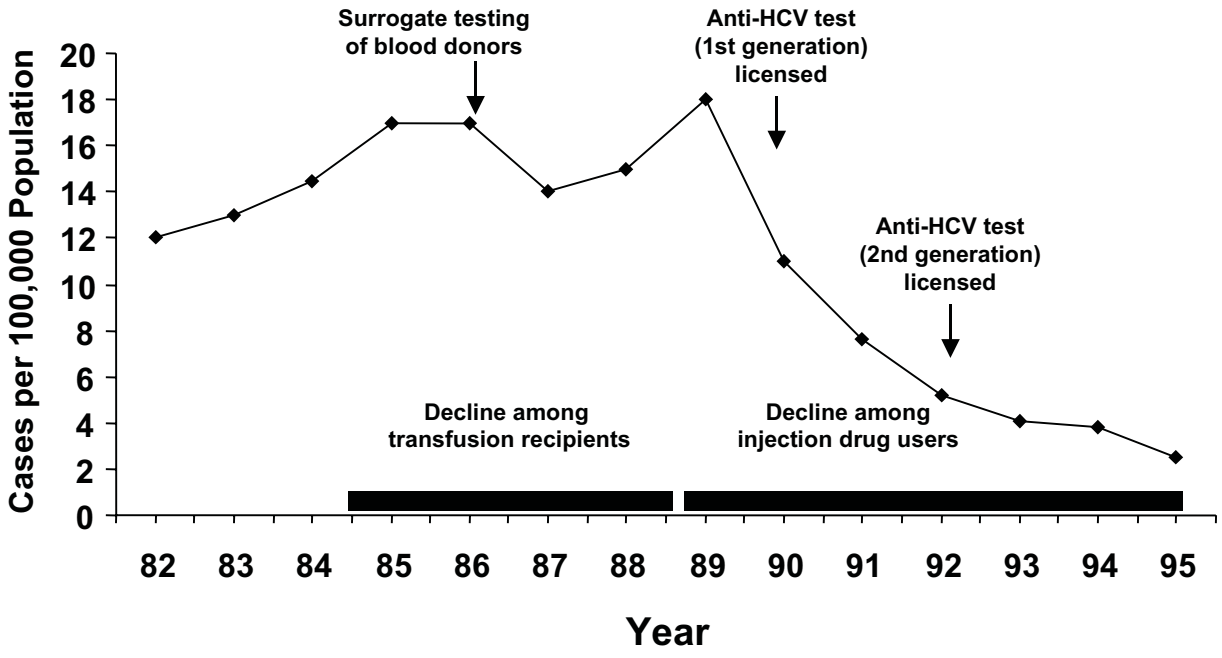
- Among men, the number of cases associated with injection drug use decreased by 85% from 1989 to 1993, but increased from 1993 to 1995.
- The number of cases associated with male homosexual activity declined by more than 50% from 1983 to 1992, but has increased from 1993 to 1995.
- Cases among men attributable to exposure to an HBV-infected contact remained stable in the early 1990s after declining in the late 1980s. For these cases, 57% of contacts were sexual and 19% were household contacts.
- A decline in cases associated with health-care employment that began in the mid-1980s continued through 1992 but has since stabilized.

Women

- The number of cases associated with injecting drug use among women, which declined approximately 70% from 1989 to 1991, has remained stable from 1993 to 1995.
- Cases among women associated with exposure to an HBV-infected contact and with multiple sexual partners have declined through 1993 but have since plateaued.
- The number of cases associated with medical or dental employment has declined more sharply among women than among men since 1989.

Hepatitis C/NANB Hepatitis

Figure IV-12. Estimated Incidence of Acute Hepatitis C, United States,1982-1995



Source: Sentinel Counties

The Sentinel Counties Study of Acute Viral Hepatitis, which has provided the only accurate surveillance data for monitoring incidence of acute hepatitis C, has shown a more than 80% decline in incidence from 1989 to 1995 (above). State reporting of hepatitis C cases to NNDSS (see Table IV-1) has been unreliable for monitoring the incidence of newly acquired hepatitis C because many of the cases reported do not meet the case definition for acute disease. This has occurred because most health departments do not have the resources required for case investigations to determine if anti-HCV-positive laboratory reports received represent acute infection, chronic infection, repeated testing of a person previously reported, or a false-positive test result.

Table IV-8. Reported Cases of Hepatitis C/NANB by Age, Sex, and Race/Ethnicity, United States, 1994-1995

	1994 N=954		1995 N=961	
CHARACTERISTIC	**No.**	**%***	**No.**	**%***
Age (Years)				
<5	5	0.5	7	0.7
5-9	10	1.1	5	0.5
10-14	7	0.7	9	0.9
15-19	31	3.3	37	3.9
20-29	179	18.9	170	17.8
30-39	367	38.7	343	35.7
40-49	198	20.8	228	23.7
50-59	73	7.7	62	6.5
60+	79	8.3	96	10.0
Sex				
Male	531	56.2	569	59.2
Female	414	43.8	381	39.6
Race/Ethnicity				
White, non-Hispanic	603	68.5	596	65.6
Black, non-Hispanic	156	17.7	174	19.1
Hispanic	88	10.0	94	10.3
American Indian or Alaskan Native	16	1.8	27	3.0
Asian or Pacific Islander	17	1.9	18	2.0

* A total of 954 and 961 cases of hepatitis C/NANB were reported to VHSP in 1994 and 1995 respectively; however, patients with missing risk factor data are excluded here.

Source: Viral Hepatitis Surveillance Program, CDC.

Demographic characteristics

The demographic profile of cases in 1994 and 1995 was similar to that in previous years:

- Persons 20-49 years of age accounted for >75% of cases in 1994 and 1995.
- The male:female ratio for reported cases was 1.5:1
- Non-Hispanic whites accounted for over 65% of reported cases.

Table IV-9. Clinical Characteristics of Patients Reported with Hepatitis C/Non-A, Non-B Hepatitis, by Age Group, United States, 1994-1995

	Percentage of Patients By Age (years)*			
1994	**Total N=954**	**<1-14 N=22**	**15-39 N=576**	**40 N=349**
Jaundice	68.1	72.2	69.9	64.7
Hospitalized for hepatitis	32.6	23.8	28.7	39.5
Death as a result of hepatitis	2.4	0.0	2.0	3.1
1995	**N=961**	**N=21**	**N=550**	**N=386**
Jaundice	62.2	42.1	65.5	58.5
Hospitalized for hepatitis	34.2	44.4	28.5	41.9
Death as a result of hepatitis	1.9	0.0	1.2	3.0

* A total of 954 and 961 cases of hepatitis C/NANB were reported to VHSP in 1994 and 1995 respectively; however, percentages exclude patients with missing data for age (1% of total), jaundice (7%-14% of total), hospitalization (6%-12% of total), and death (6%-7% of total).

Source: Viral Hepatitis Surveillance Program, CDC.

Clinical Characteristics

Hospitalization rates are higher than for hepatitis A, and similar to rates for hepatitis B. However, hospitalization rates for all cases of viral hepatitis reported to VHSP are 10%-20% higher than those reported for cases in the Sentinel Counties, suggesting that VHSP reporting may be biased toward more severe cases. Case-fatality rates are also slightly higher than for hepatitis A and B.

Table IV-10. Epidemiologic Characteristics* of Patients Reported with Hepatitis C/Non-A, Non-B Hepatitis, by Age Group, United States, 1994-95

1994	Percentage† of Patients By Age (years)			
	Total N = 947	<1-14 N = 22	15-39 N = 576	40 N = 349
Blood transfusion	3.6	6.7	2.1	5.9
Injection drug use	21.9	0.0	28.2	12.9
Employed in medical/dental field	4.9	0.0	3.5	7.5
Hemodialysis	0.5	0.0	0.0	1.4
Sexual contact of hepatitis C/NANB patient	2.4	0.0	3.5	0.9
Household contact with hepatitis C/NANB patient	1.0	4.6	1.4	0.0
Other contact with hepatitis C/NANB patient	0.7	0.0	0.7	0.9
Multiple sex partners	5.7	4.6	7.6	2.6
Unknown	59.3	84.1	53.0	67.9
1995	**Total N =957**	**<1-14 N = 21**	**15-39 N = 550**	**40 N = 386**
Blood transfusion	5.1	0.0	2.7	87.8
Injection drug use	26.4	0.0	32.2	19.3
Employed in medical/dental field	0.8	0.0	2.4	3.7
Hemodialysis	0.7	0.0	0.4	1.3
Sexual contact of hepatitis C/NANB patient	3.8	0.0	3.8	2.3
Household contact with hepatitis C/NANB patient	0.8	9.5	0.9	0.3
Other contact with hepatitis C/NANB patient	0.6	0.0	0.9	0.3
Multiple sex partners	6.4	0.0	9.3	2.1
Unknown	55.4	90.5	47.4	61.9

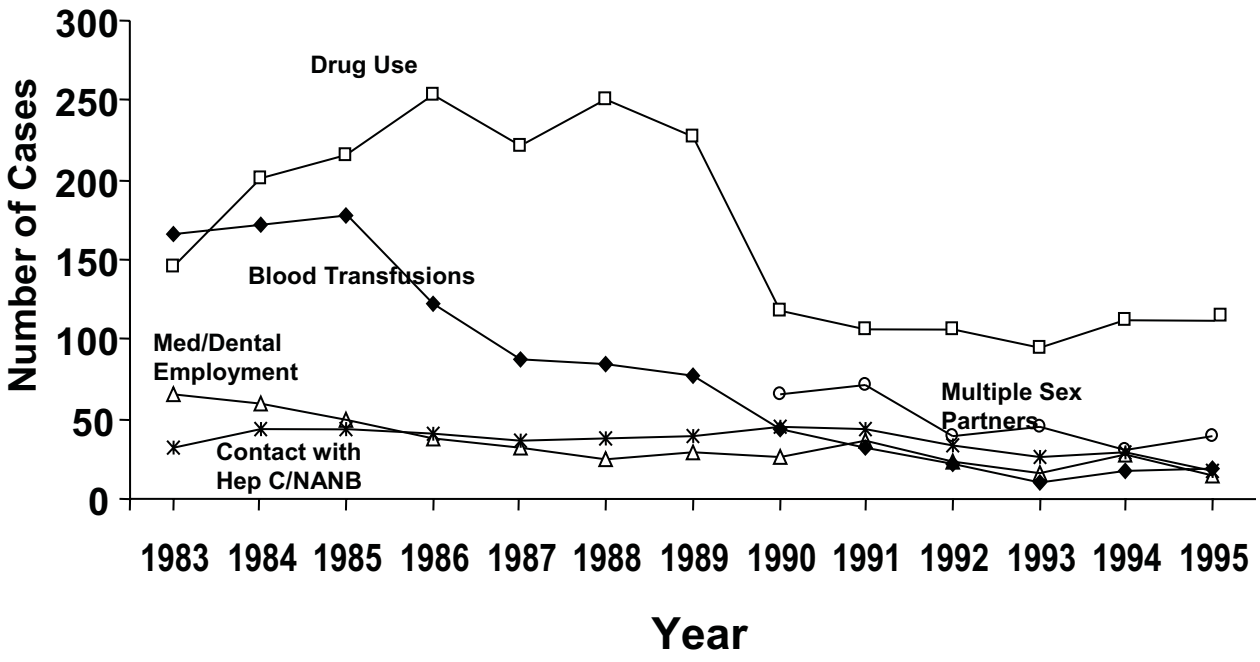
* Mutually exclusive groups in decreasing order of most probable cause.
† A total of 954 and 961 cases of hepatitis C/NANB were reported to VHSP in 1994 and 1995 respectively; however, percentages exclude patients with missing risk factor data.

Source: Viral Hepatitis Surveillance Program, CDC

Risk factors

Injection drug use was the most commonly reported risk factor among the cases for whom a risk factor was identified, accounting for approximately one-fourth of reported cases. Another 10% of cases are attributed to sexual exposures including having had multiple sex partners (approximately 6%) or having had sexual contact with a person known to be infected with HCV. Although more than half of cases in both 1994 and 1995 denied a recognized exposure, data from the Sentinel Counties study (see Figure IV-14) indicate that most persons identifying no specific exposure have some lifetime history of high-risk drug or sexual behaviors.

Figure IV-13. Trends in Selected Risk Factors for Patients Reported with Hepatitis C/NANB, by Mutually Exclusive Groups, Selected States,* 1983-1995

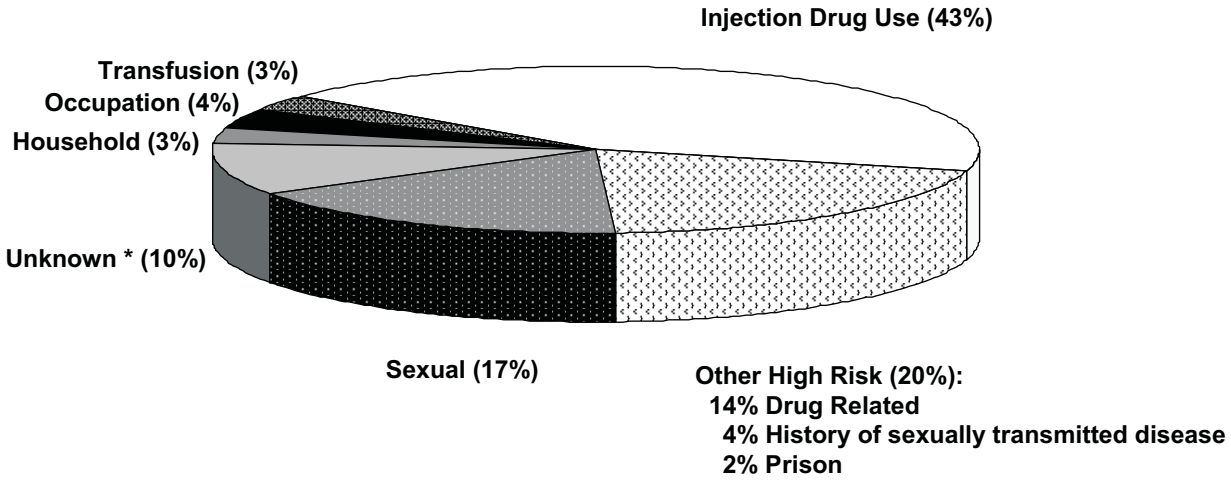


* Cases from 15 selected states with high reporting levels

Source: Viral Hepatitis Surveillance Program, CDC

Injection drug use has remained the most commonly reported risk factor for hepatitis C/NANB, despite a more than 55% reduction in number of cases from 1983 to 1993. Transfusion-associated cases have declined dramatically from 1985 to 1993.

Figure IV-14. Risk Factors Associated with Reported Cases of Acute Hepatitis C in Sentinel Counties, United States, 1983-1995



Source: Sentinel Countries

Methods and Notes

Table IV-11. Cases Reported to Viral Hepatitis Surveillance Program Compared with NNDSS, by Type of Submission, 1994-1995

	Year	
	1994	1995
Reports submitted on Form CDC 53.1	12,722	11,505
Reports submitted electronically as extended NETSS** records	7,075	10,569
Total cases reports submitted to VHSP	19,797	22,074
Total cases serologically confirmed	17,132	20,755
Total cases meeting case definition for acute hepatitis	16,937	19,905
Symptomatic hepatitis A	11,569	14,026
Symptomatic hepatitis B	4,242	4,715
Hepatitis A and B co-infection	172	203
Symptomatic C/non-A, non-B hepatitis	954	961
Total cases reported to NNDSS*	47,227	46,963
Hepatitis A	29,796	31,582
Hepatitis B	12,517	10,805
Hepatitis C/non-A, non-B	4,470	4,576
Hepatitis, unspecified	444	†

* National Notifiable Diseases Surveillance System
** National Electronic Telecommunications System for Surveillance
† No longer reported as of 1995

Table IV-12. Proportion of Total Reported Cases Including VHSP Risk Factor Data, by States,* 1995

81% - 100%	61% - 80%	41% - 60%	21% - 40%	0% - 20%
Arkansas	Alabama	Florida	Arizona	Alaska
Kansas	Connecticut	Iowa	Colorado	California
Maryland	District of Columbia	Michigan	Georgia	Idaho
Montana	Delaware	Minnesota	Hawaii	Kentucky
Oklahoma	Illinois	Missouri	South Carolina	Mississippi
Rhode Island	Indiana	North Carolina	Tennessee	New Jersey
South Dakota	Louisiana	North Dakota	Wyoming	New York City
Utah	Maine	Nebraska		Oregon
Vermont	Massachusetts	Nevada		Texas
	New Hampshire	New Mexico		
	West Virginia	New York		
		Ohio		
		Pennsylvania		
		Virginia		
		Washington		
		Wisconsin		

**and other reporting areas: New York City and the District of Columbia*

Case Definition

Epidemiologic data about reported cases of acute viral hepatitis are essential for defining the groups at risk and for monitoring changes in such groups. Since new disease acquisition is the event of interest, chronic infections should not be reported.

In 1990 the VHSP updated the case definition for acute viral hepatitis to include IgM antibody to hepatitis B core antigen (IgM anti-HBc) for improved diagnosis of acute hepatitis B, to clarify the reporting of NANB hepatitis, and to include delta hepatitis as a separate diagnostic category. The clinical criteria remain the same: an acute case must include an illness with a discrete date of onset, and jaundice or elevated serum aminotransferase levels greater than 2.5 times the upper limit of normal. The serologic criteria used to distinguish the different types of hepatitis were as follows: hepatitis A is defined as being positive for IgM antibody to hepatitis A virus (IgM anti-HAV-positive); hepatitis B as positive for IgM anti-HBc-positive (if done) or hepatitis B virus surface antigen(HBsAg) and negative for IgM anti-HAV (if done); and NANB hepatitis as negative for IgM anti-HAV, and also for IgM anti-HBc (if done) or HBsAg-negative. In 1994-95, 94% of cases had sufficient serologic testing to designate a specific type. Only those patients with a specific serologic diagnosis were included in these analyses.

Cases were excluded if they do not satisfy the criteria for acute viral hepatitis. Among serologically confirmed cases in 1994-95, 5% of hepatitis A cases, 11% of hepatitis B cases, and 7% of NANB hepatitis cases were excluded because they failed to meet the clinical case criteria. Compared with hepatitis B patients who fulfilled the criteria for acute hepatitis, more persons with hepatitis B who were asymptomatic or had no date of onset were ≤14 years of age, were Asian/Pacific Islander, were dialysis patients, or had histories of blood transfusions or surgery.

Except for age, NANB hepatitis patients not meeting the case definition showed a similar pattern. Compared with NANB hepatitis patients who fulfilled the criteria for acute hepatitis, more persons with NANB hepatitis who were asymptomatic or had no date of onset were ≥40 years of age, were patients undergoing dialysis, or had histories of surgery. This pattern, as well as that for hepatitis B, is consistent with that for the earlier years. For both hepatitis B and NANB hepatitis, these findings suggest that these persons may have been routinely screened for HBsAg or for antibody to the hepatitis C virus (anti-HCV), and found to be positive without any evidence of acute illness.

Hepatitis A and B coinfections were examined in the 1995 data, and constituted approximately 1% of cases meeting the case definition. These cases displayed no specific clustering or associations with geographic or demographic factors. For purposes of risk factor analysis, these cases were counted twice, and were included as hepatitis A cases and hepatitis B cases.

Appendix: State and Territorial Epidemiologists and Laboratory Directors

State and Territorial Epidemiologists and Laboratory Directors are acknowledged for their contributions to hepatitis surveillance programs.. The epidemiologists and laboratory directors listed below were in the positions shown as of October 1996.

State/Territory	Epidemiologist	Laboratory Director
Alabama	John P. Lofgren, MD	William J. Callan, PhD
Alaska	John P. Middaugh, MD	Gregory V. Hayes
Arizona	Robert W. England, Jr. MD, MPH	Barbara J. Erickson, PhD
Arkansas	Thomas C. McChesney, DVM	Michael G. Foreman
California	Stephen H. Waterman, MD, MPH	Michael G. Volz, PhD
Colorado	Richard E. Hoffman, MD, MPH	Ronald L. Cada, DrPH
Connecticut	James L. Hadler, MD, MPH	Sanders F. Hawkins, PhD
Delaware	A. LeRoy Hathcock, PhD	Mahadeo P. Verma, PhD
District of Columbia	Martin E. Levy, MD, MPH	James B. Thomas, ScD
Florida	Richard S. Hopkins, MD, MSPH	E. Charles Hartwig, ScD
Georgia	Kathleen E. Toomey, MD, MPH	Elizabeth A. Franko, DrPH
Hawaii	Richard L. Vogt, MD	Vernon K. Miyamoto, PhD
Idaho	Jesse F. Greenblatt, MD, MPH	Richard H. Hudson, PhD
Illinois	Byron J. Francis, MD, MPH	David F. Carpenter, PhD
Indiana	Gregory K. Steele, MD, PhD	David E. Nauth (Acting)
Iowa	M. Patricia Quinlisk, MD, MPH	Mary J. R. Gilchristr, PhD
Kansas	Gianfranco Pezzino, MD, MPH	Roger H. Carlson, PhD
Kentucky	Reginald Finger, MD, MPH	Thomas E. Maxson, DrPH
Louisiana	Louise McFarland, DrPH	Henry B. Bradford, Jr, PhD
Maine	Kathleen F. Gensheimer, MD, MPH	John A. Krueger (Acting)
Maryland	Diane M. Dwyer, MD	J. Mehsen Joseph, PhD
Massachusetts	Alfred DeMaria, Jr, MD	Ralph J. Timperi, MPH
Michigan	Kenneth R. Wilcox, Jr, MD, DrPH	Robert Martin, DrPH
Minnesota	Michael T. Osterholm, PhD, MPH	Pauline Bouchard, JD, MPH
Mississippi	Mary Currier, MD, MPH	Joe O. Graves, PhD
Missouri	H. Denny Donnell, Jr, MD, MPH	Eric C. Blank, DrPH
Montana	Todd D. Damrow, PhD, MPH	Douglas O. Abbott, PhD
Nebraska	Thomas J. Safranek, MD	John D. Blosser
Nevada	Randall L. Todd, DrPH	Arthur F. DiSalvo, MD
New Hampshire	Vacant	Veronica C. Malmberg, MSN
New Jersey	Lyn Finelli, DrPh (Acting)	Thomas J. Domenico, PhD (Acting)
New Mexico	C. Mack Sewell, DrPH, MS	Loris W. Hughes, PhD
New York City	Benjamin A. Mojica, MD, MPH	Stanley Reimer
New York State	Dale L. Morse, MD, MS	Ann Wiley, PhD
North Carolina	J. Michael Moser, MD, MPH	Lou F. Turner, DrPH
North Dakota	Larry A. Shireley, MS, MPH	James D. Anders, MPH
Ohio	Thomas J. Halpin, MD, MPH	Kathleen L. Meckstroth, DrPH
Oklahoma	J. Michael Crutcher, MD, MPH (Acting)	Garry L. McKee, PhD
Oregon	David Fleming, MD	Michael R. Skeels, PhD, MPH
Pennsylvania	James T. Rankin, Jr, DVM, PhD, MPH	Bruce Kieger, DrPH
Rhode Island	Utpala Bandy, MD, MPH	Walter Combs, PhD
South Carolina	James J. Gibson, MD, MPH	Harold Dowda, PhD
South Dakota	Susan E Lance, DVM, MPH	Richard S. Steece, PhD
Tennessee	William L. Moore, MD	Michael W. Kimberly, DrPH
Texas	Diane M. Simpson, MD, PhD	David L. Maserang, PhD
Utah	Craig R. Nichols, MPA	Charles D. Brokopp, DrPH
Vermont	Vacant	Burton W. Wilcke, Jr, PhD
Virginia	Grayson B. Miller, Jr, MD	James L. Pearson, DrPH
Washington	Paul Stehr-Green, DrPH, MPH	Jon M. Counts, DrPH
West Virginia	Loretta E. Haddy, MA, MS	Frank W. Lambert, Jr, DrPH
Wisconsin	Jeffrey P. Davis, MD	Ronald H. Laessig, PhD
Wyoming	Gayle L. Miller, DVM, MPH	Roy J. Almeida, DrPH
American Samoa	Edgar C. Reid, MO, DSM, MPH	—
Federated States of Micronesia	Vacant	—
Guam	Robert L. Haddock, DVM, MPH	Florencia Nocon (Acting)
Marshall Islands	Tom D. Kijner	—
Northern Mariana Islands	Jose L. Chong, MD	Isamu J. Abraham, DrPH
Palau	Jill McCready, MS, MPH	—
Puerto Rico	Carmen C. Deseda, MD, MPH	Jose Luis Miranda Arroyo, MD
Virgin Islands	Donna M. Green, MD	Norbert Mantor, P