

CDC's Viral Hepatitis Laboratory: Defending the Nation Through Elimination of Viral Hepatitis



United States:
hepatitis B virus (HBV) and hepatitis C virus (HCV) are the most common types of viral hepatitis.

B 4.4 million persons are living with HBV or HCV.



Globally:

257 million persons living with HBV

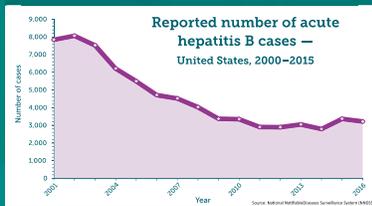
71 million persons living with HCV

1.34 million deaths from viral hepatitis in 2015

C HCV-related deaths exceed the number of deaths from the 60 other nationally notifiable diseases combined.

different types of viral hepatitis: A, B, C, D, E

Facts about HBV in the United States



Despite vaccination, acute HBV has increased more than 20% in recent years.

20,900: Estimated cases of HBV in 2016

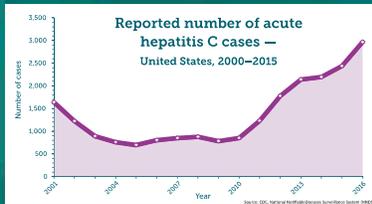
1 in 12: Asians living with HBV

2,000: Annual deaths associated with HBV

Treatment reduces the chance of developing liver disease and liver cancer but does not eliminate the disease.

Over time, chronic HBV and HCV can cause serious health problems, including liver fibrosis, cirrhosis, liver cancer and even death.

Facts about HCV in the United States



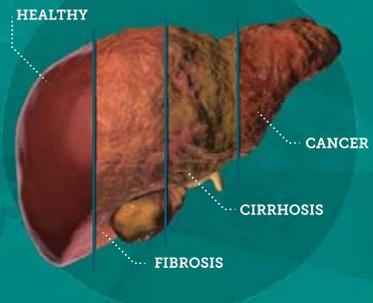
There is no vaccine to prevent HCV. New cases have been increasing since 2009.

41,200: Estimated cases of HCV in 2016

6x: The increased likelihood that people born from 1945–1965 (baby boomers) have HCV

22,000: Annual deaths associated with HCV

320,000: Deaths that can be prevented by testing and referring infected persons to care and curative treatment



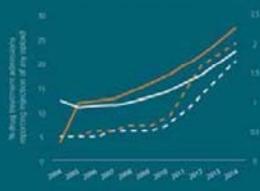
Opioids and Hepatitis

The opioid epidemic in the United States is increasing cases of viral hepatitis infections because of injection drug use and needle sharing.



233%: The increase in the number of new HCV infections in the United States reported to CDC between 2010 and 2016

HEPATITIS C AND OPIOID INJECTION ROSE DRAMATICALLY IN YOUNGER AMERICANS FROM 2004-2014



• Among people aged 18-29, HCV increased by 400% and admission for opioid injection by 623%.

• Among people aged 30-39, HCV increased by 325% and admission for opioid injection by 63%.

CDC's Viral Hepatitis Laboratory plays a crucial role in hepatitis control in the United States and globally.

The Laboratory:

- ▶ Monitors the health of Americans through the National Health and Nutrition Examination Survey (NHANES) and provides laboratory data for national strategic planning to eliminate viral hepatitis.
- ▶ Investigates outbreaks.
- ▶ Creates standards and evaluates new diagnostics.
- ▶ Innovates methods to more quickly detect people infected with viral hepatitis.
- ▶ Evaluates safer and more cost-effective vaccine delivery technologies.
- ▶ Complies with CLIA regulations and serves as a national and global reference center.

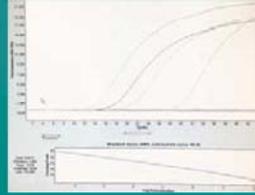


CDC's Viral Hepatitis Laboratory provides leadership and expertise in developing state-of-the-art diagnostic technologies to detect and control viral hepatitis.



CDC's Viral Hepatitis Laboratory: At the Frontlines of Science

CDC's Viral Hepatitis Laboratory is working to solve some of the most pressing problems in diagnosing, preventing, and treating hepatitis.



CDC's Viral Hepatitis Laboratory employs sophisticated tools not available in all laboratories to detect genetic material of the viruses directly in samples. This specific graph is measuring levels of hepatitis E virus through quantitative polymerase chain reaction (PCR).

Public Health Problems



CDC's Viral Hepatitis Laboratory's Solution

Need tests for use in the field that require minimal logistics, such as refrigeration

Developing the use of dried blood spot assays



Need better ways to estimate prevalence of hepatitis

Creating a versatile Western blot anti-hepatitis-C confirmatory assay



Need to support hepatitis surveillance

Evaluating a low denaturing temperature laboratory technique



Need diagnostic methods to detect mutant viral hepatitis strains

Characterizing mutant viral hepatitis isolates



Need better vaccines



Evaluating new vaccines

Developing a safer and more user-friendly hepatitis B vaccine patch that would:

- Eliminate the need for refrigeration
- Be cost-effective

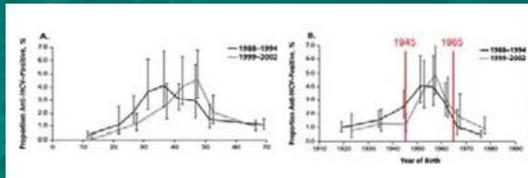
Dried blood samples require only a small amount of blood compared to routine blood samples. They can be used to detect antibodies to hepatitis B virus.

Confirming cases of hepatitis C through Western blot technology provides robust surveillance to monitor trends in the United States.

CDC's Viral Hepatitis Laboratory: At the Frontlines of Surveillance and Reference Diagnostics

CDC's Viral Hepatitis Laboratory contributes to the understanding of the burden of viral hepatitis in the United States and provides key information about best diagnostic practices essential for its elimination.

People born from 1945-1965 (baby boomers) are 5 times more likely to have hepatitis C virus (HCV) than other adults.



While anyone can get HCV, 3 in 4 people with HCV were born from 1945-1965.

CDC's Viral Hepatitis Laboratory:



DISCOVERED

the high rates of HCV infection among baby boomers.



PERFORMED

about 166,000 tests for 142 outbreak investigations and NHANES from 2013-2017 (NHANES monitors the health of Americans over time).



DETERMINED

that hepatitis E – considered rare in developed countries – is more common in the United States than previously thought.

Chronic Hepatitis C Virus Infection in the United States, National Health and Nutrition Examination Survey 2003 to 2010

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Abstract

Background—Hepatitis C virus (HCV) infection is a major public health problem in the United States and worldwide. Outbreaks of

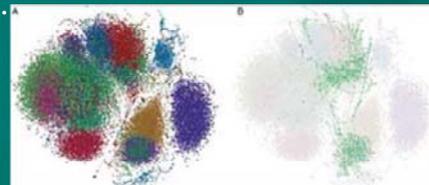
Accurate genetic detection of hepatitis C virus transmissions in outbreak settings

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Abstract

Hepatitis C is a major public health problem in the United States and worldwide. Outbreaks of



Color-coded image of genetic relatedness among HCV variants sampled during an outbreak.



Until recently, hepatitis E was thought to occur mostly in developing countries. CDC's research showed that individuals in the United States with compromised immune systems may be at risk for this strain of hepatitis.



CDC assists health departments, provides surveillance information, and conducts genetic tests on samples to determine resource allocation to eliminate viral hepatitis in the United States.

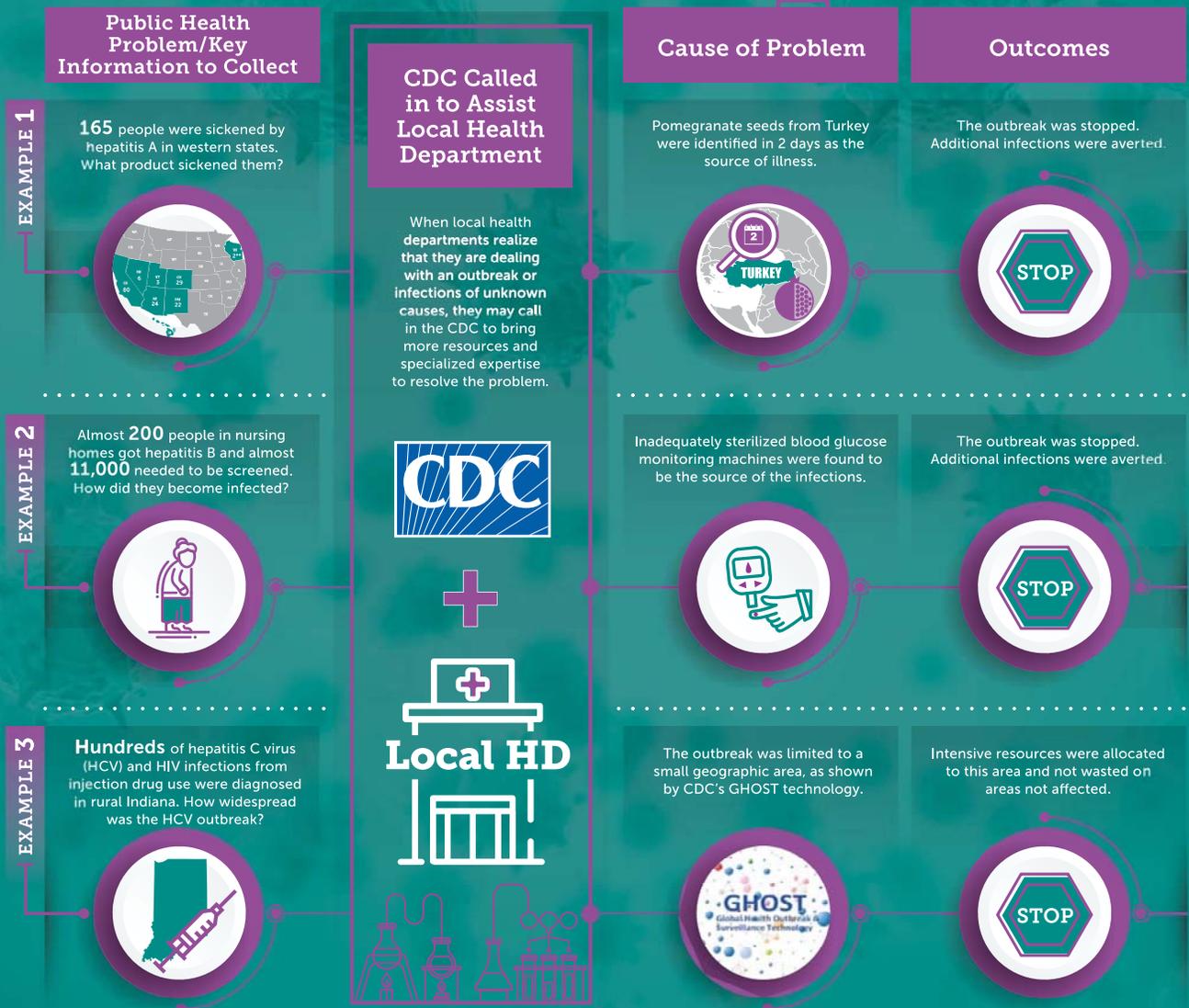
CDC's Viral Hepatitis Laboratory: At the Frontlines of Public Health Service

CDC's Viral Hepatitis Laboratory is instrumental in investigating outbreaks of hepatitis across the country.

From 2013-2017, the Laboratory investigated **142 outbreaks.**



Examples of Assisting Health Departments in Outbreak Investigation:



CDC's Viral Hepatitis Laboratory: Expanding Public Health Laboratory Support Through Innovation and Automation

The Problem:

Outbreaks of hepatitis C virus (HCV) infections associated with unsafe injection practices, drug diversion, and exposures to blood are difficult to detect and investigate.



The Solution:

A web-based system to enhance surveillance.

Global Hepatitis Outbreak Surveillance Technology (GHOST) enables state laboratories to independently conduct hepatitis C outbreak investigations and initiate public health actions to control the disease.



GHOST:

- ▶ Accurately increases the rate of detection of hepatitis C transmission.
- ▶ Allows for a 50- to 100-fold reduction in cost per specimen.
- ▶ Has been piloted in 5 states.

GHOST test results are reported to users in the form of a graphical representation of transmission clusters and networks.



GHOST is available on hand-held devices to make outbreak detection accessible in the field.



34
public health
laboratory
personnel

from
22 states
were trained in
2 GHOST network workshops.



Automated GHOST technology was developed in less than 1 year to:

- ▶ Increase the number of tests.
- ▶ Produce and provide standardized reagents to state labs enrolled in the GHOST network.



GHOST Workshop Attendees

