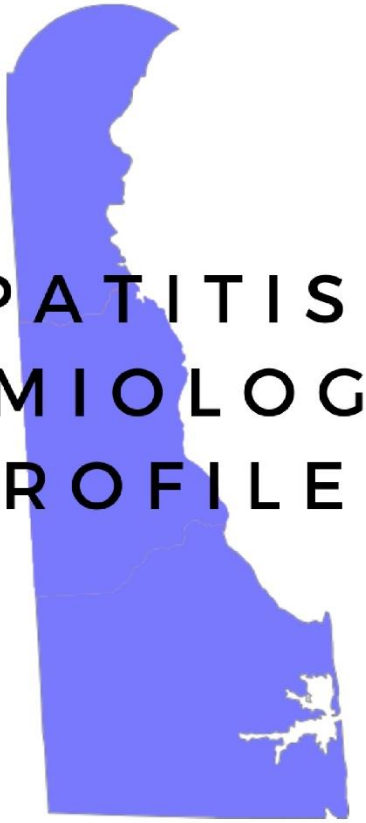
STATE OF DELAWARE
DIVISION OF PUBLIC HEALTH



HEPATITIS C EPIDEMIOLOGICAL PROFILE

DELAWARE HEALTH AND SOCIAL SERVICES
Division of Public Health

Prepared by the Center for Community Research & Service
School of Public Policy and Administration, University of Delaware

Funded by the Association of State and Territorial Health Officials

December 2017

Delaware Department of Health and Social Services
Division of Public Health

HEPATITIS C EPIDEMIOLOGIC PROFILE

Prepared for the Delaware Department of Health and Social Services,
Division of Public Health by the Center for Community Research & Service, School of Public Policy & Administration, University of Delaware

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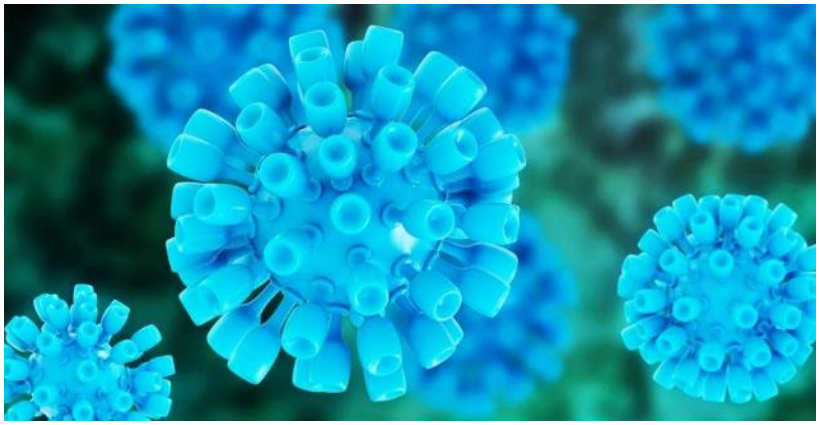
EXECUTIVE SUMMARY



The purpose of the first *Hepatitis C Epidemiological Profile* is to create a baseline of Hepatitis C virus (HCV) knowledge within Delaware and guide further research and interventions. HCV is a serious viral infection of high prevalence and high morbidity and mortality based upon national data. With the ongoing opioid epidemic, it is anticipated that hepatitis C local infection rates will rise further. The expectation is that this epidemiologic profile will serve as a guide to DPH and other stakeholders in establishing a framework for hepatitis C prevention activities.

While the prevalence of HCV saw a steep decline from the early 1990s to the early 2000s due to improved blood screening and prevention, the incidence (new cases) of acute HCV began to increase after 2010, coinciding with the increase in intravenous drug use in the U.S. Infected persons are at risk from chronic hepatitis, cirrhosis, and primary hepatocellular carcinoma, and can transmit the infection to others. A majority of those infected (75%-85%) will have chronic HCV. Early detection of HCV can mitigate the impact of the disease; however, many infected individuals are unaware they may be infected.

The Hepatitis C Epidemiologic Profile Work Group was first convened in May 2017 by the DPH's Viral Hepatitis Prevention Coordinator, who engaged stakeholders from DPH, the Division of Medicaid and Medical Assistance (DMMA), Brandywine Counseling, Christiana Care Health System (CCHS), Walgreens Pharmacy, and Westside Family Healthcare. Work Group members collaborated to better guide strategic planning within identified areas of populations at high risk for becoming infected with hepatitis C. The Work Group also sought to collaborate on measures to implement strategies that focused on prevention, surveillance, identification, and treatment of hepatitis C in Delaware. In addition to developing a framework for change, the Work Group also contributed important data that has been included in the Profile. DPH anticipates this Profile will be updated on a bi-annual basis to monitor progress on addressing this very important health issue.

Highlights from the Profile

- Health experts have called HCV a "silent epidemic" because many individuals do not know they have the disease until it is too late and they have incurred serious health damage.
- There is some evidence that race and ethnicity are related to HCV incidence and the likelihood of treatment, the type of treatment, and the effect on serious complications and

death rates.

- Patients with HCV are disproportionately likely to be uninsured or Medicaid eligible.
- Although over half (52%) of the reported cases in 2016 involve individuals living in New Castle County, the rate is higher in Sussex (315.1 per 100,000) and Kent County (315.7 per 100,000).
- One third of the individuals reported to DPH (36%) are over the age of 51. The age cohorts with the highest rate of HCV are the 20-29 group (527.5 per 100,000) and the 30-39 group (514.9 per 100,000). This may be an indication of the need to increase testing of "baby boomers (those born between 1945 and 1964)."
- Vaccines exist for Hepatitis A (HAV) and Hepatitis B (HBV), but not for HCV. New HCV medication treatment has led to a 96% cure rate. However, the currently available effective medication for HCV is often considered prohibitively expensive and coverage often depends on the type of insurance held by the patient.
- Despite the high cost of effective medication, either to the patient or to the insurer, the high level of efficacy has led some to declare that we are in "a new era," with virtually all cases of HCV curable. The only question is whether treatment should occur before or after liver transplantation in advanced cases.
- The Work Group formed recommendations that address increase awareness of HCV throughout Delaware. Improvement of reporting and involving other public health divisions, especially those focused on diseases which have co-infection with HCV, was recommended to collaborate on strategies that support a goal of decreasing HCV in Delaware.

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INTRODUCTION

Funded by a grant from the Association of State and Territorial Health Officials (ASTHO), the purpose of the first *Hepatitis C Epidemiological Profile* is to create a baseline of Hepatitis C Virus (HCV) knowledge within Delaware to guide further research and interventions. Health experts have called HCV a "silent epidemic" because many individuals do not know they have the disease until they have incurred serious health damage. The Division of Public Health (DPH) promotes testing, linkage-to-care, and treatment for HCV.

The Hepatitis C Epidemiologic Profile Work Group, which started meeting in May 2017, is comprised of stakeholders from the Delaware Department of Health and Social Services' (DHSS) DPH, Division of Medicaid and Medical Assistance (DMMA), Brandywine Counseling, Christiana Care Health Systems (CCHS), Walgreens Pharmacy, and Westside Family Healthcare. The Work Group advised in the compilation of the *Profile* and contributed important data.

Health experts have called HCV a "silent epidemic" because many individuals do not know they have the disease until they have incurred serious health damage.

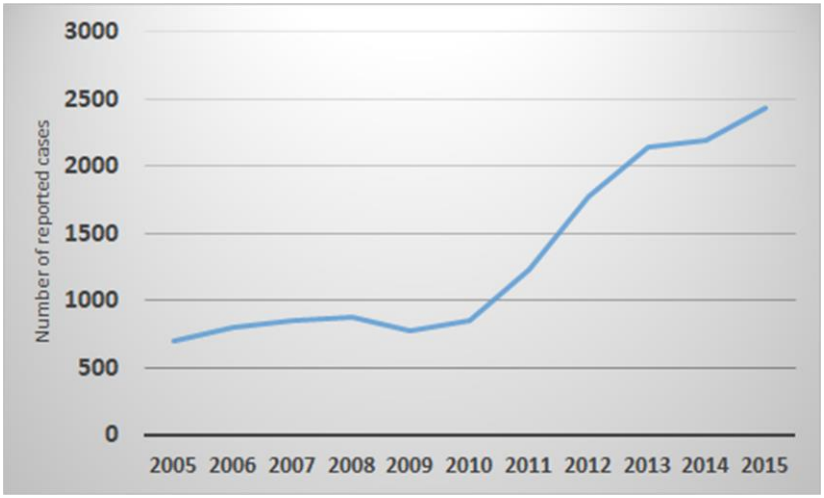
Organized into several sections, this Epi Profile first gives a brief overview of HCV by discussing its prevalence and stages. The next section is the presentation of cases reported to DPH since 2016. The third section discusses testing. The fourth section describes health utilization services that include hospitals, emergency departments, and prescriptions. Because HCV can lead to liver damage and sometimes death, the fifth and sixth sections share cancer and mortality statistics. Individuals with HCV may be co-infected with HIV, Hepatitis B (HBV), and/or have an opioid addiction; data on these co-infections are displayed in sections seven through nine. The final section provides a summary of Delaware policies, resources, and programs. The purpose of the first Epi Profile serves to describe the landscape of HCV in Delaware and will serve as a reference point for future editions.

OVERVIEW OF HEPATITIS C IN THE U.S.

Method of transmission and patient population

HCV is spread through contact with the blood of an infected patient (Centers for Disease Control and Prevention (CDC), 2016). Prior to 1992, blood transfusions, organ transplants, and other medical procedures that exposed one person to the blood of another were common modes of transmission; since 1992, blood screening has greatly reduced these exposures. Now, the most common method of transmission is the sharing of needles for injection drug use. Other transmission methods include needle stick injury in health care settings and births to HCV-infected mothers. Infrequent transmissions also occur via sex with an HCV-infected individual and sharing personal items that are infected (CDC, 2017a).

Figure 1: Incidence of Reported Acute HCV, United States, 2005-2015



Source: Centers for Disease Control and Prevention (2017, 2016, 2015), Surveillance for Viral Hepatitis – United States, 2013-2015.

HCV can be either "acute" or "chronic." Acute HCV is short term, describing the first six months after exposure to HCV. Acute HCV often develops into chronic HCV. Until recent advances in pharmaceutical treatments, individuals with chronic HCV would be infected with the disease for the remainder of their lives, with many cases leading to serious liver issues. An estimated 75-85% of acute cases become chronic, with 1-5% of those infected ultimately dying from cirrhosis or liver cancer. Most cases of cirrhosis and liver cancer are attributable to HCV; the CDC attributes 19,000 deaths annually in the U.S. to the liver damage caused by HCV (CDC, 2016a).

The incidence (new cases) of acute HCV declined through the 1990's but then began to increase after 2010 (Figure 1). This increase is thought to be coincident with the increase in intravenous drug use, especially opioid injection (CDC, 2017). Experts acknowledge, however, that the incidence of acute HCV is underreported. For instance, although 2,194 new acute cases were reported in the United States in 2014, the CDC estimates that 30,500 cases of acute HCV occurred in that year (CDC, 2017a). A Massachusetts study found underreporting occurred due

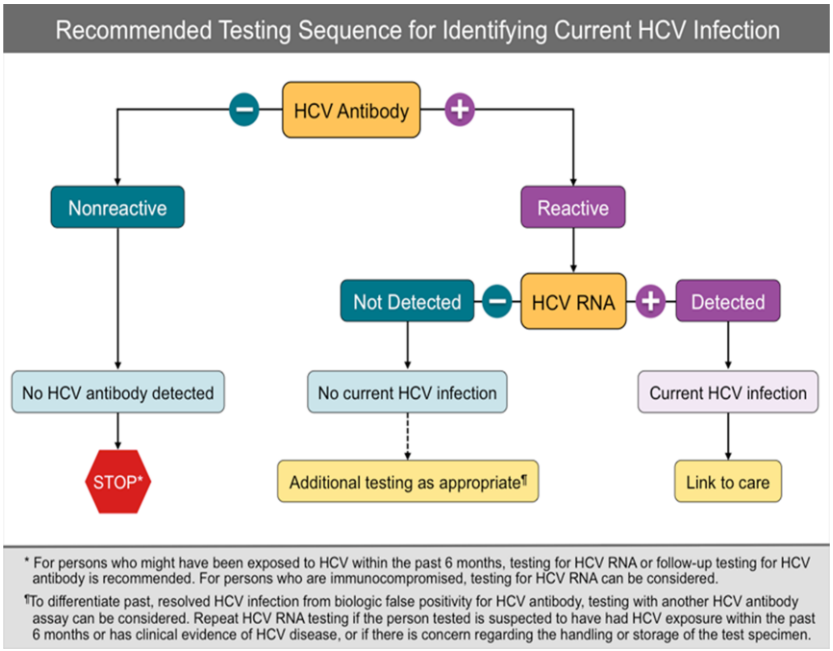
to "incomplete clinician reporting, problematic case definitions, limitations of diagnostic testing, and imperfect data capture" (Onefrey, S. et al., 2015, Abstract).

Because injection drug use is a primary mode of infection, the increased incidence of acute HCV has occurred, in Delaware and the nation, alongside the ongoing heroin epidemic (Rini, 2015a). An estimated one third of injection drug users nationwide, are infected with HCV (Rini, 2015c). Recent national research suggests that the prevalence (the proportion of cases in the population at a given time) of HCV-infected women of reproductive age has increased between 2006 and 2014 (Jiles et al., 2017). Since 2000, the prevalence also has increased among HIV-positive men who have sex with men, even among non-injection drug users (Jordan et al., 2017).

Based on 2010 data (Figure 3), Delaware's estimated HCV prevalence was higher than the prevalence in the neighboring states of Maryland, Pennsylvania, and New Jersey (Rosenberg et al., 2017). Rosenberg et al. estimated that Delaware had the 10th highest HCV prevalence rate among all states in 2017.

Further, state officials suspected the 1,200 cases reported in 2015 to DPH to be underreported (Rini, 2015b). In 2016, an initial estimate of between 1,500 and 2,000 cases in Delaware was still believed to be underreported by state officials (Rini, 2016b) and in 2017, DHSS provided an update that 2,599 HCV cases were reported in 2016 in Delaware (DHSS, 2017). At this time, it is not possible to compare Delaware numbers with the national rates due to surveillance limitations.

Figure 2: CDC Recommended Testing Sequence for HCV, United States, 2013



Source: Replicated from Centers for Disease Control and Prevention, 2013.

HCV Testing Recommendations

- *Persons born between 1945 and 1965*
- *Current drug injection users*
- *Previous drug injection users*
- *HIV-infected individuals*
- *Individuals ever on long-term hemodialysis*
- *Individuals with persistently abnormal alanine aminotransferase levels (ALT)*
- *Individuals who received clotting factor concentrates produced before 1987*
- *Individuals receiving blood transfusion or organ transplants prior to 1992*
- *Health care, emergency medical services, and public safety workers*
- *Children born to HCV-positive women*

Source: Centers for Disease Control and Prevention, 2015.

Testing

The CDC recommends two tests to identify HCV (Figure 2): an HCV Antibody test and an HCV RNA test. An HCV antibody test screens for presence of antibodies in approximately 15% of individuals exposed to HCV, their immune system is able to fight off the disease. Those with positive HCV antibody tests should have a confirmatory HCV RNA test to determine if the HCV is active (CDC, 2013).

Race and Ethnicity

The U.S. incidence of acute HCV is higher among non-Hispanic whites than among non-Hispanic blacks or Hispanics. The rate was 0.9 cases per 100,000 for non-Hispanic whites and 0.3 cases per 100,000 for non-Hispanic blacks and Hispanic persons in 2015 (CDC, 2017b).

However, when looking at chronic HCV, two widely cited papers based on an analysis of National Health and Nutrition Examination Survey (NHANES) data concluded that the prevalence of chronic HCV is higher among non-Hispanic

blacks than non-Hispanic whites (Denniston et al., 2014; Gregory L. Armstrong et al., 2006). This difference was "almost entirely attributable to differences among older participants... Prevalence was not significantly different between non-Hispanic black and non-Hispanic white persons who were younger than 40 years of age" (Armstrong et al., 2006, p. 708). The results from the NHANES analysis were also based on unadjusted odds of an HCV diagnosis, while a Baltimore, Maryland study found that after adjusting for age, sex, education, and incarceration status, "whites were twice as likely to test positive for HCV when compared to African Americans" (Latimer et al., 2009). It appears that the prevalence of HCV by race has changed in recent years due to a new cohort of young, white injection drug users (Patrick, Bauer, Warren, Jones, & Wester, 2017; Spach, 2016).

In Michigan, blacks were the only group to experience a decrease in chronic HCV rates between 2011 and 2015, though the prevalence remained higher among blacks than among whites (Michigan Department of Health and Human Services, 2016, p. 33). In California, whites accounted for 40% of the population but 60% of the new cases of chronic HCV in 2015. The proportion of newly reported cases attributed to whites increased from 53% to 60% between 2011 and 2015. Further, the proportion of cases attributed to Hispanics decreased over that period (California Department of Public Health, 2016). While the prevalence did remain higher among blacks, who were 6% of the population and 12% of HCV cases in California in 2015, an increasing trend was not noted in this cohort.

A full understanding of racial/ethnic differences in prevalence is complicated because in many states, the race of the diagnosed patient is "unknown." Many states report higher rates of HCV among blacks, while acknowledging that race/ethnicity is unknown for up to half the reported cases (see Arizona Department of Health Services (2016), p.12). For example, in New York in 2015, race was unknown for 35% of the reported cases of HCV and information about Hispanic ethnicity was missing for more than half of the reported cases (New York State Department of Health, 2017).

There is some evidence that race and ethnicity are related to the incidence of HCV, the progression of the disease, the likelihood of treatment, and the type of treatment, as well as to serious complications including death.

There is some evidence that race and ethnicity are related to the incidence of HCV, the progression of the disease, the likelihood of treatment, and the type of treatment, as well as to serious complications, including death. Rousseau et al. (2008) reported that blacks were significantly less likely to receive antiviral treatment or a complete laboratory evaluation, though rates of liver biopsy were similar to whites. Among Pennsylvania baby boomers, the rates of liver transplants and HCV mortality are higher for men, blacks, and Hispanics, while among young adults (ages 15-

39), the rate of hospitalizations associated with HCV is higher for whites and non-Hispanics than for blacks and Hispanics (Pennsylvania Department of Health, n.d.).

Income and Insurance Coverage

When HCV is reported by income level, the incidence and prevalence is consistently higher among lower income populations, meaning patients with HCV are disproportionately likely to be uninsured or Medicaid eligible (Barua et al., 2015; Fitch, Iwasaki, Pyenson, & Engel, 2013). Ferro, Blumen, and Johnson (2015) estimated that the prevalence of HCV is up to 7.5 times higher in Medicaid-covered individuals than in the commercially insured population. In Michigan, 89% of HCV-positive patients had income lower than the state's $50,000 average (Bourgi, Brar, and Baker-Genaw, 2016). Among a study of low income women 18-29 years old in four counties in California, the prevalence of HCV was an estimated 2.5% among all low income women, with increasing prevalence as income declines, reaching 5.1% among the lowest income group in that cohort (Page-Shafer et al., 2002).

Patients with HCV are disproportionately likely to be uninsured or Medicaid eligible.

Vaccination and Medication

Vaccines exist for Hepatitis A (HAV) and Hepatitis B (HBV), but not for HCV. A vaccine for HAV became available in 1995. The Food and Drug Administration approved a vaccine for HBV even earlier in 1981. The incidence of HAV and HBV has decreased because of vaccination. The CDC recommends that children should receive their first HBV vaccination within 24 hours of birth, and public schools in many states require the HBV vaccination for school entry. The CDC recommends that children 12 months or older receive the HAV vaccine. The HAV vaccine is recommended when travelling to certain countries or if travelers are at high risk.

New HCV Medications

- *All oral regimens*
- *Direct-acting, short-course (8 to 12 weeks for most patients)*
- *The average costs range from $27,600 - $95,000.*
- *96% cure rate*

Research into a HCV vaccine has been ongoing for over 25 years (CDC, 2017a) but the variation in the HCV virus (at least six genetically distinct forms with 50 subtypes identified so far) has made development of the vaccine difficult. There is also variation globally making HCV vaccination development more complex. Testing on chimpanzees, the animal most like humans with HCV, has been limited due to ethical and cost considerations (Mayo Clinic, 2017; Zingaretti, De Francesco, Abrignani, 2014). Two vaccine trials

are underway; a therapeutic trial with people already diagnosed with chronic HCV and a prophylactic trial to prevent HCV (Mayo Clinic, 2017). A therapeutic vaccine trial.

A highly effective treatment for HCV is currently available; however, it is often considered prohibitively expensive, and coverage often depends on the patient's type of insurance. The Wall Street Journal reported that a $95,000, 12-week course of treatment with the drug Harvoni costs U.S. Department of Veterans Affairs patients just $33 out-of-pocket, versus $6,000 in patient out-of-pocket costs for those covered by Medicare Part D (Gellad, 2017). Despite the high cost of the effective medication, the high level of efficacy has led some to declare that we are in "a new era" with virtually all cases of HCV curable (Munoz, Rothstein, & Gibas, 2017). HCV may be cost effective to treat, but questions exist regarding whether treatment should occur before or after liver transplantation in advanced cases (Tapper, Afdhal, & Curry, 2017). Given the high cost of the drug and the prevalence of HCV among the low-income individuals, the fiscal impact of treatment could be significant for the Medicaid program. This is particularly true if the rate of diagnoses and treatments increases. One recent study (Digestive Disease Week, 2015) estimates an economic savings of $3.2 billion annually for the U.S. and five European countries by decreasing workplace absenteeism from the HCV illness and boosting workplace productivity.

HCV CASES IN DELAWARE

HCV Cases Reported to DPH

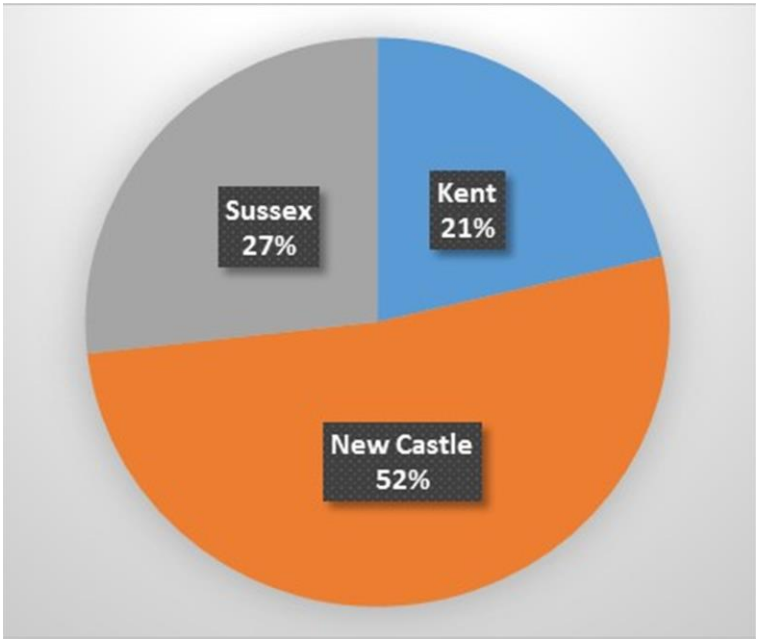
HBV, HIV, and HCV are reported to the state through the Delaware Electronic Reporting and Surveillance System (DERSS), a public health infectious disease surveillance system used in Delaware since 2004. DERSS tracks cases of HCV, HBV, and HIV based on lab tests. DPH also receives reports from physicians' offices and hospitals that help supplement the information received by DERSS. While data on risk factors are available, such data are not included in this first edition due to the small number of cases; future versions of the profile will include data on risk factors.

In 2016, DPH received notification of 2,592 new cases of HCV in Delaware. This calculates to an incidence rate of 272 cases per 100,000 individuals in Delaware (based on the total population estimates reported by the U.S. Census Bureau's annual American Community Survey). There is difficulty in comparing Delaware's rate to a national incidence rate due to under-reporting and because the national incidence rate is based on acute cases whereas Delaware's registry combines both acute and chronic cases of HCV. Underreporting is a prevalent problem. In 2015, the CDC estimates 33,900 acute HCV cases nationally (10.5 per 100,000 individuals).

The following tables show:

- The incidence of HCV varies widely between northern and southern Delaware. Half (52%) of the reported HCV cases in 2016 are in New Castle County, compared to Sussex County (27%) and Kent County (21%). However, the incidence rate is higher in Sussex County (315.1 per 100,000) and Kent County (315.7 per 100,000) compared to the rate in New Castle County (241.7 per 100,000) (Table 1, Figure 3).
- One third of the individuals reported with HCV to DPH (36%) are over the age of 51. The age cohorts with the highest rate are the 20-29 year old group (527.5 per 100,000) and the 30-39 year old group (514.9 per 100,000) (Table 2, Figure 4). Delaware males have a higher rate (316.7 per 100,000) than females (230.6 per 100,000) (Table 3).

Figure 3: Percent of Total HVC Registry Clients, By County, Delaware, 2016

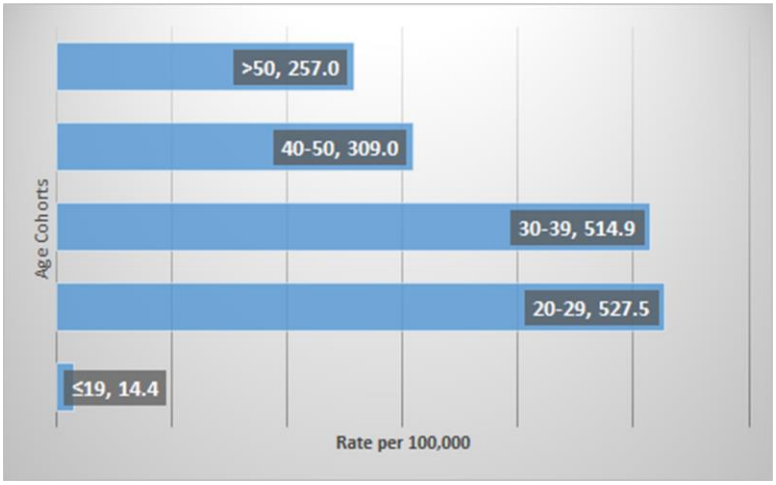


Source: Compiled with data from the Delaware Department of Health and Social Services, Division of Public Health, 2017.

While over half of the individuals in the registry are white, there are too many in the "Other/Unknown" category to adequately assess disparities according to race (Table 4).

With the establishment of reports to DPH on HCV cases in 2016, Delaware has focused more on monitoring individuals with HCV.

Figure 4: HCV Cases Reported to DPH, by Age Cohort, Rate per 100,000, Delaware, 2016



Source: Compiled with data from the Delaware Health and Social Services, Division of Public Health, 2017.

Table 1: HCV Cases Reported to DPH, By County, Delaware, 2016

County	Number	Percent of Total	Rate per 100,000*
Kent	552	21%	315.7
New Castle	1,346	52%	241.7
Sussex	694	27%	315.1
Total	2,592	100%	272.3

Rates are calculated using population estimates from the American Community Survey for 2016.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 2: HCV Cases Reported to DPH, By Age Group, Delaware, 2016

Age Group	Number	Percent of Total	Rate per 100,000*
<= 19 years	33	1%	14.4
20 – 29 years	675	26%	527.5
30 – 39 years	600	23%	514.9
40 – 50 years	351	14%	309.0
51 plus years	932	36%	257.0
Total	2,591	100%	272.3
Missing=1			

Rates are calculated using population estimates from the American Community Survey for 2016.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 3: HCV Cases Reported to DPH, by Gender, Delaware, 2016

Gender	Number	Percent of Total	Rate per 100,000*
Female	1.133	44%	230.6
Male	1.459	56%	316.7
Total	2,592	100%	272.3

Rates are calculated using population estimates from the American Community Survey for 2016.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 4: HCV Cases Reported to DPH, by Race, Delaware, 2016

Race	Number	Percent of Total	Rate per 100,000*
Black	390	15%	194.5
White	1,373	53%	213.7
Other	49	2%	58.8
Unknown**	780	30%	
Total	2,592	100%	272.3

Rates are calculated using population estimates from the American Community Survey for 2016.
****Rates not calculated for unknown category.***
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

HCV TESTING IN DELAWARE

Testing is offered at various sites and programs throughout Delaware. In addition to testing available through health providers and clinics, specific testing programs exist to reach high-risk populations. As of August 2016, testing is conducted at DPH clinics statewide.

Brandywine Counseling & Community Services, Inc.

For more than 30 years, Brandywine Counseling & Community Services (BCCS) has provided substance use and behavioral health services in Delaware. With five locations throughout the state, BCCS serves thousands of individuals 18 years and older each year through treatment, education, and prevention programs. For more information about BCCS, visit: http://www.brandywinecounseling.org/.

BCCS conducts HCV testing through two of its programs, the Syringe Exchange Program and the Community Outreach and Prevention Education (COPE) program. BCCS does not provide treatment; BCCS programs perform antibody tests. Individuals with positive antibody test results are referred to community providers for confirmatory tests to validate whether they have active HCV.

- The ***Syringe Services Program*** is facilitated by BCCS and funded by DPH to help prevent the spread of HIV/AIDS and provide community outreach for high-risk individuals. The program, which started in 2007, operates out of a mobile van that travels to several strategic locations statewide. Despite public opinion, studies conducted worldwide have concluded that syringe exchange programs do not increase or encourage injection drug use. Conversely, these programs effectively reduce the transmission of HIV/AIDS and hepatitis. The Syringe Services Program provides health and social services to injection drug users and the general community. Services include HIV and HCV testing, referrals for drug treatment, safe sex kits, referrals to social services, flu shots, and more. The testing program focuses on those at high risk of HCV due to injecting/injection drug use (IDU), unprotected sex with multiple partners, incarcerations, exposure to blood at work, and unprotected sex with a person who injects drugs. The program served over 780 individuals in FY 2016 and over 820 individuals in FY 2017.
- ***Community Outreach and Prevention*** **Education (COPE)** is a mobile medical outreach unit offering free health screenings including HIV and HCV testing, blood pressure, cholesterol, blood sugar, Body Mass Index evaluation, Tuberculosis screening, vision screening, and pregnancy testing. COPE also assists with referrals to dental and vision providers and provides medical case management. COPE, which operates statewide, began in 2014 and served 683 individuals in FY2017.

BCC's Syringe Service Program

Table 5: Syringe Service Program Rate of HCV-Positive Tests, Per 100 Individuals Tested, Delaware, FY2016-2017

Time Period	Rate per 100
FY2016	27.1
FY2017	22.6
FY2016-FY2017 Pooled	25.4

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 6: Syringe Program, Rate per 100 tested of HCV Positive Tests by Age Cohort, Delaware, FY2016-2017

Age Cohort	FY 2016	FY 2017	FY2016-17 Pooled
24 and less	37.0	7.7	27.5
25-29	22.4	4.2	16.4
30-39	32.1	18.4	27.9
40-49	21.7	23.8	22.7
50 and over	28.0	34.8	31.3

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 7: Syringe Program, Rate (per 100 tested) of HCV Positive Tests by Race, FY2016-2017

Race	FY 2016	FY 2017	FY2016-17 Pooled
Black	14.6	13.0	14.1
White	33.6	20.7	28.6

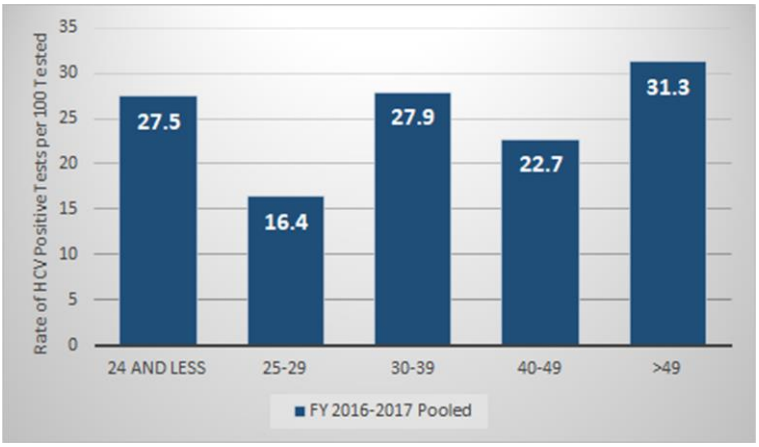
Other race categories are not presented due to confidentiality.
Source: Brandywine Counseling & Community Services, Inc., 2017.

During FY2016 and FY2017, of the 354 individuals tested for HCV through BCCS' Syringe Services Program, there was a positive rate of 25.4 per 100 persons tested (Table 5). Fewer individuals were tested in FY2017 due to funding issues; the FY2016-FY2017 pooled rates are therefore more robust indicators.

Individuals tested who are 50 years and older have a higher positive rate (31.3 per 100 persons tested) than other age cohorts. Those in the 25-29 age cohort had the lowest pooled rate (16.4 per 100 persons tested) (Table 6, Figure 5). White individuals tested had a positive rate twice as high as blacks (28.6 per 100 persons compared with 14.1 per 100 persons tested) (Table 7 and Figure 6). The rate for females is slightly higher than males (28.1 per 100 persons vs. 21.7 per 100 persons tested) (Table 8).

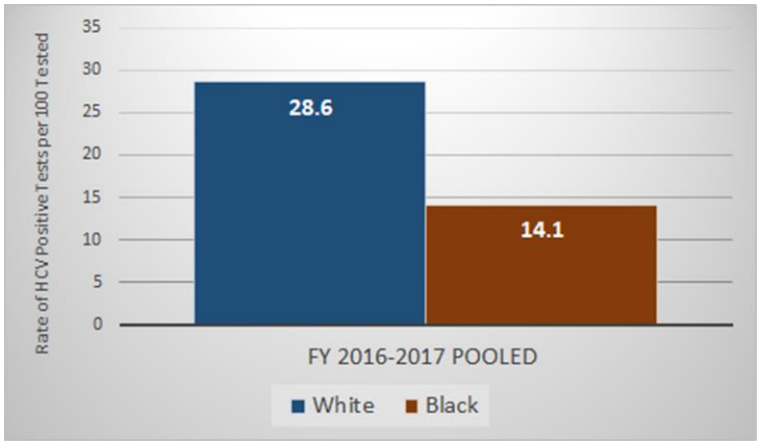
Examination by area where the individuals live shows variation. The Newark/Bear and Elsmere/Stanton/Newport areas have higher rates (35.9 per 100 and 34.6 per 100 respectively), compared to Wilmington (19.8 per 100 tested) and New Castle (16.0 per 100 tested) (Table 9).

Figure 5: Syringe Program, Rate of HCV Positive Tests per 100 Tested, by Age Cohort, Delaware, FY 2016-2017 Pooled



Source: Brandywine Counseling & Community Services, Inc., 2017.

Figure 6: Syringe Program, Rate per 100 tested of HCV Positive Tests, by Race, Delaware, FY 2016-2017 Pooled



Source: Brandywine Counseling & Community Services, Inc., 2017.

The data from the Syringe Service Program allowed for examination of exposure by two risk factors: incarceration and exposure to blood at work. Individuals exposed to blood in their occupation had lower pooled positive rates than those tested not in this risk category (17.9 per 100 persons vs. 25.9 per 100 persons tested) (Table 10). Due to the low number tested in FY2017, this is considered a tentative rate; future data trends should be examined to confirm this difference. Individuals who had been incarcerated showed higher pool rates than those not incarcerated (28.3 per 100 persons tested vs 20.4 per 100 persons tested) (Table 11). This pooled rate should be re-examined upon receipt of FY2018 data.

Table 8: Syringe Program, Rate (per 100 tested) of HCV Positive Tests by Gender, FY2016-2017

Gender	FY 2016	FY 2017	FY2016-17 Pooled
Female	32.0	21.9	28.1
Male	25.0	15.8	21.7

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 9: Syringe Program, Rate (per 100 tested) of HCV Positive Tests by Geographic Area, FY2016-2017

Area	FY 2016	FY 2017	FY2016-17 Pooled
Elsmere/Stanton/Newport	36.5	30.8	34.6
Newark/Bear	40.0	22.2	35.9
New Castle	15.8	16.7	16.0
Wilmington	20.8	18.4	19.8

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 10: Syringe Program, Rate (per 100 tested) of HCV Positive Tests by Blood Exposure at Work, FY2016-2017

Blood Exposure	FY 2016	FY 2017	FY2016-17 Pooled
No	28.2	21.9	25.9
Yes	29.2	0.0	17.9

Source: Brandywine Counseling & Community Services, Inc., 2017.

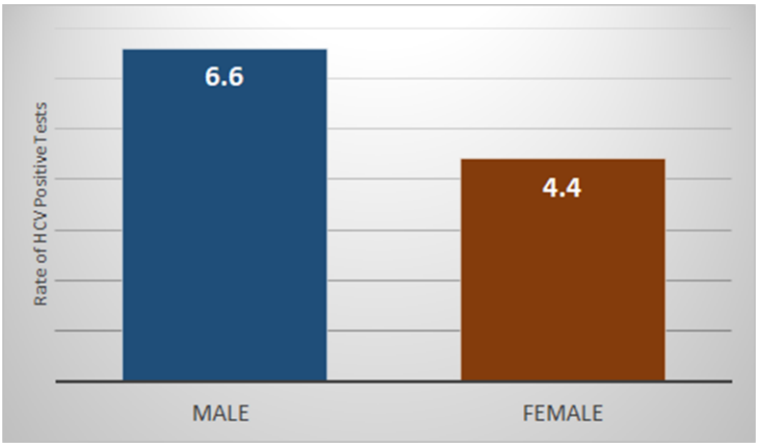
Table 11: Syringe Program, Rate (per 100 tested) of HCV Positive Tests by Incarceration, FY2016-2017

Incarcerated	FY 2016	FY 2017	FY2016-17 Pooled
No	27.5	7.8	20.4
Yes	28.7	27.5	28.3

Source: Brandywine Counseling & Community Services, Inc., 2017.

Community Outreach and Prevention Education (COPE)

Figure 7: COPE Program, Rate of HCV Positive Tests (per 100 tested) by Gender, Delaware, FY2017

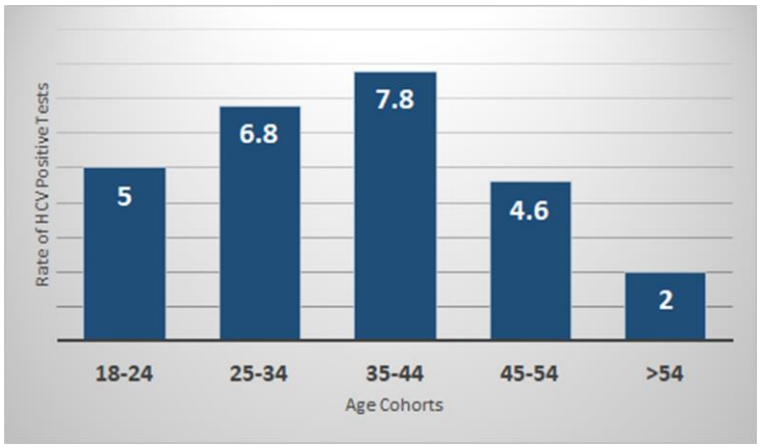


Source: Brandywine Counseling & Community Services, Inc., 2017.

The COPE program performed 283 HCV tests in FY 2017, with a positive rate of 5.3 per 100 persons tested. Males had a higher rate of positives (6.6 per 100 tested) compared with females (4.4 per 100 tested) (Figure 7, Table 12). There is no difference in the rate when examining ethnicity of individuals tested (Table 13). However, the positive rate for whites (15.3 per 100 tested) is much higher than blacks (1.1 per 100 tested) tested in this program (Table 14). The Hepatitis C Epidemiologic Profile Work Group should monitor this difference as data for the second year becomes available. Inspecting positive rates by age group shows that the middle age group, 35-44, has the highest positive rate (7.8 per 100 tested), when compared with the other age cohorts (Table 15, Figure 8).

Two risk factors have a major impact on HCV-positive rates in this program: having unprotected sex with a person who injects drugs, and using heroin (risk factors are not mutually exclusive). The positive rate for an individual who had unprotected sex with a person who injects drugs (46.2 per 100 tested) was more than eight times higher than the positive rate for all individuals (5.3 per 100 tested) (Table 16). The positive rate for heroin users (37.5 per 100 tested) was seven times higher than the rate for all individuals (5.3 per 100 tested) (Table 16).

Figure 8: COPE Program, Rate of HCV Positive Tests (per 100 tested) by Age Cohort, Delaware, FY2017



Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 12: COPE Program, Rate of HCV Positive Tests per 100 Tested, By Gender, Delaware, FY2017

Gender	Rate of Positives per 100 tested
Male	6.6
Female	4.4

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 13: COPE Program, Rate of HCV Positive Tests per 100 Tested, By Ethnicity, Delaware, FY2017

Ethnicity	Rate of Positives per 100 tested
Hispanic	5.0
Non-Hispanic	5.3

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 14: COPE Program, Rate of HCV Positive Tests per 100 Tested, By Race, Delaware, FY2017

Race	Rate of Positives per 100 tested
Black	1.1
White	15.3

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 15: COPE Program, Rate of HCV Positive Tests per 100 Tested, By Age, Delaware, FY2017

Age	Rate of Positives per 100 tested
18 – 24	5.0
25 – 34	6.8
35 – 44	7.8
45 – 54	4.6
>54	2.0

Source: Brandywine Counseling & Community Services, Inc., 2017.

Table 16: COPE Program, Rate of HCV Positive Tests per 100 Tested, By Risk Factors, Delaware, FY2017

Risk Factor	Rate of Positives per 100 tested
No sexual risk factors	6.8
Had unprotected sex with a person who injects drugs	46.2
Unprotected sex with multiple partners	3.8
Used heroin past 30 days	37.5
No known substance use risk factors	2.0

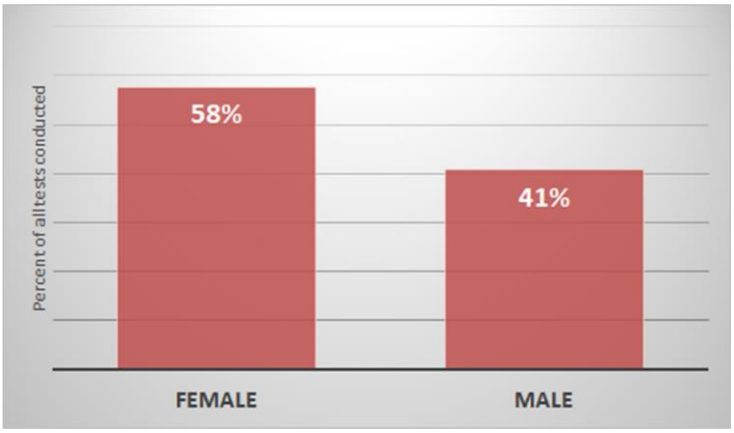
Source: Brandywine Counseling & Community Services, Inc., 2017.

Walgreens Local Specialty Pharmacies - Delaware HIV Consortium

The new Walgreens specialty pharmacy in the City of Wilmington is one of more than 260 Walgreens Community and Health System pharmacies that focus on community-based and patient-centered care for managing complex health conditions such as cancer, cystic fibrosis, HIV/AIDS, hepatitis C, and transplants. Walgreens Local Specialty Pharmacies provide comprehensive support, such as helping patients with medication adherence and therapies; connecting them to financial assistance programs; and providing refill reminder and automatic refill services. The pharmacies also offer insurance coordination of benefits and home delivery. Walgreens' new pharmacy helps empower patients with chronic, complex, and rare health conditions by providing access to specialty and traditional medications. Further, Walgreens has collaborated with the Delaware HIV Consortium to provide HIV and Hepatitis C testing at three local pharmacies. This collaboration increased patient access to testing while reducing the overall stigma associated with HIV and HCV, and it assists patients in navigating their treatment.

The Delaware HIV Consortium is a statewide non-profit organization [501(c) (3)] established to facilitate collaboration among its community partners and to ensure that quality, non-duplicative HIV treatment and prevention services are available throughout Delaware. Partners include HIV/AIDS service providers, civic leaders, public health professionals, representatives of private business, and persons living with HIV. Since the Consortium began conducting HCV testing in February 2017, there is only seven months' worth of program data available at this time. As of August 2017, 71 tests for HCV were conducted; there were no positive results. Walgreens' Wilmington locations conducted the majority of the tests (76%) and the Delaware HIV Consortium conducted the remaining (24%) tests. The majority of individuals tested were blacks (75%). There was a larger proportion of females (58%) than males (41%) (Figure 9) and the average age was 42 years old.

Figure 9: Delaware HIV Consortium HCV Testing, by Gender, 2/2017 – 8/2017



Source: Delaware HIV Consortium, 2017.

Medicaid HCV Testing

The Medicaid medical claims data for the period 2009–2015 was examined for Current Procedural Terminology (CPT) or Healthcare Common Procedure Coding System (HCPCS) codes indicating HCV testing (Table 17). The claims data does not contain test results, so any positive rates are not presented.

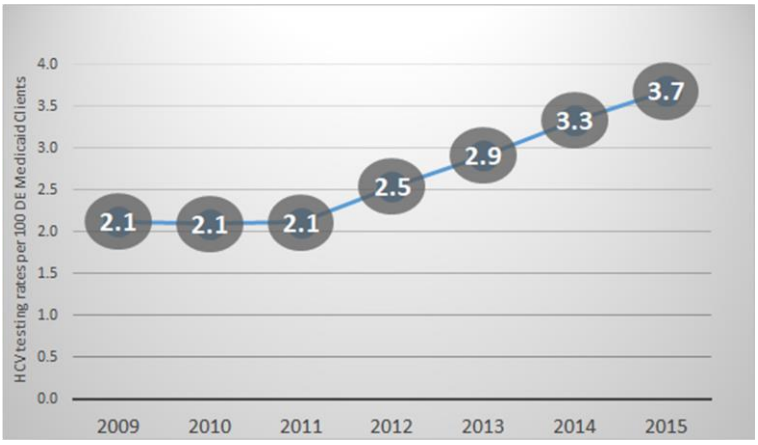
Table 17: Current Procedure Terminology and Healthcare Common Procedure Coding System codes used to measure Medicaid testing in 2009-2015

Description	Current Procedure Terminology
Hepatitis C antibody	86803
Hepatitis C antibody confirmatory test	86701
Hepatitis C direct probe technique	87520
Hepatitis C, amplified probe technique	87521
Hepatitis C quantification	87522
Hepatitis C Viral RNA, Quantitative, Real-Time PCR	86704
Hepatitis C, confirmatory test (with reflect)	86804
Infectious agent genotype analysis by nucleic acid (DNA or RNA); Hepatitis C virus	87902
Hepatitis C genotype test	3266F
Screening for Hepatitis C	G0472

Source: American Medical Association (2017); Centers for Medicare and Medicaid Services (2017).

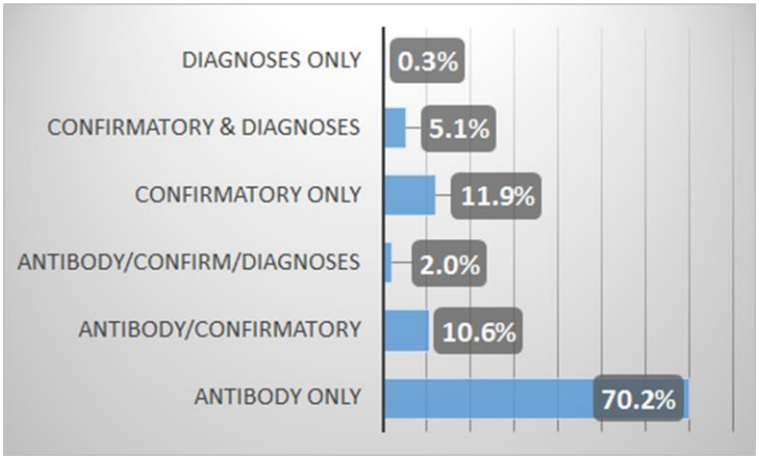
The number of Medicaid-insured individuals with a claim for a test rose steadily between 2011 and 2015, from 2.1 per 100 Medicaid clients in 2011 to 3.7 in 2015 (Figure 10). While clinical test results are not available via claims data, the type of tests were examined. Of those Medicaid clients with an HCV testing claim, two-thirds had only antibody tests over all the years (Figure 11). Another 11% had both antibody and confirmatory tests. Approximately 12% had only confirmatory tests, likely indicating that those individuals had antibody tests elsewhere or in earlier years.

Figure 10: Rates per 100 Medicaid Clients with HCV Test Claims, Delaware, 2009-2015



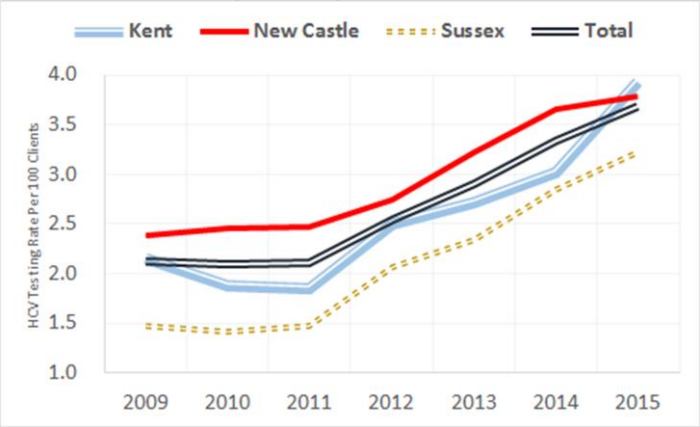
Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Figure 11: Medicaid Clients who had HCV Tests, by Type, Delaware, 2015



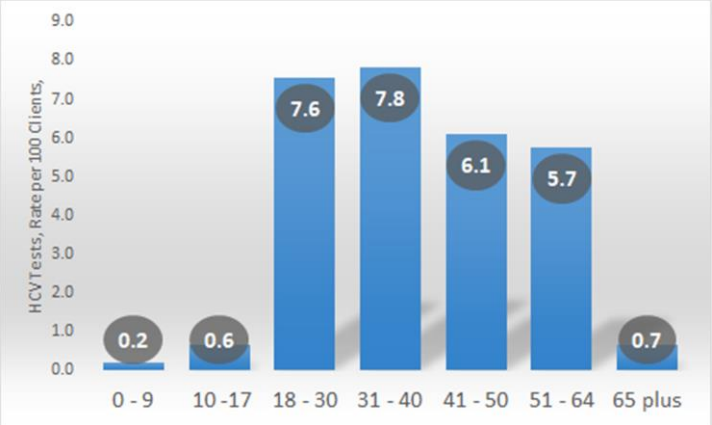
Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Figure 12: Medicaid Clients who had HCV Tests per 100 clients, by County, Delaware, 2009-2015



Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Figure 13: Medicaid Clients who had HCV Tests per 100 clients, by Age, Delaware, 2015



Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Rates of Delaware Medicaid client HCV test claims by county reflect the same pattern as the testing rates for all of Delaware in the 2009-2015 period (Table 18, Figure 12). New Castle County consistently has a higher rate of HCV testing than the other two counties and exceeds the average rate for the state. Sussex County had the lowest rate of HCV testing during each year.

While the rates for 18-64 year-olds have mirrored the rates for the total in the period 2009-2015, the rates for children (less than 18 and older) and older adults (65 years and older) have remained fairly consistent and much lower than the rates for the other age cohorts (Table 19). The 18-30 and 31-40 age cohorts had the highest rates of testing (Figure 13).

When the HCV testing rates of Delaware Medicaid clients were examined by gender, females consistently had higher rates of HCV testing than males in 2009-2015 (Table 20). In 2011 and 2012, the female testing rate was more than three times that of males; by 2013-2015, that gap narrowed to less than two times the male testing rates.

White Medicaid clients had a slightly higher rate of testing than black clients throughout 2009-2015. While Hispanic client testing rates increased in the same period, they remain lower than Blacks and Whites (Table 21).

Table 18: Delaware Medicaid Clients with HCV Test Claims, Rates per 100 clients, by County, 2009-2015

County	2009	2010	2011	2012	2013	2014	2015
Kent	2.1	1.9	1.8	2.5	2.7	3.0	3.9
New Castle	2.4	2.5	2.5	2.7	3.2	3.6	3.8
Sussex	1.5	1.4	1.5	2.1	2.3	2.8	3.2
Total	2.1	2.1	2.1	2.5	2.9	3.3	3.7

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 19: Medicaid Clients with HCV Test Claims, by Age Group, Rates per 100 Clients, Delaware, 2009-2015

Age Group	2009	2010	2011	2012	2013	2014	2015
0 – 9	0.1	0.1	0.1	0.1	0.2	0.2	0.2
10 -17	0.5	0.5	0.6	0.6	0.8	0.6	0.6
18 – 30	4.5	4.3	4.3	5.5	6.2	6.9	7.6
31 – 40	4.3	4.0	3.9	4.7	5.7	6.5	7.8
41 – 50	4.3	4.5	4.0	4.4	5.0	5.5	6.1
51 – 64	3.9	3.7	3.7	4.3	4.7	5.5	5.7
>64	0.3	0.2	0.4	0.5	0.9	1.0	0.7
Total	2.1	2.1	2.1	2.5	2.9	3.3	3.7

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 20: Medicaid Clients with HCV Test Claims, by Gender, Rates per 100 Clients, Delaware, 2009-2015

Age Group	2009	2010	2011	2012	2013	2014	2015
Males	1.4	1.4	1.0	1.3	2.0	2.3	2.7
Females	2.6	2.6	3.6	4.2	3.6	4.1	4.5
Total	2.1	2.1	2.1	2.5	2.9	3.3	3.7

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 21: Medicaid Clients with HCV Test Claims, by Race/Ethnicity, Rates per 100 clients, Delaware, 2009 - 2015

Age Group	2009	2010	2011	2012	2013	2014	2015
Black	2.1	2.3	2.4	2.8	3.1	3.5	3.9
White	2.4	2.2	2.2	2.7	3.2	3.7	4.2
Hispanic	1.4	1.3	1.2	1.4	1.7	2.0	2.2
Other	1.7	1.5	1.4	1.7	1.9	1.9	1.8
Total	2.1	2.1	2.1	2.5	2.9	3.3	3.7

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

HCV HEALTH SERVICES UTILIZATION

HCV health services utilization are shown in three ways: (1) hospital utilization for all HCV and HCV-associated liver disease; (2) HCV-related hospital and emergency department (ED) utilization by Medicaid clients; and (3) treatment through the Christiana Care Community Program.

Hospital Utilization for treatment of HCV

The number of hospital discharges for HCV decreased between 2012 and 2013 and then increased slightly between 2013 and 2014 (Table 22). HCV-associated liver disease hospitalizations increased slightly each year between 2012 and 2014. The three-year average cost for HCV hospital discharges and HCV-associated liver disease discharges were similar (Table 23). The average length of hospital stay was five days (Table 24).

Table 22: Average Delaware Hospital Discharges Associated with HCV and Liver Disease, Delaware, 2012-2014

Year	HCV Hospital Discharges		HCV Associated Liver Disease Hospital Discharges	
	Number	% Change	Number	% Change
2012	2,348	-	899	-
2013	2,162	-7.9%	931	3.6%
2014	2,216	2.5%	1,009	8.4%
3-year Average	2,242		946	

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 23: Cost of Hospital Discharges Associated with HCV and Liver Disease, Delaware, 2012-2014

Year	HCV Hospital Discharge	HCV Associated Liver Disease Hospital Discharges
2012	$23,032	$24,565
2013	$21,683	$20,447
2014	$21,716	$20,682
3-year Average	$22,144	$21,898

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

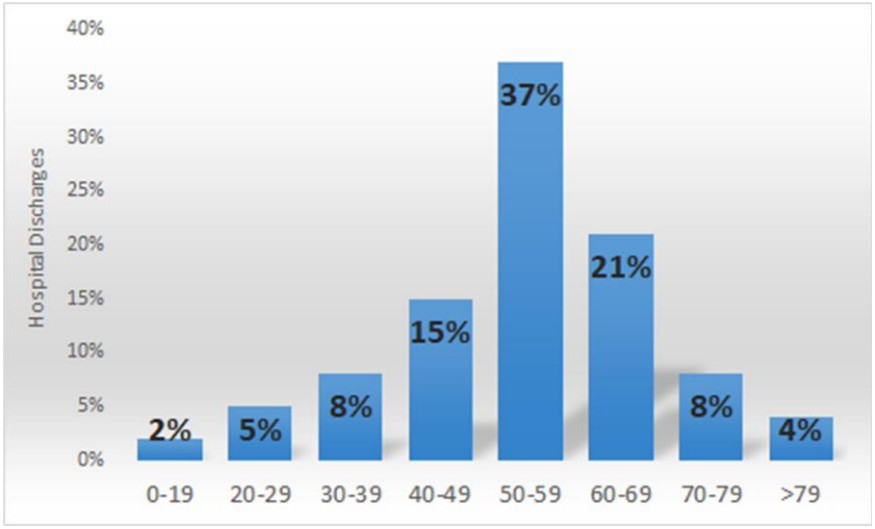
Table 24: Average Length of Stay of Hospital Visits (Days) due to HCV and HCV-associated Liver Disease, Delaware, 2012-2014

Type of Discharge	2012	2013	2014
HCV discharges	5	5	5
Liver Disease Associated with HCV	5	5	5

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

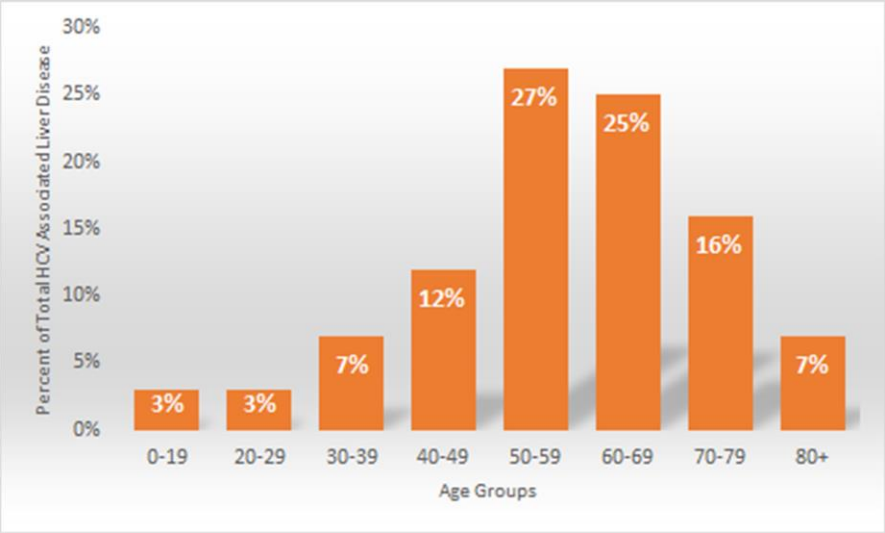
The highest prevalence of HCV-associated hospitalizations in Delaware was among individuals 50-59 years old (Figure 14, Table 25). Overall, more than two-thirds of Delaware's HCV hospitalizations (70%) occurred among individuals 50 years or older. This same pattern is found in HCV liver disease hospital discharges (Figure 15, Table 26).

Figure 14: Three-year Average Distribution of HCV-associated Hospital Discharges, by Age, Delaware, 2012-2014



Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

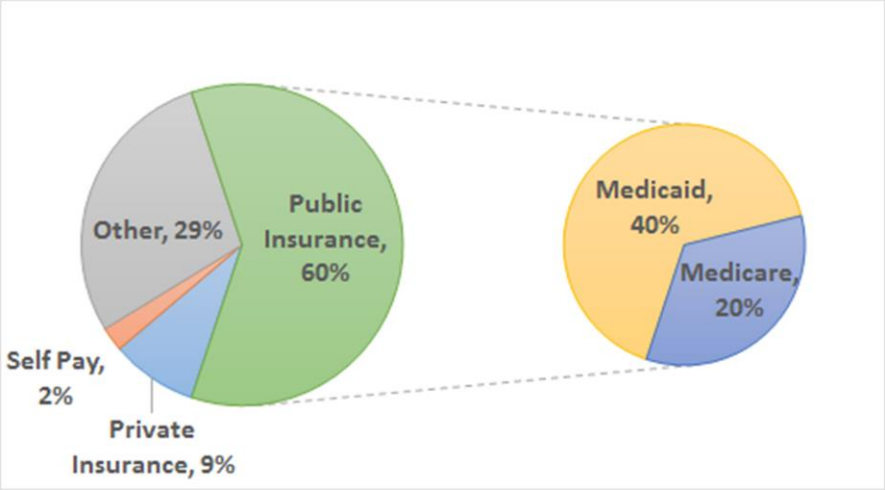
Figure 15: Three-year Average of the Distribution of Hospital Discharges for HCV-associated Liver Disease, by Age, Delaware, 2012-2014



Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Males had slightly more HCV-associated hospital discharges than females (56% vs. 44%, three-year average, Table 27). Male/female distribution was equal for similar HCV liver disease hospitalizations (Table 28). More than two thirds of those hospitalized were white in both HCV- and HCV-associated liver disease discharges (66% and 73% respectively, Tables 29 and 30).

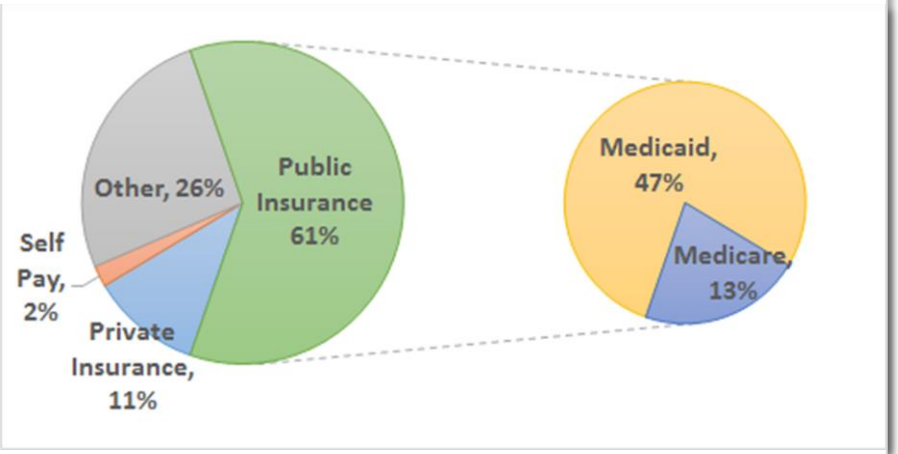
Figure 16: Three-year Average of Hospital Discharges Associated with HCV, by Insurance Coverage, Delaware, 2012-2014



Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Insurance coverage for both types of HCV discharges was through private and public coverage. Almost two thirds for both types of discharges were covered by public insurance (60% and 61% respectively). Most of the public insurance was Medicaid coverage (Figures 16 and 17, Tables 31 and 32).

Figure 17: Three-year Average of Hospital Discharges Associated with HCV Liver Disease, by Insurance Coverage, Delaware, 2012-2014



Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 25: Hospital Discharges Associated with HCV, by Age, Delaware, 2012-2014

Age Group	2012		2013		2014		3 Year Average	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
0-19	46	2%	33	1%	22	1%	33	2%
20-29	88	4%	102	5%	113	5%	101	5%
30-39	158	7%	201	9%	205	9%	188	8%
40-49	379	16%	313	14%	317	14%	336	15%
50-59	943	40%	794	37%	762	34%	833	37%
60-69	464	20%	453	21%	491	22%	469	21%
70-79	164	7%	194	9%	213	10%	190	8%
80+	106	5%	72	3%	93	4%	90	4%
Total	2,348	100%	2,162	100%	2,216	100%	2,242	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 26: Hospital Discharges with HCV-associated Liver Disease, by Age, Delaware, 2012-2014

Age Group	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
0-19	42	5%	25	3%	21	2%	29	3%
20-29	25	3%	34	4%	35	3%	31	3%
30-39	54	6%	61	7%	81	8%	65	7%
40-49	91	10%	114	12%	122	12%	109	12%
50-59	277	31%	232	25%	263	26%	257	27%
60-69	207	23%	255	27%	252	25%	238	25%
70-79	126	14%	153	16%	165	16%	148	16%
80+	77	9%	57	6%	70	7%	68	7%
Total	899	100%	931	100%	1,009	100%	946	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 27: Hospital Discharges Associated with HCV, by Gender, Delaware, 2012-2014

Age Group	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Male	1,316	56%	1,248	58%	1,226	55%	1,263	56%
Female	1,032	44%	914	42%	990	45%	979	44%
Total	2,348	100%	2,162	100%	2,216	100%	2,242	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 28: Hospital Discharges with HCV-Associated Liver Disease, by Gender, Delaware, 2012-2014

Age Group	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Male	430	48%	489	53%	504	50%	474	50%
Female	469	52%	442	47%	505	50%	472	50%
Total	899	100%	931	100%	1,009	100%	946	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 29: Hospital Discharges Associated with HCV, by Race, Delaware, 2012-2014

Race	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
White	1579	67%	1,400	65%	1,456	66%	1,478	66%
Black	642	27%	621	29%	610	28%	624	28%
Other	127	5%	141	7%	150	7%	139	6%
Total	2,348	100%	2,162	100%	2,216	100%	2,242	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 30: Hospital Discharges with HCV-Associated Liver Disease, by Race, Delaware, 2012-2014

Race	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
White	701	78%	667	72%	713	71%	694	73%
Black	147	16%	177	19%	214	21%	179	19%
Other	51	6%	87	9%	82	8%	73	8%
Total	899	100%	931	100%	1,009	100%	946	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 31: Hospital Discharges Associated with HCV, by Insurance Coverage, Delaware, 2012-2014

Insurance Status	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Medicaid	975	42%	844	39%	854	39%	891	40%
Medicare	623	27%	320	15%	433	20%	459	20%
Private Insurance	341	15%	116	5%	129	6%	195	9%
Self-Pay	97	4%	46	2%	21	1%	55	2%
Other	312	13%	836	39%	779	35%	642	29%
Total	2,348	100%	2,162	100%	2,216	100%	2,242	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Table 32: Hospital Discharges with HCV-associated Liver Disease, by Insurance Coverage, Delaware, 2012-2014

Insurance Status	2012		2013		2014		3 Year Average	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Medicaid	440	49%	449	48%	458	45%	449	47%
Medicare	137	15%	91	10%	145	14%	124	13%
Private Insurance	179	20%	71	8%	66	7%	105	11%
Self-Pay	31	3%	20	2%	9	1%	20	2%
Other	112	12%	300	32%	331	33%	248	26%
Total	899	100%	931	100%	1,009	100%	946	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Health Statistics Center, 2017.

Delaware Medicaid Clients and HCV Diagnoses

The Internal Classification for Diseases (ICD) codes (version 9 and 10) are used to examine Medicaid medical claims data for HCV (Table 33). Version 9 was used for all claims prior to October 2015. Version 10 was adopted on October 1, 2015. The codes used to identify chronic and liver issues are indicated on the table.

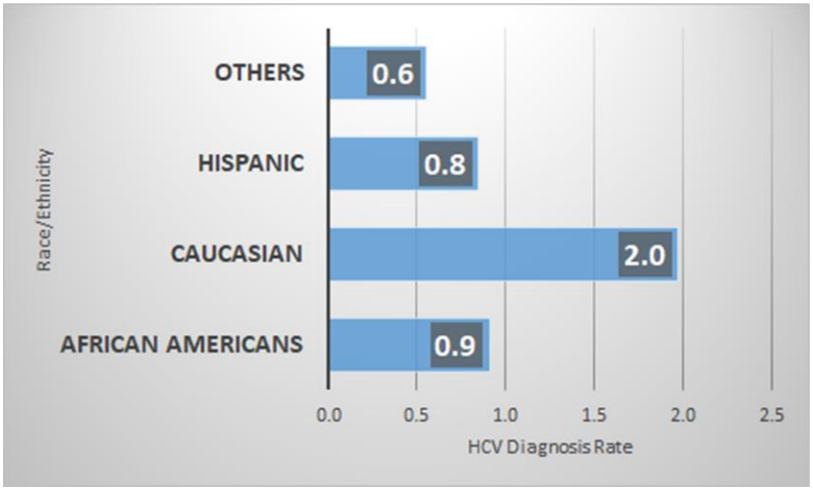
Table 33: ICD9/ICD10 Codes Used to Evaluate Medicaid Claims for HCV Diagnoses

Codes	Description	Liver or Chronic?
ICD 9 Codes		
07041	Acute Hepatitis C With Hepatic Coma	
07044	Chronic Hepatitis C With Hepatic Coma	Chronic
07049	Other specified viral hepatitis with hepatic coma	
07051	Acute Hepatitis C Without Mention Of Hepatic Coma	
07054	Chronic Hepatitis C Without Mention Of Hepatic Coma	Chronic
07070	Unspecified Viral Hepatitis C Without Hepatic Coma	
07071	Unspecified Viral Hepatitis C With Hepatic Coma	
5715	Cirrhosis Of Liver Without Mention Of Alcohol	Liver
5718	Other Chronic Nonalcoholic Liver Disease	Liver
5719	Unspecified Chronic Liver Disease Without Mention Of Alcohol	Liver
V0260	Viral Hepatitis carrier, unspecified	
V0262	Hepatitis C carrier	
V0269	Other viral hepatitis carrier	
V1209	Personal History Of Other Infectious And Parasitic Diseases	

ICD 10 Codes		
B1710	Acute Hepatitis C Without Mention Of Hepatic Coma	
B1711	Acute Hepatitis C With Hepatic Coma	
B178	Other specified acute viral hepatitis	
B182	Chronic viral hepatitis C	Chronic
B1920	Unspecified Viral Hepatitis C Without Hepatic Coma	
B1921	Unspecified Viral Hepatitis C With Hepatic Coma	
K7460	Unspecified cirrhosis of liver	Liver
K7689	Other specified diseases of liver	Liver
K769	Liver disease, unspecified	Liver
K77	Liver disorders in diseases classified elsewhere	Liver
Z2250	Viral Hepatitis carrier, unspecified	
Z2252	Hepatitis C carrier	
Z2259	Other viral hepatitis carrier	
Z8619	Personal History Of Other Infectious And Parasitic Diseases	

Source: National Center for Health Statistics (2014 and 2015). International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) and International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM).

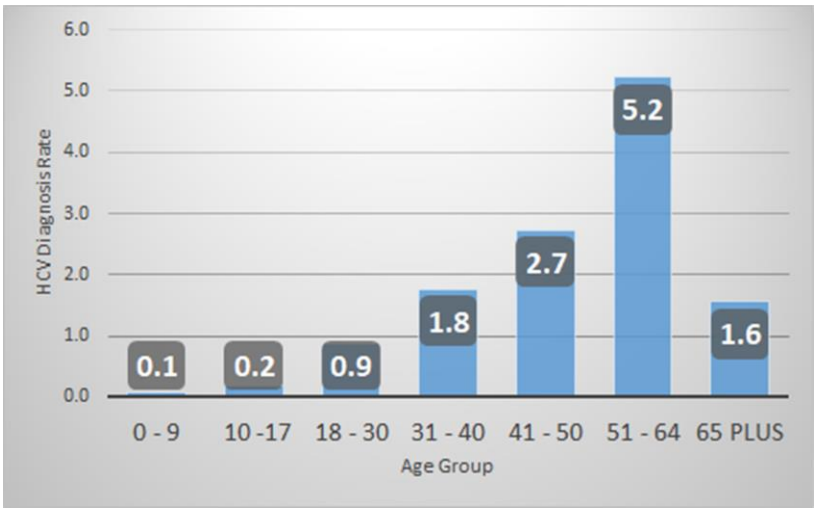
Figure 18: Medicaid Clients, Medical Claims with HCV Diagnoses, Rate per 100 Clients, by Race, Delaware, 2015



Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

The rate of clients with HCV claims remained stable during the period 2009-2015, ranging from 1.0 in 2009 to 1.3 in 2015. (Table 34). The percent of clients with an HCV test and HCV medical claims varied slightly over the years, from 18.2% in 2009 to 14.4% in 2015 (Table 35). The medical claims were also examined for ICD-9/10 codes that indicated liver disease or chronic HCV (Table 36). Approximately half of the HCV medical claims were associated with liver disease; more than one third were chronic HCV diagnoses.

Figure 19: Medicaid Clients, Medical Claims with HCV Diagnoses, Rate per 100 Clients, by Age, Delaware, 2015



Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

The rate by gender does not differ greatly; however, between 2013 and 2015, men had a slightly higher rate than women (Table 37). Whites consistently had a higher rate than blacks and Hispanics, while Hispanics and blacks had similar rates (Figure 18, Table 38). Older clients (51-64) have the highest rate among all the other age cohorts (Figure 19, Table 39). There was little difference by county (Table 40).

Table 34: Medicaid Clients, Medical Claims with HCV Diagnoses, Delaware, 2009-2015

Year	Number with HCV diagnoses	Rate of Clients with HCV Claims per 100 Clients
2009	1,823	1.0
2010	2,247	1.2
2011	2,290	1.1
2012	2,420	1.2
2013	2,249	1.1
2014	2,846	1.3
2015	3,052	1.3

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 35: Medicaid Clients, Clients with Both HCV Tests and HCV Medical Claims, Delaware, 2009-2015

Year	Number with Claims with HCV Testing and HCV Diagnoses Medical Claims	Percent of Clients Tested for HCV
2009	685	18.2%
2010	745	18.6%
2011	766	17.8%
2012	892	16.9%
2013	888	14.4%
2014	1,156	15.6%
2015	1,395	16.7%

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 36: Medicaid Clients, Liver and Chronic HCV Diagnoses among Clients with HCV Medical Claims, Delaware, 2009-2010

Year	Liver diagnoses		Chronic diagnoses	
	Number	Percent of All Medical Claims w/HCV Diagnoses	Number	Percent of All Medical Claims w/HCV Diagnoses
2009	789	43%	788	43%
2010	1,203	54%	845	38%
2011	1,173	51%	892	39%
2012	1,318	54%	950	39%
2013	1,052	47%	873	39%
2014	1,376	48%	1,129	40%
2015	1,290	42%	1,283	42%

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 37: Medicaid Clients, Medical Claims with HCV Diagnoses, by Gender, Delaware, 2009-2015

Year	Males		Females	
	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients
2009	933	1.3	890	0.9
2010	1,096	1.3	1,151	1.0
2011	1,125	1.0	1,165	1.3
2012	1,184	1.0	1,234	1.4
2013	1,152	1.3	1,097	0.9
2014	1,449	1.5	1,395	1.1
2015	1,583	1.6	1,466	1.1

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 38: Medicaid Clients, Medical Claims with HCV Diagnoses, by Race/Ethnicity, Delaware, 2009-2015

Year	Blacks, non-Hispanics		Whites, non-Hispanic		Hispanic		Others	
	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients
2009	507	0.7	1122	1.4	146	0.6	48	1.0
2010	617	0.8	1378	1.6	210	0.8	45	0.9
2011	622	0.8	1430	1.6	193	0.7	45	0.8
2012	664	0.8	1503	1.7	203	0.7	50	0.9
2013	560	0.7	1461	1.6	190	0.6	38	0.6
2014	725	0.8	1790	1.8	272	0.8	59	0.8
2015	786	0.9	1923	2.0	284	0.8	59	0.6

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 39: Medicaid Clients, Medical Claims with HCV Diagnoses, by Age Cohort, Delaware, 2009-2015

Age group	2009		2010		2011		2012		2013		2014		2015	
	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients
0 - 9	20	0.0	17	0.0	17	0.0	26	0.0	42	0.1	41	0.1	51	0.1
10 -17	27	0.1	28	0.1	36	0.1	32	0.1	44	0.1	69	0.2	72	0.2
18 - 30	191	0.6	241	0.6	247	0.6	267	0.7	244	0.6	340	0.8	368	0.9
31 - 40	252	1.5	344	1.8	338	1.6	371	1.7	296	1.3	382	1.5	448	1.8
41 - 50	616	3.9	712	4.1	641	3.4	638	3.3	546	2.8	577	2.8	559	2.7
51 - 64	643	4.9	791	5.3	908	5.3	978	5.1	964	4.7	1,279	5.2	1,380	5.2
65 plus	70	0.7	113	1.2	100	1.0	106	1.1	106	1.0	147	1.4	165	1.6
Total*	1,819	1.0	2,246	1.2	2,287	1.1	2,418	1.2	2,242	1.1	2,835	1.3	3,043	1.4

**Some cases excluded due to missing age data.*
Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 40: Delaware Medicaid Clients, Medical Claims with HCV Diagnoses, by County, 2009-2015

County	2009		2010		2011		2012		2013		2014		2015	
	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients	Number with HCV claims	Rate per 100 clients
Kent	377	1.1	419	1.1	455	1.1	539	1.3	514	1.3	637	1.5	580	1.3
New Castle	1,006	1.0	1,358	1.3	1,357	1.2	1,372	1.2	1,169	1.0	1,490	1.2	1,665	1.3
Sussex	436	1.0	465	1.0	474	1.0	498	1.0	561	1.1	710	1.3	786	1.5
Total*	1,819	1.0	2,242	1.2	2,286	1.1	2,409	1.2	2,249	1.1	2,837	1.3	3,031	1.3

**Some cases excluded due to missing county data.*
Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

HCV-Related Prescription Use of Delaware Medicaid Clients

Although prescription costs for HCV drug treatments are expensive, today they can essentially ensure an individual is "cured" for many HCV strains. Prior to 2016, the Delaware Medicaid program only paid for HCV drug treatments for individuals with late stage liver damage. In 2016, the policy was changed by Delaware Medicaid to allow approval for medication based on an individual's HCV genotype, regardless of the stage of liver damage. This policy was fully implemented by January 2018.

The Medicaid prescription claims were examined for prescriptions for various HCV drug treatments. Between 2012 and 2015, the number of clients receiving HCV prescriptions varied from 69 to 171 individuals (Table 41). The use of Ribavirin, Interferon, and Incivek decreased over this period; the use of Harvoni, approved by the U.S. Food and Drug Administration (FDA) in October 2014, was the most prescribed medication for Delaware Medicaid HCV clients in 2015.

Table 41: Medicaid Clients Receiving HCV Prescriptions, Delaware, 2012-2015

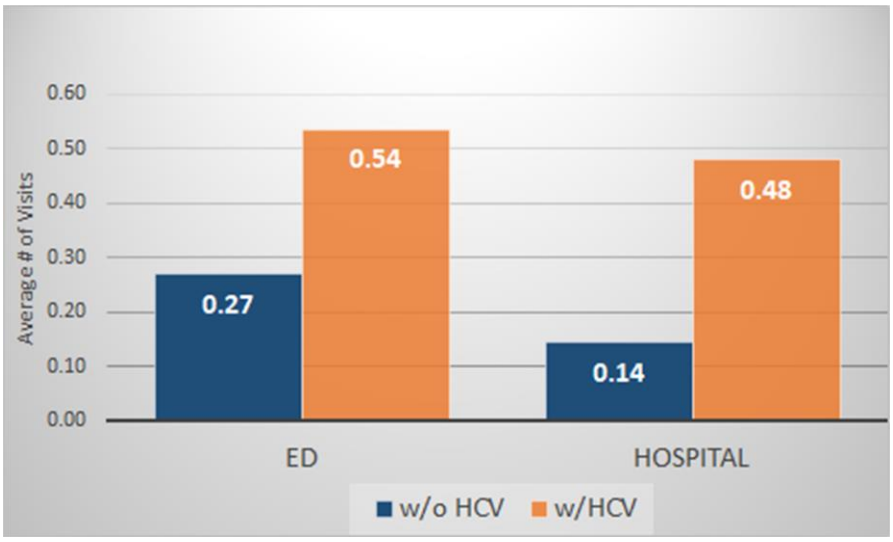
Year	Number with prescriptions	Ribavirin	Interferon	Harvoni	Olysio	Solvadi	Viekira	Incivek	Victrelis
2012	171	171	163	0	0	0	0	110	0
2013	100	99	98	0	0	0	0	43	0
2014	69	65	27	<11	<11	17	0	<11	0
2015	145	33	<11	114	<11	11	<11	0	0

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Medicaid Emergency Department (ED) and Hospital Utilization

During the period 2009-2015, the average ED use for Medicaid clients with HCV-related medical claims was consistently and significantly higher than for Medicaid clients without HCV-related claims (Figure 20, Table 42). T-tests were performed on the differences in each year and were found to be significant (p<.0001). Medicaid clients with HCV also had a higher number of hospitalizations in 2009-2015, compared to Medicaid clients without HCV-related medical claims (Table 43). Again, the difference between averages for the two groups is significant in each year (p<.0001).

Figure 20: Medicaid Clients, Average ED and Hospital Visits, Delaware, 2015



Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 42: Medicaid Clients, Average Emergency Department Visits, by HCV claim, Delaware, 2009-2015

Year	Average Number of ED Visits	
	Clients w/HCV claim	Clients w/o HCV claim
2009	0.57	0.28
2010	0.57	0.22
2011	0.87	0.33
2012	0.77	0.30
2013	0.66	0.27
2014	0.49	0.22
2015	0.54	0.27

Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Table 43: Medicaid Clients, Average Hospital Visits, by HCV claim, Delaware, 2009-2015

Year	Average Number of Hospital Visits	
	Clients w/HCV Claims	Clients w/o HCV Claims
2009	0.48	0.14
2010	0.48	0.13
2011	0.47	0.13
2012	0.59	0.15
2013	0.62	0.15
2014	0.55	0.14
2015	0.48	0.14

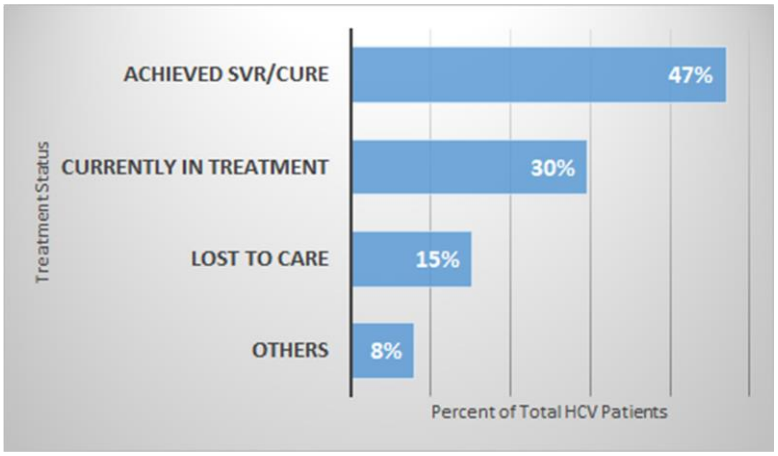
Source: Center for Community Research & Service, University of Delaware, 2017. Compiled with data provided by the Delaware Department of Health and Social Services, Division of Medicaid & Medical Assistance through a partnership with of the University's Colleges of Health Sciences and Arts & Sciences.

Christiana Care Community Program

The Christiana Care Health Services (CCHS) Community Program has been the major provider of HIV medical services throughout Delaware since 1986. As Delaware's only Ryan White Part C and Part D grantee since 1997, the Community Program developed clinical sites in each of Delaware's three counties. These sites are integrated into the communities with the highest rates of HIV infection, and represent collaborations with DPH, BGOC, Brandywine Counseling and Community Services (BCCS-drug and alcohol treatment), and Westside Family Healthcare (WSFH), a federally qualified health center (FQHC). These collaborations allow outreach to be conducted, provide direct linkage into care, and provide clients with alternative sites for care to enhance access. Currently, the Community Program is providing comprehensive care to over 1,700 patients with HIV infection, approximately 25% of whom are co-infected with Hepatitis C. The Community Program continues to provide treatment for Hepatitis C for this co-infected population (72 in 2017). In 2014, in response to a demonstrated need, the Community Program expanded services to provide treatment to those with Hepatitis C who are not co-infected with HIV.

As of August 2017, the program treated 138 HCV mono-infected patients. Most (84%) were treated in New Castle County, while a minority were treated at the clinical sites in Kent County (14%) or Sussex County (2%). The majority of HCV mono-infected patients had genotypes 1a (68%) or 1b (12%). Currently, 30% of the patients are in treatment (Figure 21). Among patients who completed liver fibrosis testing, more than half (54%) had evidence of advanced fibrosis or cirrhosis (fibrosis scores of F3, F3-F4, or F4).

Figure 21: Christiana Care Community Program HCV Outcomes, Mono-infected, Delaware, as of August 2017



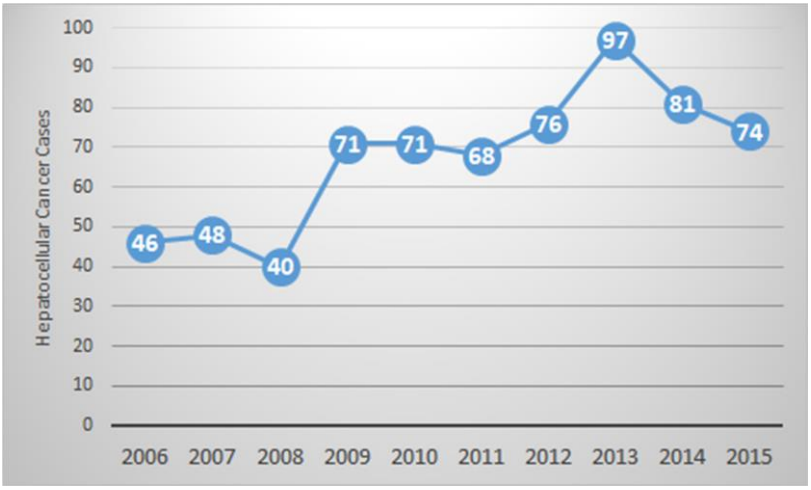
Source: Christiana Care Health System, 2017.

Almost half (47%) have achieved sustained virologic response (SVR). SVR results when HCV continues to be undetectable three months after treatment is complete. Patients with SVR are considered to be cured, as late relapse is very rare. Of those who achieved an SVR, the most frequent regimens used were ledipasvir /sofosbuvir (41%) and elbasvir/grazoprevir (37%).

HCV AND CANCER

As stated previously, 1-5% of chronic HCV individuals die from cirrhosis and liver cancer (CDC, 2016a). The Delaware Cancer Registry began in 1996 to record all reported cancer cases. Health care providers are required by state law to provide this information to the Cancer Registry.

Figure 22: Hepatocellular Cancer Cases, Delaware, 2006-2015



Source: Delaware Department of Health and Social Services, Division of Public Health, Cancer Registry.

There was an increase of 31 hepatocellular cases between 2008 and 2009, but over the following years, the number of cases varied little other than a jump in 2013 (Figure 22). Three-fourths of the individuals with cancer were males throughout all years (Table 44), although gender distribution was somewhat equal in the cases reported to DPH. Individuals with cancer are also in the higher age cohorts (Table 45) and are mostly whites (Table 46).

Table 44: Hepatocellular Cancer Cases, by Gender, Delaware, 2006-2016

Gender	2006		2007		2008		2009		2010		2011	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total	No.	% of total	No.	% of total
Male	35	76%	---	---	---	---	55	77%	---	---	50	74%
Female	11	24%	---	---	---	---	16	23%	---	---	18	26%
Total	46	100%	48	100%	40	100%	71	100%	71	100%	68	100%

Gender	2012		2013		204		2015		2016	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total	No.	% of total
Male	63	83%	64	66%	67	83%	60	81%	---	---
Female	13	17%	33	34%	14	17%	14	19%	---	---
Total	76	100%	97	100%	81	100%	74	100%	44	100%

Source: Compiled from data provided by the Delaware Department of Health and Social Services, Division of Public Health, Cancer Registry.
NOTES: (1) Counts less than 11 are not shown. (2) Not all Hepatitis C cases are reported to the Delaware Cancer Registry so this information may be incomplete. (3) 2016 data is incomplete.

Table 45: Hepatocellular Cancer Cases, by Age Cohort, Delaware, 2006-2016

Age Category	2006		2007		2008		2009		2010		2011	
	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total
Under 40	---	---	---	---	---	---	---	---	---	---	---	---
40-49	---	---	---	---	---	---	---	---	---	---	---	---
50-59	14	30%	20	42%	11	28%	30	42%	21	30%	26	38%
60-69	17	37%	22	46%	14	35%	22	31%	17	24%	22	32%
70 and older	11	24%			13	33%	13	18%	27	38%	17	25%
Total	46	100%	48	100%	40	100%	71	100%	71	100%	68	100%

Age Category	2012		2013		2014		2015		2016	
	Number	% of total	Number	% of total	Number	% of total	Number	% of total	Number	% of total
Under 40	---	---	---	---	---	---	---	---	---	---
40-49	---	---	---	---	---	---	---	---	---	---
50-59	28	37%	33	34%	22	27%	26	35%	27	61%
60-69	26	34%	39	40%	32	40%	25	34%		
70 and older	18	24%	23	24%	24	30%	21	28%	16	36%
Total	76	100%	97	100%	81	100%	74	100%	44	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Cancer Registry.
NOTES: (1) Counts less than 11 are not shown. (2) Not all Hepatitis C cases are reported to the Delaware Cancer Registry so this information may be incomplete. (3) 2016 data is incomplete.

Table 46: Hepatocellular Cancer Cases, by Race, Delaware, 2006-2016

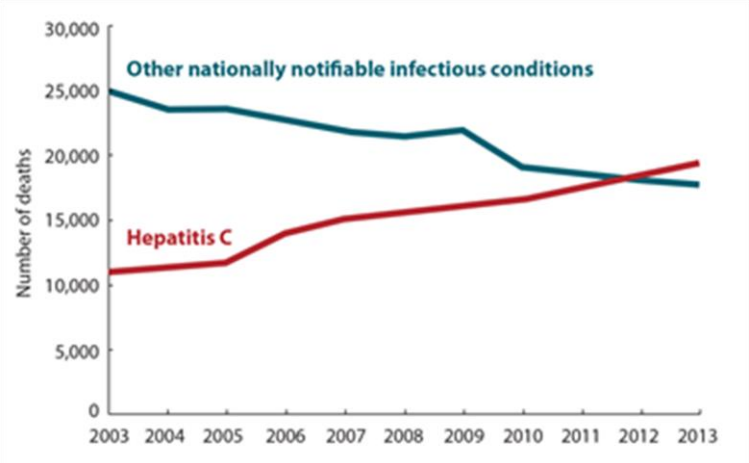
Race	2006		2007		2008		2009		2010		2011	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total	No.	% of total	No.	% of total
White	30	65%	31	65%	---	---	46	65%	53	75%	44	65%
Blacks	14	30%	14	29%	---	---	20	28%	15	21%	21	31%
Total	46	100%	48	100%	40	100%	71	100%	71	100%	68	100%

Race	2012		2013		2014		2015		2016	
	No.	% of total	No.	% of total	No.	% of total	No.	% of total	Number	% of total
White	56	74%	72	74%	53	65%	55	74%	30	68%
Blacks	15	20%	24	25%	25	31%	16	22%	13	30%
Total	76	100%	97	100%	81	100%	74	100%	44	100%

Source: Delaware Department of Health and Social Services, Division of Public Health, Cancer Registry.
NOTES: (1) Counts less than 11 are not shown. (2) Not all Hepatitis C cases are reported to the Delaware Cancer Registry so this information may be incomplete. (3) 2016 data is incomplete.

HCV MORTALITY

Figure 23: Hepatitis C-related deaths versus other nationally notifiable infections conditions, U.S., 2003–2013



Source: Lye et al, 2016. Reprinted with permission.

Nationally, the number of deaths attributable to HCV increased by 75% from 11,051 to 19,368, between 2003 and 2013. The CDC estimates that deaths related to HCV are now greater than deaths from all the other infectious conditions in the U.S. (Lye et al, 2016) (Figure 23). In Delaware, HCV deaths per 100,000 are slightly lower than the national estimates and decreased between 2013 and 2015 (Table 47). Delaware HCV rates per 100,000 are similar to the HIV rates shown in Table 47. In 2015, however, HCV rates were below HIV rates. The rates for HCV/HIV, HCV/cancer, and HIV/cancer are not calculated due to the low number of deaths in these co-infection categories.

Table 47: Number of Deaths with Hepatitis C, HIV or Cancer as One of the Causes of Death, Delaware, 2012-2015

Year of Death	HCV Only	HCV per 100,000 population	HIV only	HIV per 100,000 population	Hep C and HIV	Hep C and Cancer	HIV and Cancer
2012	32	3.5	35	3.8	<11	16	<11
2013	40	4.3	31	3.3	<11	<11	<11
2014	34	3.6	34	3.6	<11	12	<11
2015	25	2.6	31	3.3	<11	17	<11

In keeping with the CMS suppression rules, cell numbers less than 11 are suppressed.
ICD codes use for HCV: B17.1, B18.2; ICD codes for HIV: B20-B24; ICD codes for Cancer: C00-C97
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

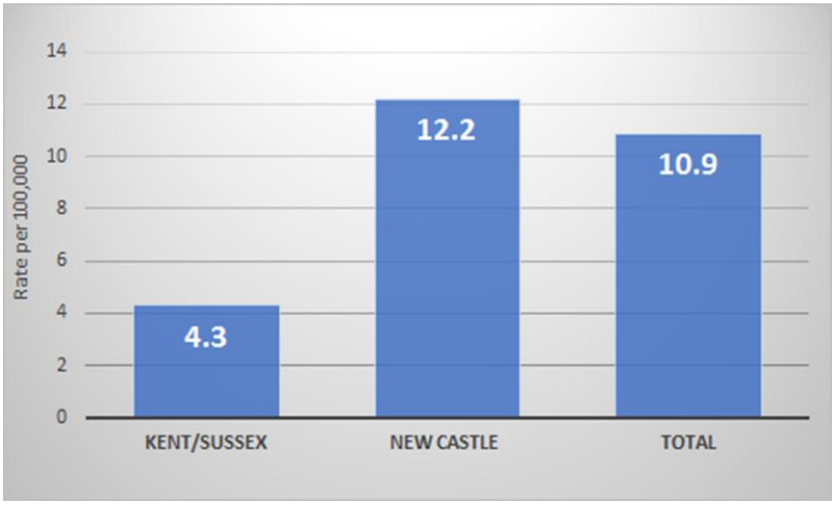
DELAWARE HCV/HIV CO-INFECTION

The CDC recommends that individuals with HIV also be tested for HCV, especially HIV-infected injection users. The CDC estimates that 25% of HIV-infected individuals are also infected with HCV (CDC, 2015). The co-infection of HCV and HIV may cause chronic HCV to progress faster. It is unclear if HCV hastens the progress of HIV (U.S. Department of Health & Social Services, 2017).

An analysis of DPH's HCV and HIV reports to determine co-infections yielded an incidence rate of 85 cases in 2016.

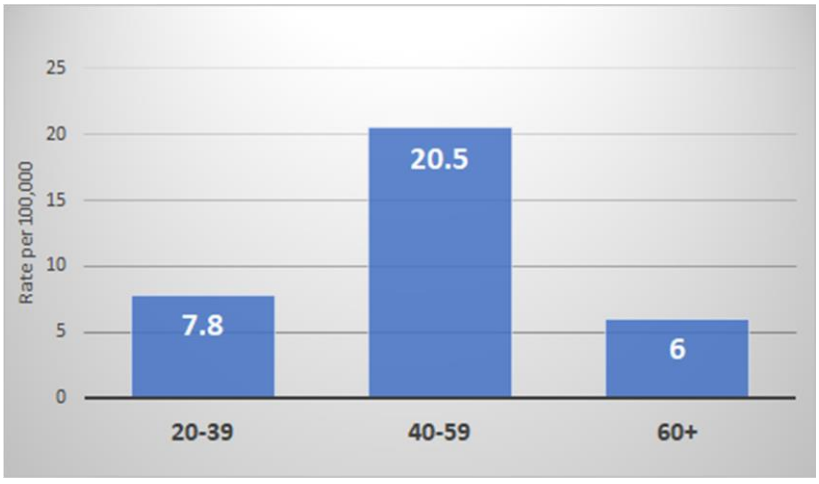
The New Castle County HCV/HIV co-infection rate (12.2 per 100,000) is almost three times larger than both Kent and Sussex counties (4.3 per 100,000 combined) (Figure 24, Table 55). Individuals ages 40-59 have a rate of 20.5 per 100,000, more than twice of other age groups (Table 56, Figure 25). Males (13.5 per 100,000) have a higher rate than females (4.7 per 100,000) (Table 57). The rate among blacks (25.9 per 100,000) is seven times higher than among whites (3.7 per 100,000) (Table 58).

Figure 24: HCV/HIV Co-infection Rate per 100,000, by County, Delaware, 2016



Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Figure 25: HCV/HIV Co-infection Rate per 100,000, by Age, Delaware, 2016



Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 48: HCV/HIV Co-infection, by County, Delaware, 2016

County	Number	Percent	Rate per 100,000
Kent/Sussex	17	20%	4.3
New Castle	68	80%	12.2
Total	85	100%	10.9

Kent and Sussex counties are aggregated due to the low number of cases in each county.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 49: HCV/HIV Co-infection, by Age, Delaware, 2016

Age Group	Number	Percent	Rate per 100,000
20-39	19	22%	7.8
40-59	51	60%	20.5
60+	15	18%	6.0
Total	85	100%	10.9

Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 50: HCV/HIV Co-Infection, by Gender, Delaware, 2016

Gender	Number	Percent	Rate per 100,000
Female	23	41%	4.7
Male	62	59%	13.5
Total	85	100%	10.9

Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 51: HCV/HIV Co-Infection, by Race, Delaware, 2016

Race	Number	Percent	Rate per 100,000
Black	52	35%	25.9
White	24	18%	3.7
Total	85	100%	10.9

Missing = 9
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

HEPATITIS B IN DELAWARE

Like HCV, Hepatitis B (HBV) is a viral infection that attacks the liver and has common methods of transmission similar to HCV. There has been a vaccine against HBV since 1982, and it is 95% effective in preventing the disease. The World Health Organization (WHO) and the CDC recommend that babies receive the vaccine within 24 hours of birth. In the 1990s, U.S. states started requiring the vaccine and, by 2000, 47 states mandated that children be vaccinated against HBV before entering school. (Conis, E., 2011).

Since the adoption of the HBV vaccine, the total number of HBV cases in the United States decreased, and the majority of cases now occurs among adults. The range of individuals who have HBV in the United States is estimated to be between 850,000 and 2.2 million (CDC, 2016a). In 2014, there were approximately 19,200 new cases of HBV reported in the United States but like HCV, the true prevalence is thought to be much higher; many individuals may have HBV but do not know it. The U.S. incidence rate of HBV was 0.9 per 100,000 in 2014 and 1.1 per 100,000 in 2015. Delaware's rate, 0.8 per 100,000 in 2015, is below the national rate (CDC, 2017b).

In addition to HBV vaccination, the CDC (CDC, 2018) recommends:

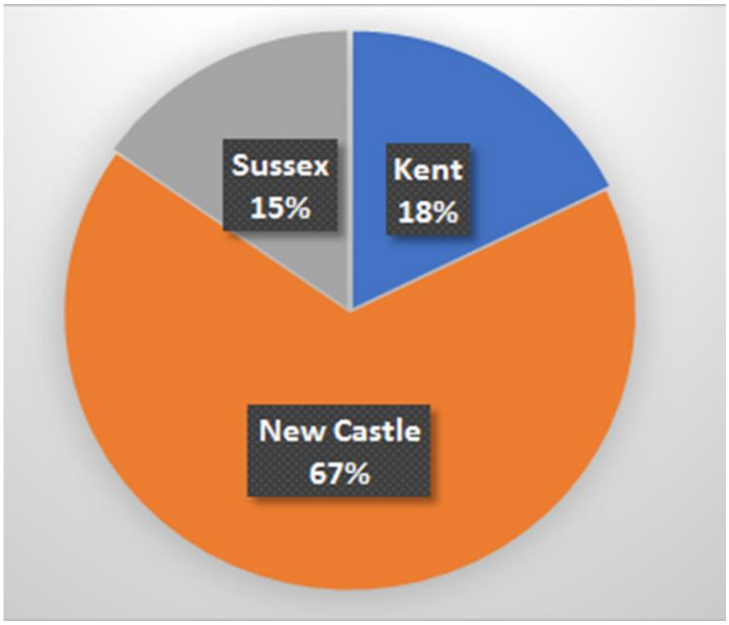
- Testing HBsAG-positive pregnant women
- Post-vaccination serologic testing for infants when they do not know the HBsAG status of the mother
- Single-dose re-vaccination for infants of HBsAG positive mothers who haven't responded to the initial vaccine
- Vaccination for person with chronic liver disease (for example, HCV infection).

When examining HCV cases, it is important to consider HBV because individuals with a HBV/HCV co-infection are at greater risk of serious health impacts. "Numerous studies have demonstrated that dually infected patients carry a greater risk of advanced liver disease, cirrhosis and hepatocellular carcinoma compared with monoinfected patients." (Konstantinou, D. and Deutsch, M., 2015, p 221). While the rate of co-infection is not exactly known, based on the National Health and Nutrition Examination Survey III, the rate of HCV/HBV co-infection is estimated to be 25% (HEP, 2016).

Hepatitis B Surveillance

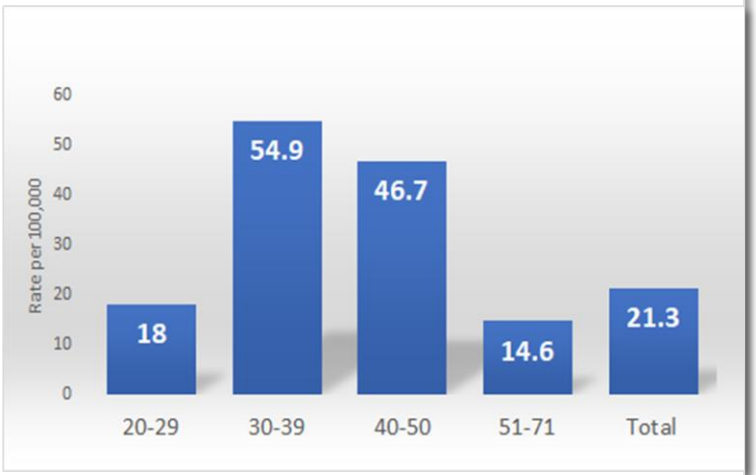
There were 203 new cases of HBV reported in Delaware in 2016. Similar to HCV, HBV cases are reported to DPH through lab reports and providers' offices. The overall Delaware incidence rate for HBV in 2016 is 21.3 per 100,000. The majority of HBV cases were found in New Castle County (67%), which also has the highest rate of 24.4 per 100,000 (Figure 26, Table 59). Age cohorts 30-39 and 40-50 have rates at least double that of other age cohorts (Figure 27, Table 60). Males (26.0 per 100,000) have a higher rate than females (16.9 per 100,000) (Table 61). Blacks (35.4 per 100,000) have an incidence rate that is six times higher than whites (5.6 per 100,000) (Table 62).

Figure 26: Percent of Hepatitis B Cases, by County, Delaware, 2016



Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Figure 27: Rate of Hepatitis B Cases, per 100,000, by Age, Delaware, 2016



Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 52: Hepatitis B Cases by County, Delaware, 2016

County	Number	Percent	Rate per 100,000
Kent	36	18%	20.6
New Castle	136	67%	24.4
Sussex	31	15%	14.1
Total	203	100%	21.3

Source: Delaware Department of Health and Social Services, Division of Public Health, HBV Registry, 2017.

Table 53: Hepatitis B Cases by Age Cohort, Delaware, 2016

Age Group	Number	Percent	Rate per 100,000
<= 19	*Suppressed*		
20 – 29	23	11%	18.0
30 – 39	64	32%	54.9
40 – 50	53	26%	46.7
51 - 71	53	26%	14.6
71 plus	*Suppressed*		
Total	203	100%	21.3

Missing=1

Suppressed: Too few cases to report.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 54: Hepatitis B Cases by Gender, Delaware, 2016

Gender	Number	Percent	Rate per 100,000
Female	83	41%	16.9
Male	120	59%	26.0
Total	203	100%	21.3

Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Table 55: Hepatitis B Cases by Race, Delaware, 2016

Race	Number	Percent	Rate per 100,000
Black	71	35%	35.4
White	36	18%	5.6
Other	75	37%	90.0
Unknown	21	10%	
Total	203	100%	21.3

Rates not calculated for unknown category.
Source: Delaware Department of Health and Social Services, Division of Public Health, 2017.

Hepatitis B Perinatal Cases

Perinatal HBV poses a threat to the well-being of infants. The CDC estimates that 40% of infants born to mothers with HBV will develop chronic HBV themselves. Of this group of infants, one-fourth will die at some point from liver disease (CDC, 2017c).

There were 44 infants born to HBV mothers each year between 2012 and 2016 in Delaware's HVB Registry. The majority of HBV-positive mothers were either black (45%) or Asian (39%), and only 5% were reported with Hispanic ethnicity (Figure 28). DPH has an effective program to ensure all babies born to HBV infected mothers receive appropriate treatment. There have been no recent cases of perinatal-acquired HBV.

Figure 28: Delaware HBV Perinatal Cases 2012 - 2016

HBV Perinatal cases 2012 - 2016

- Number of infants born to HBV-positive women: 44 per year
- Number of infants identified as HBV-positive during reporting year: 0*
- Average Maternal age: 30.8 years of age (range 20 – 43 years)
- Maternal race: 45% Black; 39% Asian; 16% White
- 5% of the cases were reported with Hispanic ethnicity

** Some babies born to HBV-positive mothers may be lost to follow-up (mothers may be foreign born and return their countries, or move to different states without forwarding addresses). Some mothers may be non-compliant and do not take their children for serology, even after efforts to educate them on the importance.*

Source: Delaware Department of Health and Social Services, Division of Public Health, HBV Registry, 2017.

HCV/HBV Co-infected

As previously stated, HCV/HBV co-infection may lead to more serious health outcomes for the individual. In 2016, there was an incidence of less than 10 HCV/HBV co-infection cases in the Delaware program. The prevalence of HCV/HBV co-infection is unknown.

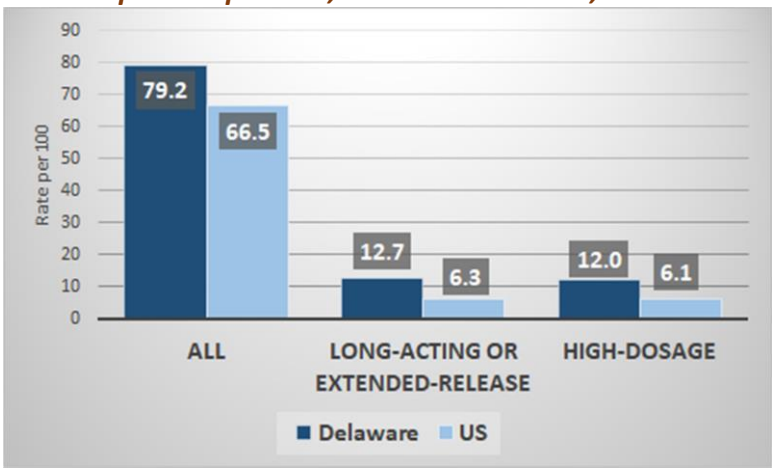
OPIOIDS

The growth of new HCV cases in the U.S. is strongly associated with the increase in opioid use over the past several years (Zibbel et al (2015). Injecting/injection drug use (IDU), the most common risk factor for HCV, is also common among individuals who misuse prescription opioids. Gombas et al (2000) found that 80% of the opioid users in his 2000 study tested positive for HCV antibodies and of those, 67% were found to be infected for HCV. Murphy et al (2015) state that successful treatment of opioid disorders improves the chances of the start of treatment for HCV. Increasingly, health care providers are advised not to prescribe opioids as the first-line treatment for chronic pain (excluding active cancer, palliative, or end-of-life care). Instead, the CDC recommends the use of non-opioid therapies such as rehabilitative services

and physical therapy, cognitive behavior therapy and relaxation techniques, exercise and strength training, and non-opioid medications. In addition, providers are encouraged to identify co-existing mental health conditions and guide the patient into accessing local treatment options.

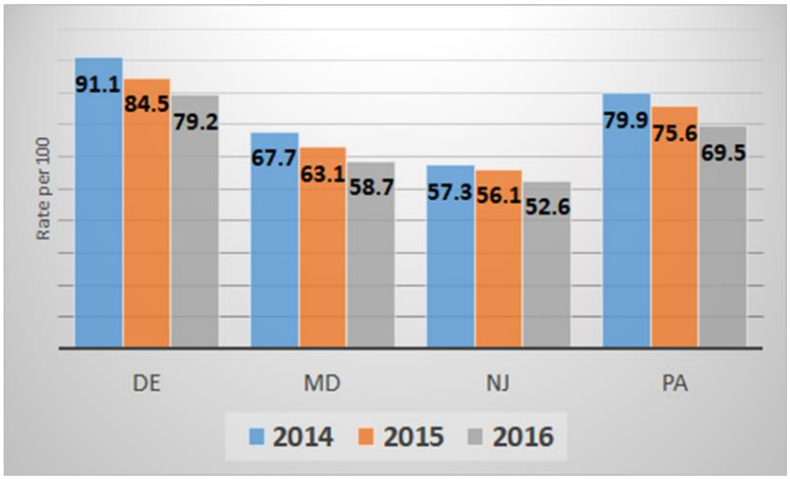
DHSS is working with many other agencies, organizations, and communities to identify and reach those with substance use disorders quickly and match them to the treatment services they require.

Figure 29: Rates of opioid prescriptions dispensed per 100 persons, U.S. and Delaware, 2016



Source: CDC National Center for Injury Prevention and Control (2017d). Annual Surveillance Report of Drug-Related Risks and Outcomes.

Figure 30: Rates of opioid prescriptions dispensed per 100 persons, Delaware and Neighboring States, 2014-2016



Source: CDC National Center for Injury Prevention and Control (2017d). Annual Surveillance Report of Drug-Related Risks and Outcomes.

The CDC (2017d) notes the decrease of abuse of prescription opioids because of heightened monitoring and awareness of over-prescribing by the states and health providers. Although prescription opioids are no longer the main driver of the opioid epidemic, misuse of prescription opioids is still a contributor to the problem (Centers for Disease Control and Prevention, 2017d). When compared to the surrounding states of Maryland, New Jersey, and Pennsylvania, Delaware had the highest opioid prescription, long acting or extended-release (LA/ER), and high-dosage rates per 100 people for the years 2014-2016. (Figure 29). The LA/ER and high-dosage prescribing rates in Delaware were approximately twice as high as the rate for the U.S. (Figure 30).

Moving Forward

The work group has compiled a list of recommendations for Delaware as "next-steps" for moving forward the work on HCV in Delaware.

Recommendations of the Hepatitis C Epidemiologic Profile Work Group

- ✓ Disseminate The *Hepatitis C Epidemiological Profile* (HCV Epi profile) by posting it on the DPH website, the University of Delaware website, and on a new Adult Viral Hepatitis Program (AVHP) webpage to be developed. Update the HCV Epi profile bi-annually.
- ✓ Implement risk-based prevention and intervention strategies such as community and patient education/awareness. Increase awareness of HCV through public campaigns that promote testing among baby boomers and others at high risk for HCV infection.
- ✓ Educate and train non-specialist providers such as nurse practitioners (NPs) and primary care physicians (PCPs) to serve as community-based providers. Integrate a strategy referred to as "task shifting," where treatment is shared among PCPs and specialists within the community (the burden of treatment has thus far been borne by specialists such as gastroenterologists, hepatologists, and infectious disease physicians) in an effort to bridge the gap in hepatitis C treatment and provide a continuum of care for those infected (Ahmed et al., 2017).
- ✓ Improve reporting of HCV infections to identify newly acquired infections with a goal to identify underlying risk factors and prevent further spread.
- ✓ Increase engagement with other public health department programs (HIV, STD, etc.) to integrate viral hepatitis testing, thereby increasing provider capacity and readiness to diagnose and treat HCV through the use of targeted training/educational opportunities (i.e.: webinars) and the development of a hepatitis specific webpage.
- ✓ Encourage automatic reflex to polymerase chain reaction (PCR) testing for all anti-HCV antibody positive tests to reduce the incidence of "non-confirmed" disease.
- ✓ Improve coordination of viral hepatitis services (i.e.: testing, screening, linkage-to-care, treatment) with community based organizations (CBOs)/clinical settings and expand service integration with the DHSS Division of Substance Abuse and Mental Health (DSAMH), Department of Corrections (DOC), additional Federally Qualified Health Centers (FQHCs), CBOs, hospitals, and emergency departments (EDs). This will serve to improve access to care by expanding testing, screening, linkage-to-care, and treatment.
- ✓ Guide the development of policies and legislation to improve HCV treatment outcomes.
- ✓ Build a Hepatitis Coalition comprised of various partners, stakeholders, CBOs, and legislators throughout the state who will advise the DPH about HCV.

- ✓ Establish a baseline of HCV knowledge to further guide research, identify grant-funding opportunities, and implement additional interventions to improve data collection and surveillance.
- ✓ Establish a protocol to track and monitor perinatal HCV transmission.

DELAWARE HCV PROGRAMS & RESOURCES

Community Outreach and Prevention Education (COPE). Brandywine Counseling & Community Services' mobile medical outreach unit, which covers free health screenings including HIV and HCV.

https://www.brandywinecounseling.com/cope/

DPH Adult Viral Hepatitis Program. The mission of DPH's program is to "provide statewide management, education and training for the prevention of viral hepatitis."

http://www.dhss.delaware.gov/dph/dpc/hepatitis.html

DPH Campaign for Baby Boomers. DPH's HCV campaign educates providers about testing baby boomers for HCV.

http://www.dhss.delaware.gov/dph/dpc/hepatitis.html

DPH Clinics. Since August 2016, DPH has provided HCV testing and counseling. DPH has clinics throughout the state (Dover, Georgetown, Milford, Seaford, and Wilmington).

http://dhss.delaware.gov/dph/chs/chshiv.html

Syringe Services Programs (SSP). https://www.brandywinecounseling.com/ssp/

Walgreens Hepatitis Services. Testing and treatment referrals.

https://www.walgreens.com/topic/pharmacy/hepatitis-services.jsp

Wilmington Annex HIV program and testing. Delaware Community HIV/AIDS Wellness Clinic. Provides counseling and testing needs for both HIV and HCV.

http://dhss.delaware.gov/dhss/dph/dpc/hivwellness.html

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