Perinatal Hepatitis C Surveillance Summary

Background

Hepatitis C virus (HCV) is a single-stranded Ribonucleic acid (RNA) virus which causes liver inflammation that can progress over time to advanced fibrosis, cirrhosis, and hepatocellular carcinoma. HCV is one of the most common bloodborne pathogens in the United States. Rates of HCV have increased gradually in the United States since 2010, and as a result, the number of HCV infections during pregnancy increased by 20% from 2016-2020. Perinatal transmission is limited to infants greater than 2 months and younger than 36 months of age born to mothers with detectable HCV RNA.

Perinatal HCV became nationally notifiable in 2018, meaning that it became required to be reported to the Centers for Disease Control and Prevention (CDC) by state and local health departments due to public interest by reason of their contagiousness, severity, or frequency. However, implementation of perinatal HCV surveillance is not yet widespread with only 28 states, including Ohio, reporting perinatal cases to CDC as of 2022. CDC prioritizes perinatal HCV surveillance to prevent transmission and increase identification of HCV in infants and children born to HCV-positive mothers. The overall goals of perinatal HCV surveillance are to ensure that infants born to HCV-positive mothers are identified, appropriately tested for HCV, and linked to care. HCV-associated liver disease usually progresses slower in children than adults, but if left untreated, infected children remain at risk for cirrhosis or liver cancer.

Perinatal HCV Follow-up

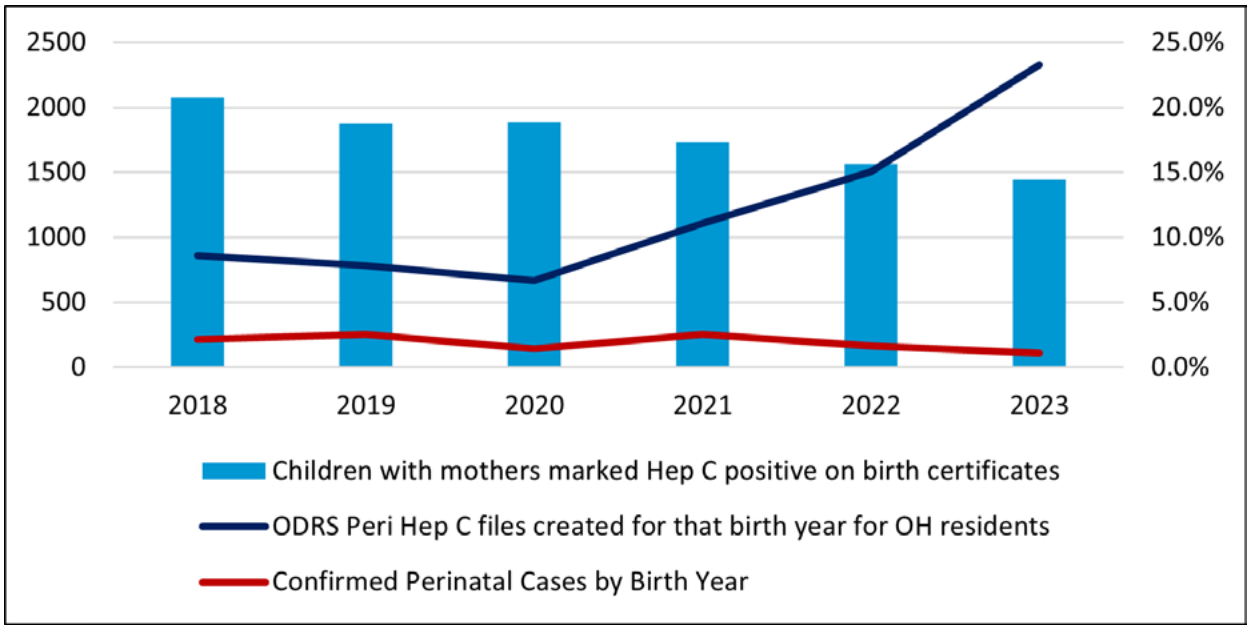
Birth certificate data was pulled from Ohio's Vital Statistics data warehouse managed by the Ohio Department of Health for the years 2018 through 2023. The data revealed information such as the number of live births to Ohio residents for each year, race, ethnicity, country of birth, demographics for both the infant and parents, the HCV status of the mother, amongst other variables. This information allowed for the matching of perinatal HCV records created in the Ohio Disease Reporting System (ODRS) to be linked to their HCV-tested mothers. SAS programming and Microsoft Excel were used to filter and organize several variables in birth data, followed by analysis of the data.

Analysis

Ohio has seen a downward trend of children whose mothers were marked HCV-positive on birth certificates, while seeing an upward trend of infants and young children being tested for HCV. The HCV-positive designation is used when describing persons, not infants, who are HCV RNA-positive or who are hepatitis C virus antibody (anti-HCV)-positive with no evidence of a detection test (HCV RNA) being performed.

In 2018, Ohio had 2,079 mothers marked HCV-positive on birth certificates. Of those 2,079 positive mothers, 179 perinatal HCV files were created in ODRS, resulting in 8.6% of perinatally-exposed children having been tested. In 2023, 1,445 mothers were marked HCV-positive, with 336 perinatal files created in ODRS, resulting in 23.3% of perinatally-exposed children being tested, Figure 1.

Figure 1. Mother and Infant Testing, Ohio, 2018-2023



Ohio's efforts to request onboarding laboratories to voluntarily submit negative HCV RNA test results led to a 170.9% testing increase from 2018 to 2023. In 2018, 57 perinatal HCV records were marked "not a case" in ODRS for testing negative for HCV RNA, compared to 297 perinatal records classified as "not a case" in 2023. The number of negative labs received for all HCV cases, acute, chronic and perinatal, nearly tripled in count from 2018-2023, increasing from 11,751 total results in 2018 to 34,463 total results in 2023. CDC's case definition explains that a negative HCV RNA test result, alone or corresponding with a positive HCV antibody result, indicates that a person is not infectious for HCV. Persons exposed to HCV will remain antibody positive, which could be consistent with a current HCV infection or past HCV infection that has been resolved; however, HCV RNA testing determines if the person is currently infectious (confirmed positive case) or has cleared the infection (not a case). While negative HCV RNA reporting in Ohio is not mandated, obtaining negative results provides a clearer understanding of the overall HCV case positivity. This is achieved by excluding individuals who are not actively infected from Ohio's morbidity numbers, as well as accounting for the number of infants undergoing testing.

Data used from Ohio's Vital Statistics data warehouse during 2018-2023 indicates that a total of 10,574 mothers were marked HCV-positive on birth certificates. Table 1 shows that, of those marked HCV-positive, 1,213 perinatal HCV files were created in ODRS, with 228 infants testing positive for HCV RNA, resulting in an estimated 2.16% of perinatally-exposed infants becoming infected between 2018-2023. Although screening is recommended during every pregnancy in which a mother tests positive for HCV, the data is likely underestimated due to undiagnosed HCV infections in pregnant women.

Table 1. Mother and Infant Testing, Ohio, 2018-2023

Year	Children with HCV-positive mother on birth certificates	ODRS Perinatal HCV files created for OH residents	Confirmed Perinatal Cases by MMWR Year
2018	2,079	179	40
2019	1,874	147	41
2020	1,883	125	39
2021	1,728	191	42
2022	1,565	235	27
2023	1,445	336	39
Total	**10,574**	**1,213**	**228**

In Ohio, from 2018-2023, there were 228 reported cases of children under 3 years of age being confirmed perinatal HCV cases through a positive HCV RNA. Of these cases, most mothers were diagnosed with HCV prior to pregnancy or delivery (n=175). In Table 2, "Prior to delivery" is defined as the mother being diagnosed during pregnancy. "At the time of delivery" includes the mother being diagnosed within a few days before or after delivery, while "unknown" means any perinatal case who did not have a birth record during the time of data extraction or whose mother did not have a positive RNA on file.

Table 2. Hepatitis C Diagnosis of Birth Mother by MMWR Year

Year	After delivery n (%)	At the time of delivery n (%)	Prior to delivery n (%)	Prior to pregnancy n (%)	Unknown n (%)	Total n
2018	4 (10%)	1 (3%)	5 (13%)	26 (65%)	4 (10%)	40
2019	2 (5%)	3 (7%)	9 (22%)	23 (56%)	4 (10%)	41
2020	0 (0%)	2 (5%)	7 (18%)	26 (67%)	4 (10%)	39
2021	1 (2%)	1 (2%)	10 (24%)	27 (64%)	3 (7%)	42
2022	0 (0%)	0 (0%)	2 (7%)	18 (67%)	7 (26%)	27
2023	3 (8%)	0 (0%)	4 (10%)	18 (46%)	14 (36%)	39

Identification of an HCV-positive mother during or after delivery necessitates coordination of case management to ensure appropriate testing of their infant for perinatal HCV transmission. Multiple factors could correlate with increased risk for perinatal HCV transmission among mothers who are HCV RNA-positive during pregnancy such as: maternal HCV RNA levels, co-infection

with Human immunodeficiency viruses (HIV), maternal injection drug use, intrapartum exchange of fluids, and breastfeeding. All infants born to mothers with HCV should have follow-up HCV RNA testing performed between two and six months of age. However, research has shown (2) that HCV testing for infants born to mothers with HCV often does not occur. Early identification of HCV will result in fewer undiagnosed infections in the pediatric and young adult population and create opportunities to link infants to care so that they can be evaluated for treatment with direct-acting antiviral (DAA) medications once they are three years of age or older. Treatments are over 95% effective at curing HCV infection. HCV treatment studies during pregnancy and breastfeeding suggest no increase in congenital abnormalities or complications, but further data on the safety and efficacy of DAAs to treat HCV during pregnancy are still needed.

References

1. Amy L. Sandul, DHSc, MPH, Carolyn Wester, MD, MPH, and Lakshmi Panagiotakopoulos, MD Testing Infants and Children With Perinatal Exposure to Hepatitis C Virus https://www.aafp.org/pubs/afp/issues/2024/0900/editorial-perinatal-exposure-hepatitis-c-virus.html#afp20240900p228-b1

2. CDC, MMWR Recommendations for Hepatitis C Testing Among Perinatally Exposed Infants and Children- United States, 2023 https://www.cdc.gov/mmwr/volumes/72/rr/rr7204a1.htm

3. CDC, Surveillance of Hepatitis C During Pregnancy and Perinatal Hepatitis C https://www.cdc.gov/hepatitis/statistics/surveillanceguidance/HepatitisC.htm

4. Maria A. Corcorran, MD, MPH https://www.hepatitisc.uw.edu/go/key-populations-situations/perinatal-hcv-transmission/core-concept

5. Nationwide Children's Hospital, Screening Infants For Hepatitis C https://www.nationwidechildrens.org/-/media/nch/for-medical-professionals/practice-tools-new/screening-infants-for-hepatitis-c.ashx