THE MISSISSIPPI DRUG EPIDEMIC SURVEILLANCE SYETEM

Hospitalizations for Hepatitis C in Mississippi: 2014-2018

MISSISSIPPI STATE DEPARTMENT OF HEALTH

Epidemiological Report

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Key Findings

- Between 2014 and 2018, the number of hospitalizations associated with hepatitis C virus (HCV) was 22,522. Among those stays, 4,581 (20.3%) had a co-existing intravenous drug use (IDU) diagnosis.
- From 2014 to 2018, hepatitis C infections associated with IDU nearly doubled, fueling the overall increase in the number of stays for hepatitis C in Mississippi.
- Caucasians accounted for 72.0% of all HCV stays and for 82.5% of all HCV stays associated with IDU.
- During 2014-2018, hepatitis C infection was present in over one third (39.7%) of all stays for hepatocellular carcinoma and in nearly one quarter (23.9%) of all stays for hepatic cirrhosis.
- The state needs to invest in the diagnosis and early treatment of this curable infection to control the spread of hepatitis C, decrease the burden of severe liver disease, prevent premature deaths, and reduce hospitalization-related expenses.

Hospitalizations for Hepatitis C in Mississippi, 2014-2018

Intrevenous Drug Use	Advanced Liver Disease	Self-paying	Baby Boomers (55-75 years)	Caucasians
20.3%	18.4%	19.1%	49.7%	72.0%

Background: Intravenous drug users are at risk for acquiring blood-borne infections, including hepatitis C. The escalating epidemic of injectable drugs, such as heroin and fentanyl, has fueled a parallel epidemic of hepatitis C. As a result, the annual incidence of acute hepatitis C more than doubled in 10 years in the United States, from 0.3 cases per 100,000 in 2004 to 0.7 cases per 100,000 in 2014.[1] This growing number of new cases presents a public health concern because hepatitis C is associated with substantial morbidity, including cirrhosis of the liver, liver cancer, liver failure, and increased demand for organ transplants.[2] In short, hepatitis C is a major cause of preventable mortality that killed 20,000 Americans in 2013.[3]

Hepatitis C Surveillance and Data: Although hepatitis C is a nationally notifiable disease, the collection of data on hepatitis C cases has been a challenge in Mississippi. Because of the lack of a systematic statewide data collection system, little is known about the demographic distribution, comorbidity burden, medical complications, or social costs associated with this severe but preventable infection. To address this knowledge gap and learn more about the epidemiology of hepatitis C in Mississippi, we analyzed the state's hospital discharge data (HDD) for 2014-2018. Compiled from medical claims, HDD contain information on patient's demographics, residence, length of stays, total charges, clinical diagnosis, and procedures performed**.** All non-federal general hospitals in the state report their data to the Mississippi's Inpatient and Outpatient Data System, a collaborative effort between the Mississippi State Department of Health and the Mississippi Hospital Association.

Goals: In this report, we examined trends, demographics, comorbidities, outcomes of care, resource utilization, and residence patterns of hepatitis C hospitalizations. Since hepatitis C virus is mostly transmitted via intravenous injections among drug users, we focused on evaluating the association between hepatitis C and intravenous drug use (IDU-HCV). We included hospitalizations with primary or secondary HCV diagnoses that occurred among residents and non-residents in Mississippi.

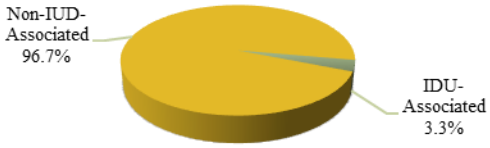
Hepatitis C Virus Transmission: Injection drug use is the main mode of HCV transmission in the United States. Before 1992, hepatitis C was also spread through blood transfusions and organ transplants. Other less frequent but possible routes of viral transmission are from sexual contact with an infected partner, from an infected mother to her newborn, and nonsterile applications of tattoos or body piercing.

Intravenous Drug Use: The International Classifications of Diseases, Ninth and Tenth Revisions, Clinical Modification (ICD-9-CM and ICD-10-CM) were used to identify diagnoses for hepatitis C and coexisting medical conditions such as drug use disorders, liver illness, pregnancy status, as well as homelessness. Because there are no codes specifying the route of drug admission, we applied the diagnoses for three commonly injected substances (opioids, amphetamines, and cocaine) as a surrogate marker for IDU. Because of the stigmatization surrounding drug use behaviors, patients may not report drug use. Hence, drug-related diagnoses may not always be recorded in healthcare data and the number of HCV hospitalizations with an IDU diagnosis may be underestimated in this report.

Between 2014 and 2018, there were a total of 66,297 hospitalizations attributable to IDU in Mississippi. During that time, the number of hepatitis C-associated stays was 22,522 and among them 4,581 (20.3%) had a co-existing IDU diagnosis (Figure 1). By contrast, the percent of IDU-related diagnoses among all other hospitalizations was 3.3% (Figure 2).

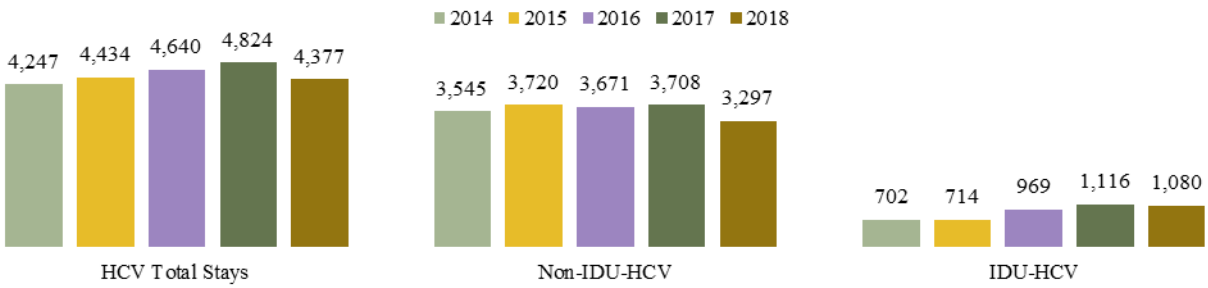
Figure 1. Hospitalizations for Hepatitis C and Intravenous Drug Use in MS, 2014-2018

Figure 2. All Other Hospitalizations and Intravenous Drug Use in MS, 2014-2018



Trends: In comparison with 2014, the number of IDU stays in 2018 rose from 10,491 to 15,396, representing a cumulative increase of 46.8% (an average annual increase of 10.0%). During the same time, the number of hospitalizations for hepatitis C increased by 3.1%, albeit with a small dip between 2017 and 2018. This overall trend, however, differed for hepatitis C stays with and without IDU diagnoses. The cumulative increase for IDU-HCV hospitalizations was 53.8%, from 702 in 2014 to 1,080 in 2018, representing an annual average increase of 11.4%. By contrast, the trend in the number of non-IDU-HCV hospitalizations fluctuated only slightly. In fact, such hospitalizations declined cumulatively by 7.0% (an average annual decrease of 1.8%) during the same time. These statistics revealed that IDU-associated hepatitis C hospitalizations are driving up the overall hepatitis C hospitalization trend.

Figure 3. Number of Hospital Stays for Hepatitis C in MS, 2014-2018



Multiple Drug Use: During 2014-2018 in Mississippi, among the 4,581 IDU-HCV hospitalizations 2,636 (57.5%) had opioid-related diagnoses recorded; 1,765 (38.5%) had amphetamine-related diagnoses recorded; and 1,348 (29.4%) had cocaine-related diagnoses recorded. These drug groups are not mutually exclusive. In fact, multiple drug use was documented in 23.0% (1,055) of all IDU-HCV hospitalizations.

Demographics: Demographic analysis revealed that patients hospitalized with IDU-HCV diagnoses were, on average, ten years younger than non-IDU-HCV patients (45.4 years vs. 55.3 years). Because of contaminated blood transfusions before 1992, baby boomers born from 1945 to 1965 are five times more likely to have hepatitis C than other adults.[4] In Mississippi, baby boomers accounted for half (49.7%) of all hepatitis C stays, but for 28.2% of hepatitis C stays associated with IDU. The vast majority of IDU-HCV stays occurred among the younger populations. The age group 18-54 accounted for 71.5% of all IDU-HCV hospitalizations. There were 14 hospitalizations associated with hepatitis C among the pediatric age group (0-17); of those, four hospitalizations were among infants. Men comprised a higher proportion of all stays involving hepatitis C (58.0%) and accounted for the majority of IDU-HCV stays (56.5%). Compared with non-IDU-HCV, patients hospitalized with IDU-HCV were more likely to be Caucasian (82.6% versus 69.4%, $p < 0.001$).

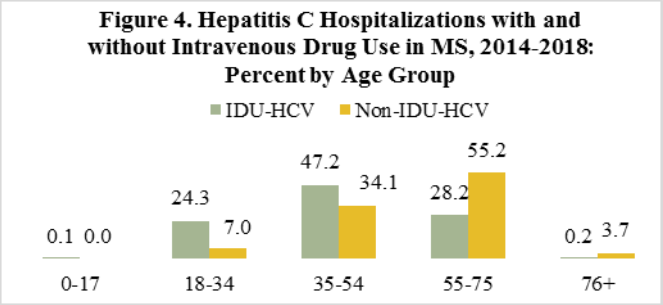


Figure 4. Hepatitis C Hospitalizations with and without Intravenous Drug Use in MS, 2014-2018: Percent by Age Group

Hepatitis C in Homeless Persons: Homeless persons are especially vulnerable to hepatitis C infections because of unsanitary living conditions, lack of medical care, high rates of drug use disorder and mental illness. Obtaining an accurate estimate of hepatitis C rates among homeless people, however, is difficult. As a result, estimates of the prevalence of hepatitis C among homeless people in the United States range from 19% to 69% depending on study design and sample.[5] Our goal was to capture the total number of hospitalizations in Mississippi featuring the following two characteristics: documented homelessness and hepatitis C. In our data, a diagnostic code indicating homelessness (V60.0 and Z59.0) was recorded in 630 or 2.8% of all HCV-associated hospitalizations. Three quarters of these patients (75.4%) were male and 80.5% were Caucasians. Nearly half of the stays (48.3%) with coexisting hepatitis C and homelessness were among self-paying patients and 38.9% were covered by Medicaid or Medicare. Compared with non-IDU-HCV, patients hospitalized with IDU-HCV were more likely to have a coexisting code for homelessness (6.7% versus 1.8%, $p < 0.001$).

Delivery Hospitalizations and Hepatitis C: In the United States, between 1% and 2.5% of pregnant women are infected with hepatitis C and such women have a 5% risk for transmitting this infection to their newborns.[6] Between 2014 and 2018, there were 422 delivery hospitalizations in Mississippi with a coexisting diagnostic codes for hepatitis C. Nearly three quarters (72.5%) of these hospitalizations were covered by Medicaid and 92.7% occurred among Caucasian women.

Table 1. Hepatitis C Hospitalizations: Demographic Characteristics and Primary Expected Payers, MS, 2014-2018 Combined

	All HCV Stays		IDU-HCV		Non-IDU-HCV	
Gender	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Females	9,458	42.0	1,992	43.5	7,466	41.6
Males	13,064	58.0	2,589	56.5	10,475	58.4
Race Group	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Caucasians	16,225	72.0	3,782	82.5	12,443	69.4
African-Americans	5,784	25.7	731	16.0	5,053	28.2
Other	513	2.3	68	1.5	445	2.4
Age Group (years)	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
0-17	14	0.1	6	0.1	8	0.0
18-34	2,365	10.5	1,113	24.3	1,252	7.0
35-54	8,274	36.7	2,161	47.2	6,113	34.1
55-75 (baby boomers)	11,186	49.7	1,291	28.2	9,895	55.2
76+	683	3.0	10	0.2	673	3.7
Homelessness	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
	630	2.8	305	6.7	325	1.8
Delivery diagnosis	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
	422	1.9	83	1.8	339	1.9

Geographical Distribution of Hepatitis C Hospitalizations: For this analysis, we included only hospital stays for state residents: 21,412 (95.1%) of HCV hospital stays**.** Between 2014 and 2018, the statewide hospitalization rate for hepatitis C was 14.3 per 10,000 hospitalizations. The majority (56.5%) of hepatitis C stays occurred among residents in the state's urban areas (a rate of 17.6 stays per 10,000 population). Rural residents accounted for 43.5% of hepatitis C stays in the state (a rate of 11.6 stays per 10,000 population). During that time, the statewide rate for IDU-HCV was 2.8 per 10,000 population, while the statewide rate for non-IDU-HVC was 11.5.

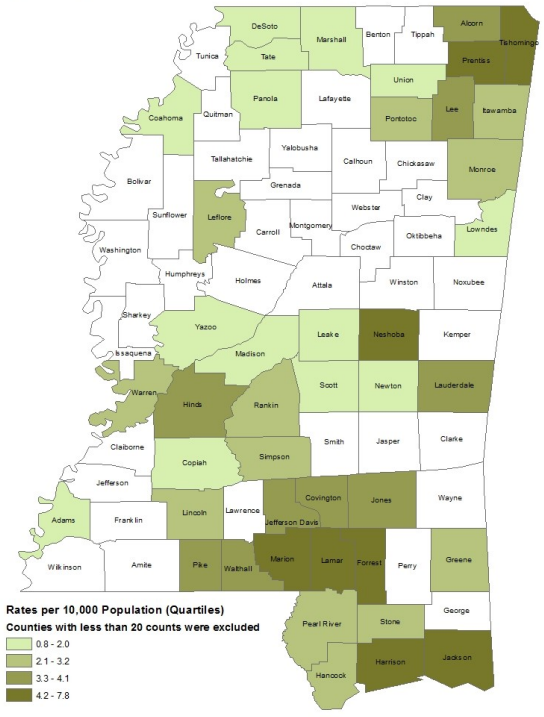
Figure 5. Hospitalizations for Hepatitis C by Home Area in MS, 2014-2018

Table 2. Hospitalizations for IDU-HCV in MS, 2014-2018: Ranked by Rate per 10,000

County	Stays	Rate
Forrest	296	7.8
Harrison	586	5.8
Neshoba	72	4.9
Prentiss	59	4.7
Marion	58	4.6
Tishomingo	44	4.5
Jackson	305	4.3
Lamar	127	4.2
Hinds	499	4.1
Covington	39	4.0
Lauderdale	155	4.0
Jones	133	3.9
Jefferson Davis	22	3.8
Lee	163	3.8
Walthall	28	3.8
Pike	71	3.6
Alcorn	61	3.3
Stone	29	3.2
Greene	22	3.2
Pontotoc	50	3.2
Hancock	70	3.0
Pearl River	81	2.9

Geography of IDU-HCV and Non-IDU-HCV Stays: To evaluate the geographical differences in the hospitalization rates for hepatitis C with and without IDU, we created two separate maps (Map 1 and Map 2). The overall geographical patterns were similar for hepatitis C hospitalizations with and without IDU. Despite the similarity, we ranked in Table 2 all Mississippi counties that had rates higher than the average statewide rate (2.8) for IDU-HCV. During the study period, counties with high hospitalization rates for IDU-HCV clustered in three regions of the state: the Gulf Coast and Pine Belt in the south and the northeastern corner of the state (Map 1). Based on our data, we cannot determine whether these areas have populations at higher risk for acquiring hepatitis C through IDU or whether these areas have more resources for diagnosing and treating drug use and its associated infections. It is worth mentioning, however, that the identified "hot spots" are within or near major cities (Gulfport-Biloxi, Hattiesburg, and Tupelo). All of these places have a high concentration of medical facilities and specialty care.

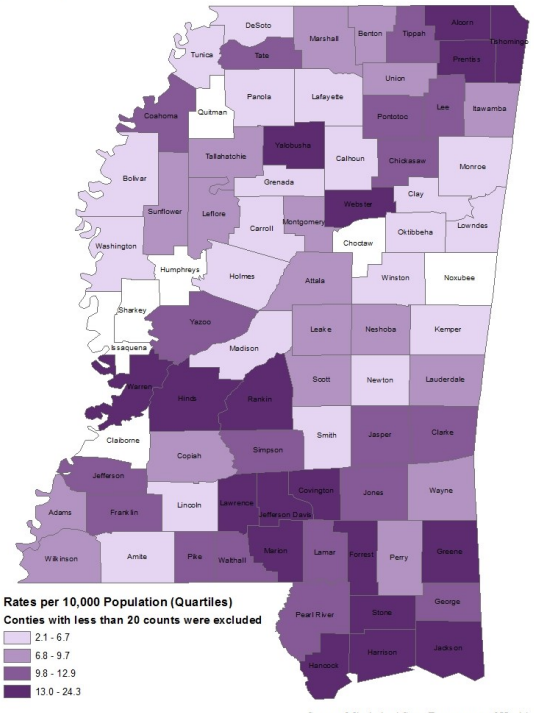
Map 1. Hospitalization Rates for IDU-HCV by Home County in MS, 2014-2018



Source: Mississippi State Department of Health

Calculating reliable rates requires a minimum number of at least 20 cases. Counties presented in white had less than 20 hospital stays and are excluded from the analysis of rates.

Map 2. Hospitalization Rates for Non-IDU-HCV by Home County in MS, 2014-2018



Source: Mississippi State Department of Health

Natural History and Complications of Hepatitis C Infection: Acute HCV infection can progress to chronic infection in 75% to 85% of all cases.[7] Chronic hepatitis C infections progress slowly; they are characterized by persistent liver inflammation and can evolve into cirrhosis in 10%–20% of cases within a period of 20 years. After cirrhosis has developed, the annual risk of hepatocellular carcinoma is between 1% and 5% and the annual risk of liver decompensation is between 3% and 6%. Decompensated cirrhosis (advanced liver disease) is an acute deterioration in liver function with high mortality rates (10%-20%).[8] Clinically, decompensated cirrhosis presents with jaundice, ascites, hepatic encephalopathy, hepato-renal syndrome, or variceal hemorrhage. Alcohol abuse, hepatitis B virus (HBV) and human immunodeficiency virus (HIV) co-infections are factors that can accelerate the development of liver complications in HCV-infected patients.[9]

Comorbidity Analysis: Our goal was to determine the burden of severe liver disease, coexisting HBV and HIV infections, non-intravenous drug-related conditions, and alcohol-related morbidity among patients hospitalized with a HCV diagnosis in Mississippi. For the analysis of severe liver disease, we stratified data into five groups: hepatocellular carcinoma, liver transplant, liver cirrhosis (excluding alcoholic and biliary cirrhosis), advanced liver disease (i. e., liver failure, portal hypertension, ascites, varices, and hepato-renal syndrome), and alcoholic liver disease (i.e., alcohol-related fatty liver, hepatitis, unspecified liver damage, fibrosis, sclerosis, cirrhosis, and hepatic failure).

Comorbidity Burden in Patients Hospitalized with Hepatitis C: Nearly one-third (31.8%) of all hepatitis C stays had a severe liver condition on record: 18.7% had cirrhosis, 18.4% had advanced liver disease, and 3.0% had hepatocellular carcinoma. Despite recommendations for abstinence from alcohol, 10.5% of all hepatitis C hospitalizations had alcohol-related liver disease and 20.4% suffered from alcohol use disorder. Half of all HCV hospitalizations (48.2%) had a coexisting nicotine dependence and 7.6% had a coexisting cannabis use disorder. Less than 4.0% had coexisting HIV or HBV infections.

As a whole, the liver-related morbidity burden was smaller among IDU-HCV hospital stays compared to non-IDU-HCV stays. In part, this may be due to the fact that patients with IDU-HCV were, on average, younger than patients with non-IDU-HCV. For the same reason, in-hospital mortality was lower for the IDU-HCV group. Non-injection substance use was highly prevalent among hepatitis C patients, in particular, among those with coexisting IDU diagnoses. Comparative analysis uncovered that IDU-HCV stays were more likely to have coexisting tobacco use disorder (63.7% vs. 44.3%), alcohol use disorder (25.9% vs. 19.1%), and cannabis use disorder (21.5% vs. 4.0%) than non-IDU-HCV stays. The proportions of coexisting HIV and HBV infections, however, were similar between the two study groups.

Table 3. Hepatitis C Hospitalizations with and without Intravenous Drug Use: Morbidity Burden and Outcomes of Care

	All Hepatitis C Stays		IDU-HCV Stays		Non-IDU-HCV	
Liver-Related Morbidity	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Cirrhosis of liver	4,221	18.7	415	9.1	3,806	21.2
Alcoholic liver disease	2,363	10.5	221	4.8	2,142	11.9
Decompensated cirrhosis	4,144	18.4	335	7.3	3,809	21.2
Hepatocellular carcinoma	666	3.0	44	1.0	622	3.5
All of the above conditions	7,172	31.8	705	15.4	6,467	36.1
Non-Injection Drug Use-Related Disorders	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Nicotine use disorder	10,857	48.2	2,916	63.7	7,941	44.3
Alcohol use disorder	4,602	20.4	1,182	25.8	3,420	19.1
Cannabis use disorder	1,708	7.6	985	21.5	723	4.0
Coexisting HIV and HBV	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
HIV/AIDS	813	3.6	176	3.8	637	3.6
Hepatitis B infection	840	3.7	224	4.9	616	3.4
In-Hospital Deaths	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
	849	3.8	90	2.0	759	4.2

ICD-9-CM/ICD-10-CM Codes for HCV: 07041; 07044; 07051; 07054; 0707; V0262; B1710; B1711; B182; B182; B1920; B1921; Z2252
ICD-9-CM/ICD-10-CM Codes for Liver Comorbidities: 5715; K746; 5710; 5711; 5712; 5713; K70; 5722; K72; 4560; 4561; 4562; I85; 5723; K766; 5724; K767; 7895; R18; V427; Z944; 5051, 5059; 0FY00Z0, 0FY00Z1, 0FY00Z2; 1550; C22; 3051; 3050; 303; F10; 3052; 3043
ICD-9-CM/ICD-10 Codes for Non-Injection Drug Use-Related Disorders: F17, 351, F10, 303, 3050; F12, 3052, 3043
ICD-9-CM/ICD-10 Codes for HBV (B18, B180, B181, B190, B191, Z2251,V0621, 0702, 0703) **and HIV/AIDS:** (042,V08, B20, Z21)

The Proportion of Hepatitis C among Hospitalizations for Severe Liver Disease: The goal of this analysis was to obtain the percentage of HCV hospitalizations among all hospitalizations with a severe liver disease diagnosis. In addition, we determined the proportion of deaths among hospitalizations for coexisting HCV infection and severe liver diseases.

Liver Morbidity with Implicated Hepatitis C: We identified that a significant proportion of stays associated with severe liver morbidity in Mississippi coexisted with HCV infection (Figure 6). Hepatitis C infection was implicated in over one third (39.7%) of all stays for hepatocellular carcinoma, in 23.9% of all stays for liver cirrhosis (excluding alcoholic and biliary cirrhosis), in 16.8% of all stays for alcoholic liver disease, and in over 13.0% of all stays for decompensated cirrhosis and liver transplant. Hospitalizations with a liver transplant diagnosis may include a history of such a procedure.

Figure 6. Liver Illness with and without Hepatitis C: Percent of Totals in MS, 2014-2018

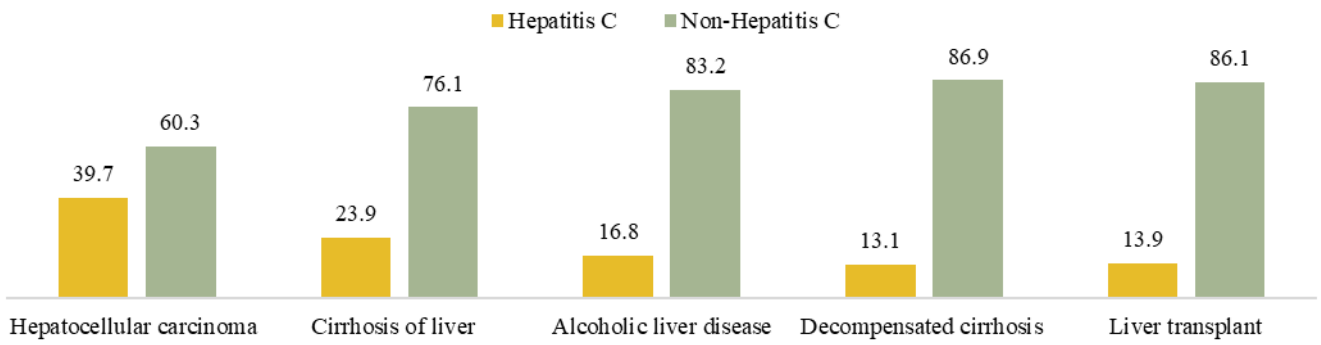


Table 4. Hepatitis C Hospitalizations Coexisting with Severe Liver Illness, Associated Deaths, and Hospital Charges, MS, 2014-2018 Combined

Conditions	Number of Stays	Number of Deaths	Percent of Deaths	Mean Charges	Total Charges
Hepatocellular carcinoma and HCV	666	73	11.0	$53,218	$35,443,015
Cirrhosis of liver and HCV	4,221	262	6.2	$53,232	$224,692,803
Alcoholic liver disease and HCV	2,363	195	8.3	$63,144	$149,208,502
Decompensated cirrhosis and HCV	4,144	387	9.3	$65,975	$273,400,350
Liver transplant and HCV	212	6	2.8	$111,367	$23,609,737

In-hospital Mortality: Between 2014 and 2018, there were 42,134 in-hospital deaths in Mississippi. Among those deaths, 849 (2.1%) were associated with HCV. By comparison, hospital stays with a HCV diagnosis accounted for 1.1% of all hospital stays. The hospital stays with co-occurring HCV and decompensated hepatic cirrhosis were associated with 387 in-hospital deaths. In other words, 9.3% of patients with coexisting hepatitis C and cirrhosis had a recorded death. The in-hospital mortality rate was highest among patients with hepatocellular carcinoma: 11.0% of such stays had a documented death. Patients with decompensated cirrhosis and HCV had the second highest mortality rate of 9.3%. Not surprisingly, hospital stays with diagnoses for alcoholic liver disease and hepatitis C also had a high mortality rate of 8.3%. The number of deaths among those with liver transplants was relatively low—a total of 6 deaths or 2.8% of all hospital stays with a diagnosis for liver transplant.

Hospital Charges: Between 2014 and 2018, the average charges for hepatitis C coexisting with liver cirrhosis or hepatocellular carcinoma were around $53,000. The average charges for HCV and alcoholic liver disease were $63,144, the average charges for HCV and decompensated cirrhosis were $65,975, and the average charges for HCV and liver transplants were $111,367.

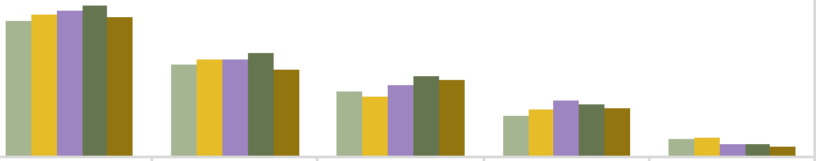
Demographics by Payer: The distribution of payers was different for stays with and without co-exiting HCV and IDU diagnoses (Table 5). Compared with non-IDU-HCV, patients hospitalized with IDU-HCV were more likely to be uninsured (32.4% vs. 15.7%, $p < .001$). The proportion of patients with Medicare insurance, however, was higher among the non-IDU-HCV group than the IDU-HCV group.

Table 5. Hepatitis C Hospitalizations: Demographic Characteristics and Primary Expected Payers, MS, 2014-2018 Combined

	All HCV Stays		IDU-HCV		Non-IDU-HCV	
Primary Expected Payer	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Medicare	8,590	38.1	1,158	25.3	7,432	41.4
Medicaid	5,766	25.6	1,212	26.5	4,554	25.4
Self-pay	4,301	19.1	1,482	32.4	2,819	15.7
Private	2,960	13.1	577	12.6	2,383	13.3
Other	905	4.1	152	3.2	753	4.2

Number of Stays by Payer: The number of Medicare patients hospitalized with a HCV diagnosis regardless of IDU status remained stable over time (Figure 7, Tables 5 and 6). Such stays accounted for 38.3% of all HC admissions in 2014 and for 38.5% in 2018. At the same time, the proportion of HCV hospitalizations increased for two groups of payers: self-paying patients accounted for 18.7% of all hepatitis C admissions in 2014, but for 21.3% in 2018; while privately insured patients accounted for 11.6% of all hepatitis C admissions in 2014 but for 13.4% in 2018. Among all major payers, only the state Medicaid program experienced a decline in the proportion of hepatitis C stays— from 26.3% in 2014 to 24.0% in 2018.

Figure 7. Number of Hepatitis C Hospitalizations by Payers in MS, 2014-2018



	Medicare	Medicaid	Self-pay	Private	Other
2014	1,628	1,118	793	492	216
2015	1,717	1,169	728	576	244
2016	1,750	1,179	869	675	167
2017	1,811	1,250	980	629	154
2018	1,684	1,050	931	588	124

Table 6. Number of Hospitalizations by Payer

Payer	Change 2014-2018
Medicare	3.4%
Medicaid	-6.1%
Self-pay	17.4%
Private	19.5%
Other	-42.6%
All	+3.1

Conclusions: The use of contaminated needles has been the main force behind the growing number of hepatitis C across the nation as this infection is transmitted primarily through the parenteral route. For example, between 38.1% and 68.0% of injection drug users also have co-existing hepatitis C.[10] In our data, one out of every five patients hospitalized with hepatitis C had a concomitant diagnosis of IDU. In addition to the mode of transmission, the chronic nature of this disease has resulted in high prevalence rates across the nation. Hepatitis C infection is, therefore, an evolving national epidemic with an estimated 2.4 million Americans living with this disease in 2016.[11] Most likely, the high prevalence of hepatitis C and growing use of cheap heroin and synthetic fentanyl will continue to drive up the incidence of hepatitis C both nationally and in Mississippi.

As our study reveals, the medical consequences of the drug epidemic are far-reaching. From 2014 to 2018, hepatitis C infections associated with IDU nearly doubled, fueling the overall increase in the number of stays for hepatitis C in Mississippi. The parallel increase in drug abuse and blood-borne infections suggests a causal relation and underlines the importance of building statewide programs for preventing, diagnosing, and treating drug-associated infectious diseases. These programs could implement such public health and clinical measures as building an extensive surveillance system for drug-related illnesses, encouraging legislative initiatives for needle exchange programs, enhancing diagnostic tools for suspected drug-associated infections, and improving treatment options for patients with drug dependence.

Pathways for Prevention

The Hidden Epidemic: Although millions of Americans live with the medical complications of hepatitis C, awareness of this infection remains low among medical providers and populations at-risk for this disease. Research suggests, for instance, that only 50% of people infected with hepatitis C are aware of their infection.[12] This is because many patients may be asymptomatic for years and seek medical help only after liver-related complications develop.

Screening Recommendations: To increase the screening rate, the Centers for Disease Control and Prevention published official recommendations in 2012 for hepatitis C screening.[13]According to these guidelines, the CDC recommends HCV screening for all persons at high risk (e.g., intravenous drug users), as well as a one-time screening for adults born between 1945-1965 (i.e., baby boomers). Universal one-time screening for all adults regardless of risk factors is not recommended at this point; but, the CDC is reviewing a new guidance with possible recommendations for universal screening for adults.

Treatment is Prevention: Immunization and treatment are key factors for decreasing the burden of infectious diseases. Unfortunately, there is no vaccine for hepatitis C. During the last decade, however, there have been major advances in the pharmacological treatment of hepatitis C. Current direct-acting antiviral (DAA) treatment regimens for hepatitis C are highly effective, achieving > 95% cure rate.[14] In addition, the newer DAA medications have fewer side effects, a simple dosage (one-a-day pill) regimen, and have become relatively more accessible due to recent price reductions.

Mississippi's Project ECHO (Extension for Community Healthcare Outcomes): The University of Mississippi Medical Center has started a telehealth initiative aimed at educating primary care physicians, nurse practitioners, pharmacists, registered nurses, and physician's assistants on the diagnosis and treatment of hepatitis C. During real-time telehealth conferences, primary care providers discuss the diagnosis, treatment, and follow-up of hepatitis C cases from their practices with an infectious disease specialist. The program hopes to expand and include a gastroenterologist and psychiatrist in its future sessions. By ensuring care even in remote regions, Project ECHO is an asset for a state that is rural, medically underserved, and has a shortage of specialty care. Undoubtedly, Project ECHO at UMMC will help provide hepatitis C treatment to some of the state's most vulnerable and medically marginalized populations. Mississippi providers wishing to join Project ECHO can contact Morgan Davis at Mdavis11@umc.edu or 601-815-4226.

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Authors: Manuela Staneva, MPH; Thomas Dobbs, MD, MPH; Meg Pearson, PharmD, MS; Jonathan Hubanks, PharmD; Paul Byers, MD

References:

1.Libel JE, Asher AK, Patel RC, et al. Increases in Acute Hepatitis C Virus Infection Related to a Growing Opioid Epidemic and Associated Injection Drug Use, United States, 2004 to 2014. Am J Public Health. 2018;108(2):175–181. doi:10.2105/AJPH.2017.304132
2.Mohamed AA, Elbedewy TA, El-Serafy M, El-Toukhy N, Ahmed W, Ali El Din Z. Hepatitis C virus: A global view. World J Hepatol. 2015;7(26):2676–2680. doi:10.4254/wjh.v7.i26.2676Kathleen N. Ly,
3.Elizabeth M. Hughes, Ruth B. Jiles, Scott D. Holmberg, Rising Mortality Associated With Hepatitis C Virus in the United States, 2003–2013, Clinical Infectious Diseases, Volume 62, Issue 10, 15 May 2016, Pages 1287–1288.
4.Department Of Health And Human Services/Centers for Disease Control and Prevention (CDC). HEPATITIS C: Why Baby Boomers Should Get Tested.
5.Gelberg L, Robertson MJ, Arangua L, et al. Prevalence, distribution, and correlates of hepatitis C virus infection among homeless adults in Los Angeles. Public Health Rep. 2012;127(4):407–421. doi:10.1177/003335491212700409
6. Prasad, M.R. and Honegger, J.R. Hepatitis C virus in pregnancy. Am J Perinatol. 2013; 30: 149–1595.
7.Westbrook RH, Dusheiko G. Natural history of hepatitis C. J Hepatol. 2014;61(1) Suppl;S58-68. 10.1016/j.jhep.2014.07.012
8. Mansour D, McPherson S. Management of decompensated cirrhosis. Clin Med (Lond). 2018;18(Suppl 2):s60–s65. doi:10.7861/clinmedicine.18-2-s60
9. Parikh N, Nonnemacher MR, Pirrone V, Block T, Mehta A, Wigdahl B. Substance abuse, HIV-1 and hepatitis. Curr HIV Res. 2012;10(7):557–571. doi:10.2174/157016212803306023
10. Degenhardt L, Peacock A, Colledge S, Leung J, Grebely J, Vickerman P, Stone J, Cunningham EB, Trickey A, Dumchev K, Lynskey M, Griffiths P, Mattick RP, Hickman M, Larney S. Global prevalence of injecting drug use and sociodemographic characteristics and prevalence of HIV, HBV, and HCV in people who inject drugs: a multistage systematic review. Lancet Global Health. 2017;5(12):e1192-1207.
11 Hofmesiter MG, Rosenthal EM, Barker LK, Rosenberg ES, Barranco MA, Hall EW, Edlin BR, Mermin J, Ward JW, Ryerson AB. Estimating prevalence of hepatitis C Virus Infection in the United States, 2013 -2016. Hepatology. 2018:XX(X):pp-pp.
12. Younossi ZM, Stepanova M, Afendy M, Lam BP, Mishra A (2013) Knowledge about infection is the only predictor of treatment in patients with chronic hepatitis C. J Viral Hepat 20: 550–555.
13. Testing for HCV infection: An update of guidance for clinicians and laboratorians. MMWR 2013; Vol. 62 Early Release.
14..AASLD/IDSA: HCV Guidance: Recommendations for Testing, Managing, and Treating Hepatitis C. 2019.