Hospitalizations associated with HBV and HCV in Oregon, 2016-2020

Background

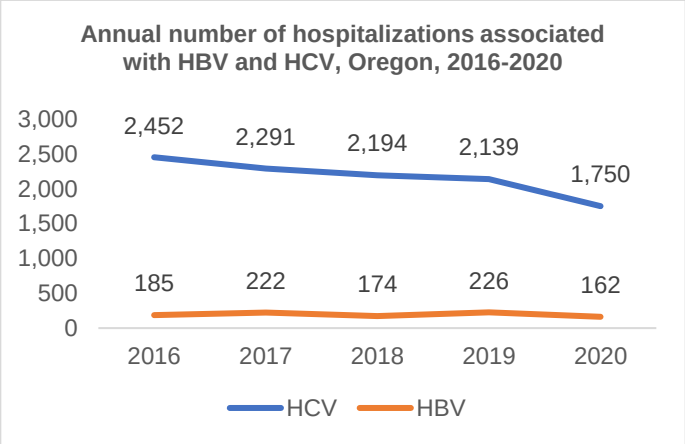
Globally, liver disease is the 11th leading cause of death, accounting for over 2 million deaths annually.[1] These deaths are mostly related to cirrhosis and liver cancer, both of which can be caused by viral hepatitis. According to the most recent global burden of liver disease update, HBV- and HCV-related diseases led to 1.1 million deaths in 2020, similar to the number of deaths from tuberculosis, but higher than the number due to either HIV or malaria.

Liver disease is also expensive. From 2012 to 2016 in the US, the number of chronic liver disease hospitalizations rose 23%, and the costs increased from $14.9 billion to $18.8 billion.[2]

Although HBV- and HCV-related cases of cirrhosis and liver cancer are not reportable in Oregon, tracking hospitalizations for cirrhosis, liver cancer, and liver transplantation among individuals with HBV and HCV allows us to monitor the burden of disease from these complications of chronic viral hepatitis.

Number of cases

During the period 2016-2020, review of hospital discharge data identified 10,826 hospitalizations in Oregonians who had diagnoses for both hepatitis C virus (HCV) and some form of advanced liver disease (cirrhosis, liver cancer or liver transplant). Oregon averaged 2,165 hospitalizations per year, and the number of hospitalizations declined 29%.

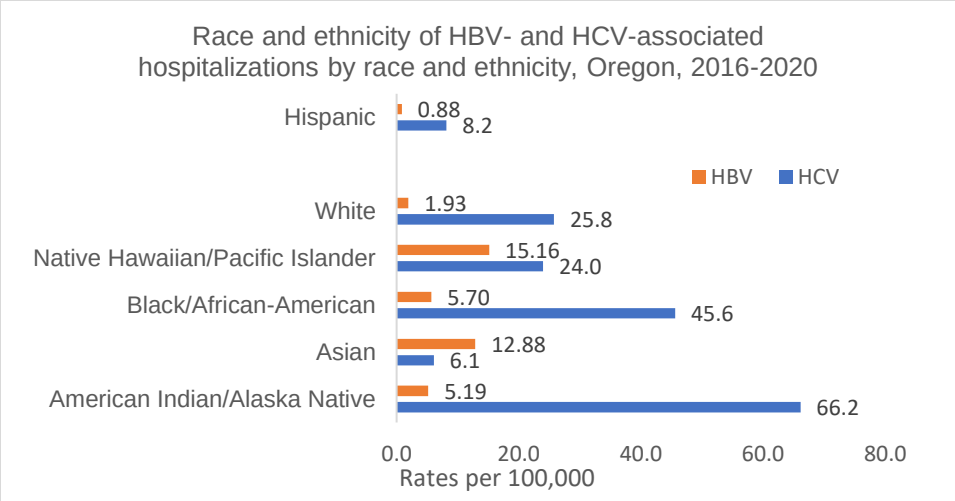


Hospitalizations associated with hepatitis B virus (HBV) were less common; there were 969 hospitalizations in all, with an average of 194 hospitalizations annually. Unlike HCV, there was little change in the number of hospitalizations over the 5-year period.

Patient demographic data

Two-thirds of the HCV-associated hospitalizations occurred in males. Fewer than 3% occurred in persons under age 40 years, while 78% occurred in persons aged 50–69. HBV-associated hospitalizations were also more common in males (71%), and 82% of persons were over the age of 50.

Rates of HCV-associated hospitalizations were more than twice as high in American Indian and Alaskan Native people than White people, while the second



highest rate was found in Black and African American individuals. For HBV, the highest rates were seen among people from Asian, Native Hawaiian, and Pacific Islander communities.

Length of stay and costs

For HCV, the average length of stay was 5.9 days. During this five-year period, the average charges per patient discharge were $49,398, and the total charges per year for these hospitalizations averaged $106,957,059.

Both the average length of stay (6.6 days) and average charges per patient discharge ($53,914) were higher for HBV than for HCV. The total charges per year for HBV hospitalizations were lower ($10,448,619 per year) due to ncelower numbers of hospitalizations.

	HBV	HCV
Length of stay	6.6 days	5.9 days
Average charges per hospitalization	$53,914	49,398
Average charges per year	$10,448,619	$106,957,059
Percent of hospitalizations where payer was Medicaid or Medicare	77%	83%

Most HCV hospitalizations (83%) were in persons whose insurance payer was either Medicare (43%) or Medicaid (40%). Similarly, the majority of HBV-associated occurred among persons on Medicare (43%) or Medicaid (34%).

Key Facts

- Hospitalizations from HCV have been dropping in the past 5 years, while HBV-associated hospitalizations are stable
- For both HBV and HCV, hospitalizations were most common in men in their 50s and 60s
- Racial disparities for both HBV and HCV persist: rates of hospitalizations associated with HBV were highest among Asian, Native Hawaiian, and Pacific Islander people
- The highest rates of HCV-associated hospitalizations occurred among Native American and Alaska Native individuals and Black and African American people
- Hospital charges among patients with HBV or HCV and diagnoses of cirrhosis, liver cancer, and liver transplant averaged over $100,000,000 annually

Technical Specifications

Methods

After signing a data use agreement with the Oregon Health Authority's Office of Health Analytics, which owns and manages several health-related data sets, we obtained hospital discharge data that allowed us to review admission diagnoses, charges, and patient demographic information from Oregon's 60 acute care inpatient hospitals. We analyzed data from Oregon residents hospitalized between 2016 and 2020. We classified hospitalizations in which discharge diagnoses were listed for both HCV and a condition associated with advanced liver disease (cirrhosis, liver cancer, or liver transplant) as an admission likely related to advanced liver disease attributable to HCV. Similarly, we classified hospitalizations with diagnoses for both HBV and advanced liver disease as HBV-associated hospitalizations. The International Classifications of Disease Codes, Tenth Revision (ICD-10), for each of these is listed in Table 7.

Data Tables

Table 1. Number of HCV-related hospitalizations by year and category* of liver disease, Oregon, 2016-2020 (n=10, 826)

	Total hospitalizations	Cirrhosis		Liver cancer		Liver transplant	
Year	Count	Count	Percent	Count	Percent	Count	Percent
2016	2,452	2,310	94.2%	420	17.1%	58	2.4%
2017	2,291	2,188	95.5%	383	16.7%	37	1.6%
2018	2,194	2,102	95.8%	308	14.0%	45	2.1%
2019	2,139	2,044	95.6%	337	15.8%	31	1.4%
2020	1,750	1,672	95.5%	286	16.3%	36	2.1%
2016-2020	10,826	10,316	95.3%	1,734	16.0%	207	1.9%

*Note that row percentages sum to > 100% because many of the individuals had both cirrhosis and a second diagnosis of either liver cancer or liver transplant.

Table 2. Number of HBV-related hospitalizations by year and category* of liver disease, Oregon, 2016-2020 (n=969)

	Total hospitalizations	Cirrhosis		Liver Cancer		Liver Transplant	
Year	Count	Count	Percent	Count	Percent	Count	Percent
2016	185	173	93.5%	41	22.2%	2	1.1%
2017	222	194	87.4%	47	21.2%	9	4.1%
2018	174	159	91.4%	39	22.4%	10	5.7%
2019	226	210	92.9%	54	23.9%	8	3.5%
2020	162	144	88.9%	42	25.9%	11	6.8%
2016-2020	969	880	90.8%	223	23.0%	40	4.1%

*Note that row percentages sum to > 100% because many of the individuals had both cirrhosis and a second diagnosis of either liver cancer or liver transplant.

Table 3. Demographic characteristics of individuals* with HCV-associated hospitalizations, by category of liver disease, Oregon, 2016-2020 (n=5,181)								
	All Hospitalizations		Cirrhosis		Liver Cancer		Liver Transplant	
Gender	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
F	1755	33.87	1684	34.47	205	23.24	26	31.33
M	3426	66.13	3202	65.53	677	76.76	57	68.67
Age								
10-19	1	0.02	1	0.02	0	0	0	0
20-29	25	0.48	25	0.51	1	0.11	0	0
30-39	121	2.34	119	2.44	1	0.11	1	1.20
40-49	410	7.91	406	8.31	12	1.36	1	1.20
50-59	1708	32.97	1651	33.79	202	22.90	16	19.28
60-69	2350	45.36	2178	44.58	520	58.96	50	60.24
70+	566	10.92	506	10.36	146	16.55	15	18.07
Race								
American Indian or Alaska Native	153	2.95	144	2.95	23	2.61	1	1.20
Asian	53	1.02	48	0.98	21	2.38	1	1.20
Black or African-American	176	3.40	156	3.19	38	4.31	2	2.41
Native Hawaiian or Pacific Islander	19	0.37	18	0.37	4	0.45	1	1.20
White	4428	85.47	4188	85.71	726	82.31	73	87.95
Refused or unknown	139	2.68	128	2.62	31	3.52	3	3.61
Other	213	4.11	204	4.18	39	4.42	2	2.41
Ethnicity								
Hispanic	214	4.13	197	4.03	42	4.76	10	12.05
Non-Hispanic	4869	93.98	4597	94.09	819	92.86	72	86.75
Refused or unknown	98	1.89	92	1.88	21	2.38	1	1.20
Payer								
Commercial	506	9.77	473	9.68	126	14.29	7	8.43
Medicaid	2022	39.03	1953	39.97	233	26.42	7	8.43
Medicare	2273	43.87	2100	42.98	452	51.25	63	75.90
Other	297	5.73	278	5.69	59	6.69	6	7.23
Uninsured	83	1.60	82	1.68	12	1.36	0	0

*Note that the denominator (n=5,181) in Table 3 is different than in Tables 1 and 2 because the first two tables referred to the number of hospitalizations. Since several people were hospitalized more than once for HCV-associated hospitalizations, we used only the first hospitalization to evaluate demographic characteristics.

Table 4. Demographic characteristics of individuals with HBV-associated hospitalizations, by category of liver disease, Oregon, 2016-2020 (n=541)								
	All Hospitalizations		Cirrhosis		Liver Cancer		Liver Transplant	
Gender	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Female	155	28.65	139	28.66	17	14.78	11	52.38
Male	386	71.35	346	71.34	98	85.22	10	47.62
Age Group								
20-29	6	1.11	4	0.82	2	1.74	1	4.76
30-39	31	5.73	27	5.57	4	3.48	2	9.52
40-49	59	10.91	55	11.34	7	6.09	0	0
50-59	165	30.50	151	31.13	34	29.57	6	28.57
60-69	174	32.16	158	32.58	36	31.30	6	28.57
70+	106	19.59	90	18.56	32	27.83	6	28.57
Race								
American Indian or Alaska Native	12	2.22	12	2.47	0	0	0	0
Asian	112	20.70	91	18.76	46	40.00	3	14.29
Black or African American	22	4.07	18	3.71	8	6.96	0	0
Native Hawaiian or Pacific Islander	12	2.22	10	2.06	5	4.35	0	0
White	332	61.37	305	62.89	47	40.87	18	85.71
Refused or unknown	14	2.59	14	2.89	2	1.74	0	0
Other	37	6.84	35	7.22	7	6.09	0	0
Ethnicity								
Hispanic	23	4.25	22	4.54	3	2.61	1	4.76
Non-Hispanic	507	93.72	452	93.20	111	96.52	20	95.24
Refused or unknown	11	2.03	11	2.27	1	0.87	0	0
Payer								
Commercial	*77*	*14.23*	*62*	*12.78*	*29*	*25.22*	*2*	*9.52*
Medicaid	*185*	*34.20*	*177*	*36.49*	*22*	*19.13*	*4*	*19.05*
Medicare	*234*	*43.25*	*205*	*42.27*	*55*	*47.83*	*14*	*66.67*
Other	*31*	*5.73*	*29*	*5.98*	*6*	*5.22*	*1*	*4.76*
Uninsured	*14*	*2.59*	*12*	*2.47*	*3*	*2.61*	*0*	*0*

*Note that the denominator (n=541) in Table 3 is different than in Tables 1 and 2 because the first two tables referred to the number of hospitalizations. Since several people were hospitalized more than once for HCV-associated hospitalizations, we used only the first hospitalization to evaluate demographic characteristics.

Table 5. Length of stay and hospital charges for HCV-associated hospitalizations, Oregon, 2016-2020				
Length of stay in days	**Year**	**Mean**	**Median**	**Sum**
	2016	5.5	4	13,536
	2017	5.6	4	12,882
	2018	5.8	4	12,760
	2019	6.2	4	13,355
	2020	6.3	4	10,942
	5-year Average	**5.9**		
Total charges per hospitalization in US dollars	2016	43,987	28,042	107,857,074
	2017	46,253	30,855	105,966,668
	2018	50,477	29,626	110,745,856
	2019	52,550	33,149	112,403,746
	2020	55,893	35,485	97,811,992
	5-year Average	**49,398**		

Table 6. Length of stay and hospital charges for HBV-associated hospitalizations, Oregon, 2016-2020				
Length of stay	**Year**	**Mean**	**Median**	**Sum**
	2016	6.1	4	1,120
	2017	6.5	4	1,438
	2018	6.5	4	1,124
	2019	7.1	5	1,605
	2020	7	5	1,130
	5-year average	6.6		
Total charges per hospitalization in US dollars	2016	44,952	24,987	8,316,103
	2017	53,542	30,952	11,886,374
	2018	54,309	32,999	9,449,813
	2019	57,709	33,677	13,042,156
	2020	58,942	38,984	9,548,647
	5-year Average	53,914		

Table 7. Definition of hospitalizations associated with HBV and HCV and International Classification of Diseases Codes, Tenth Revision (ICD-10)

A. ANY OF THE BELOW INDICATES HCV			C. ANY OF THE BELOW INDICATES ADVANCED LIVER DISEASE	
B1711	Acute hepatitis C with hepatic coma	**An HCV-associated hospitalization is defined as having at least one code from column A and one from Column C.**	B190	Unspecified viral hepatitis with hepatic coma
B1710	Acute hepatitis C without mention of hepatic coma		**I8501**	Esophageal varices with bleeding
B182	Chronic viral hepatitis C		**I8500**	Esophageal varices without bleeding
Z2252	Hepatitis C carrier		**I8510**	Esophageal varices in diseases classified elsewhere without bleeding
B1920	Unspecified viral hepatitis C without hepatic coma		**I8511**	Esophageal varices in diseases classified elsewhere with bleeding
B1921	Unspecified viral hepatitis C with hepatic coma		**K652**	Spontaneous bacterial peritonitis
Z22.52	Carrier of viral hepatitis C		**K7460**	Unspecified cirrhosis of liver
			K7469	Other cirrhosis of liver
B. ANY OF THE BELOW INDICATES HBV			**K7210**	Chronic hepatic failure without coma'
B1910	Hepatitis B without mention of hepatic coma	**An HBV-associated hospitalization is defined as having at least one code from column A and one from column C.**	**K7211**	Chronic hepatic failure with coma
B161	Acute hepatitis B with delta-agent without hepatic coma		**K7290**	Hepatic failure, unspecified
B1911	Viral hepatitis B with hepatic coma		**K7291**	Hepatic failure, unspecified with coma
B181	Chronic hepatitis B without delta-agent		**K766**	Portal hypertension
B162	Acute hepatitis B without delta-agent with hepatic coma		**K767**	Hepatorenal syndrome
B160	Acute hepatitis B with delta agent with hepatic coma		**R180**	Malignant ascites
B180	Chronic viral hepatitis b with delta-agent		**R188**	Other ascites
B169	Acute hepatitis B without delta-agent and without hepatic coma		**C220**	Liver cell carcinoma
B170	Carrier of viral hepatitis B		**C227**	Other specified carcinoma of the liver
			C228	Malignant neoplasm of liver, primary, unspecified as to type
			C229	Malignant neoplasm of liver, not specified as primary or secondary
			T8640	Unspecified complication of liver transplant
			T8641	Liver transplant rejection
			T8642	Liver transplant failure
			T8643	infection of liver transplant
			T8649	other complications of liver transplant
			Z4823	Aftercare following liver transplant
			Z8505	Personal history of malignant neoplasm of liver
			Z944	Liver transplant status

References

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2. Hirode G, Saab S, and Wong RJ. Trends in the burden of chronic liver disease among hospitalized US adults. JAMA Network Open. 2020;3(4):e201997. doi:10.1001/jamanetworkopen.2020.1997