

Inpatient Costs and Outcomes Associated With Chronic Hepatitis C-Related Complications in the United States

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BACKGROUND

Hepatitis C virus (HCV) is a common blood-borne infection in the United States (US), with an estimated 1.6%, or 4.1 million, Americans having an antibody to HCV, indicating ongoing or previous infection with the virus. Approximately 75% to 85% of these patients are chronically infected.¹ Over time, patients with chronic HCV can encounter serious complications leading to cirrhosis, liver failure, and liver cancer and thus can impose a significant cost burden on third-party payers. Hepatitis C also causes an estimated 10,000 to 12,000 deaths annually in the US.²

OBJECTIVES

To estimate per-discharge inpatient costs and outcomes associated with four major chronic HCV-related complications, ascites, variceal bleeding, hepatic encephalopathy, and hepatocellular carcinoma (hepatoma).

METHODS

Study Design

Retrospective database analysis

Data Source

Discharge data were collected from the 2005 Healthcare Cost and Utilization Project (HCUP) Nationwide Inpatient Sample (NIS).

- NIS is the largest all-payer inpatient care database in the US.
- The 2005 dataset contains data from approximately 8 million hospital stays.
- NIS is the only national hospital database with charge information on all patients, regardless of payer.
- NIS includes numerous clinical and nonclinical variables for each inpatient stay, including patient demographics, diagnosis codes, length of stay (LOS), total charges, admission and discharge status, payer, and hospital-specific characteristics.
- Sampling weights allow for nationally representative estimates.

Inclusion Criteria

- At least one primary or nonprimary diagnosis of chronic HCV (ICD-9-CM codes 070.44, 070.54, 070.70, 070.71)
- Four HCV complications identified using the following ICD-9-CM codes:
 - Ascites: ICD-9-CM code 789.5
 - Variceal bleeding: ICD-9-CM code 456.0
 - Hepatic encephalopathy: ICD-9-CM code 572.2
 - Hepatoma: ICD-9-CM code 155.0
- Unique patient identifiers were not provided, so we were unable to follow patients who moved from facility to facility.

Outcome Measures

- Per-discharge costs
 - NIS's charge data converted to costs using facility-specific cost-to-charge ratios
 - Costs converted to 2007 US dollars
- Per-discharge LOS
- Cost per day
- Probability of death

RESULTS

Patient Characteristics (Table 1)

- There were 275,737 chronic HCV-related discharges in 2005.
- Approximately 11.5% (31,711) of these discharges were for ascites, and 5.6% (15,322) were for hepatic encephalopathy.
- Admissions for variceal bleeding and hepatoma were less common at 0.3% (745) and 2.8% (7,592), respectively.
- The population of HCV patients with hepatoma complications was the oldest (mean age 58.23 years) and had the greatest proportion of males (79.03%).
- More than 90% of the hospitals were located in an urban setting.
- Medicare and Medicaid were the primary payers for over half of the discharges in the study sample.

Table 1. Characteristics of Study Sample^{a, b, c}

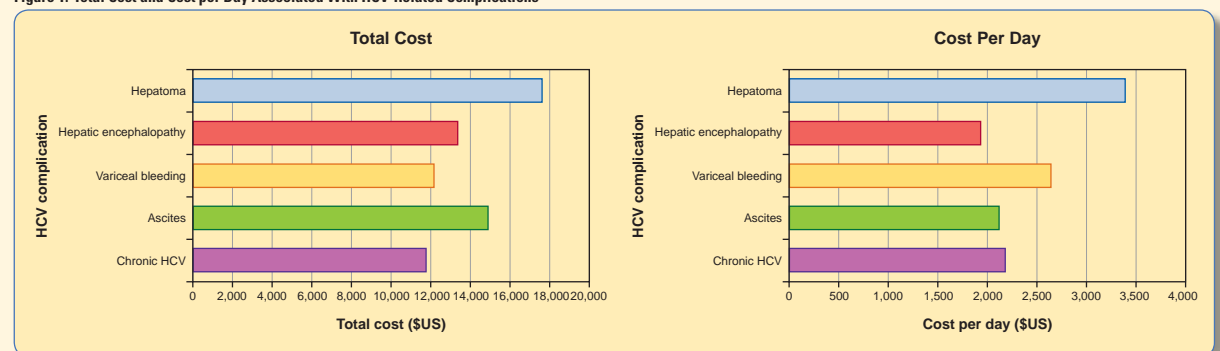
Demographics	Discharge Category									
	HCV N = 275,737		Ascites N = 31,711		Variceal Bleeding N = 745		Hepatic Encephalopathy N = 15,322		Hepatoma N = 7,592	
Mean age (SD)	50.17 (0.23)		52.90 (0.24)		51.67 (0.90)		53.24 (0.26)		58.23 (0.35)	
	N	%	N	%	N	%	N	%	N	%
Gender										
Male	169,996	61.65	21,681	68.37	523	70.18	10,386	67.78	6,000	79.03
Female	105,589	38.29	10,025	31.61	222	29.82	4,936	32.22	1,592	20.97
Missing/invalid	151	0.05	5	0.02	-	-	-	-	-	-
Race										
White	127,078	46.09	14,592	46.01	310	41.67	6,973	45.51	3,449	45.43
Black	50,461	18.30	4,145	13.07	68	9.16	1,771	11.56	1,181	15.55
Other	38,851	14.09	6,223	19.62	131	17.55	2,923	19.08	1,885	24.82
Missing	59,346	21.52	6,751	21.29	235	31.62	3,654	23.85	1,078	14.20
Hospital region										
Northeast	65,377	23.71	6,667	21.03	113	15.12	3,044	19.87	2,408	31.72
Midwest	43,717	15.85	4,421	13.94	94	12.56	2,322	15.15	946	12.46
South	99,635	36.13	12,564	39.62	350	46.99	5,366	35.02	2,285	30.09
West	67,008	24.30	8,058	25.41	189	25.33	4,591	29.96	1,953	25.72
Hospital location										
Rural	22,174	8.04	2,218	7.00	99	13.31	1,175	7.67	210	2.76
Urban	253,562	91.96	29,493	93.00	646	86.69	14,147	92.33	7,383	97.24
Payer type										
Medicare	82,395	29.88	9,131	28.79	187	25.18	4,829	31.52	2,521	33.20
Medicaid	86,671	31.43	9,936	31.33	199	26.71	5,154	33.63	1,651	21.75
Private insurance	62,861	22.80	8,441	26.62	178	23.87	3,706	24.19	2,774	36.54
Other	42,757	15.89	4,046	12.75	176	23.61	1,619	10.57	614	8.09
Missing/invalid	1,053	0.38	158	0.49	5	0.64	15	0.1	32	0.41

SD = standard deviation.
^a Percentages and counts across categories do not add up to 100% due to rounding error.
^b Complication categories are not mutually exclusive.
^c Counts were weighted to obtain nationally representative estimates.

Costs Associated With Chronic HCV-Related Complications (Figure 1)

- Total inpatient costs for HCV-related discharges were \$11,784, with an average cost of \$2,190 per day.
- All four HCV-related complications analyzed had higher total costs compared to HCV-related discharges without evidence of these complications.
- Hepatoma was associated with the highest total inpatient costs (\$17,609) and cost per day (\$3,394).
- Total inpatient costs for hospitalizations related to ascites were \$14,858, and cost per day was \$2,125; total inpatient costs related to variceal bleeding were \$12,128, and cost per day was \$2,639.
- The total inpatient costs associated with hepatic encephalopathy were \$13,380, and the cost per day was \$1,936.

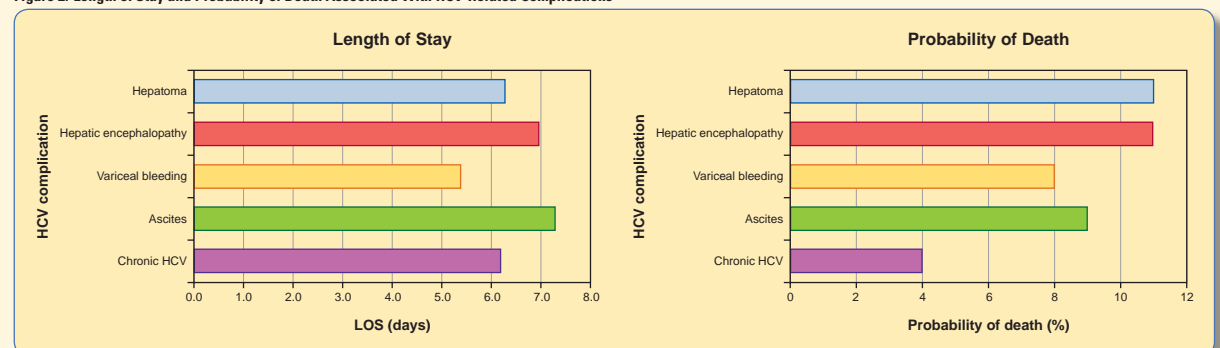
Figure 1. Total Cost and Cost per Day Associated With HCV-Related Complications



Length of Stay and Probability of Death (Figure 2)

- The average LOS for patients with ascites was 7.3 days, and the probability of death was 9%.
- The average number of inpatient days for hepatic encephalopathy was 7 days, and the probability of death was 11%.
- The probability of death from variceal bleeding (8%) and the LOS (5.4 days) were lower compared with the other complications.
- The average LOS for hepatoma was 6.3 inpatient days, and the probability of death was 11%.
- The probability of death for chronic HCV patients without any of these complications was 4%.

Figure 2. Length of Stay and Probability of Death Associated With HCV-Related Complications



LIMITATIONS

- Subjects were identified based on diagnosis codes, which, if recorded inaccurately, may cause some patients to be misidentified as having HCV-related complications.
- Because unique patient identifiers were not provided, we were unable to follow patients who moved from facility to facility. Results may be biased somewhat if the experiences of patients who transferred from facility to facility differed from those who remained in the analytic sample.

CONCLUSIONS

- Advanced chronic HCV can lead to serious and costly complications.
- Efforts to improve HCV treatment may help slow disease progression and thus result in cost savings from avoided complications.

REFERENCES

- Centers for Disease Control. Hepatitis C factsheet. Available at: www.cdc.com/hepatitis. Accessed Mar 2008.
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