Health Care Resource Utilisation and Costs Among Various Disease States in Adults With Hepatitis Delta Virus in Inpatient and Outpatient Settings in the United States

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Conclusions

- In the US, health care resource utilisation (HCRU) and costs were significantly greater for patients with hepatitis delta virus (HDV) and more advanced liver disease than for those with noncirrhotic disease (NCD)
- Specifically, among patients with HDV and more advanced liver disease (vs NCD):
  - The number of inpatient visits, length of hospital stay, and number of pharmacy claims were higher among those with decompensated cirrhosis (DC), hepatocellular carcinoma (HCC), or liver transplant (LT)
  - The number of outpatient visits was higher among those with compensated cirrhosis (CC), DC, HCC, or LT
  - Inpatient costs were higher among those with DC, HCC, or LT
  - All-cause total costs were higher among those with CC, DC, HCC, or LT
- These results highlight the need for advancement in screening and treatment measures to reduce disease burden and the resultant HCRU and costs

Plain Language Summary

- People living with hepatitis delta virus have more severe liver disease than those living with hepatitis B virus alone
- People with hepatitis delta virus and more advanced liver disease typically had more hospital visits, spent a longer time in hospitals, and incurred greater costs than did people with noncirrhotic disease; this was observed most consistently for people with decompensated cirrhosis
- Early diagnosis and treatment of hepatitis delta infection are important to minimise progression to more severe disease and reduce disease-related costs

Introduction

- Infection with HDV, a defective RNA virus that requires the presence of hepatitis B virus (HBV) for propagation, results in the most severe form of viral hepatitis[1,2]
- Compared with HBV monoinfection, HDV is associated with an increased risk of cirrhosis, HCC, LT, and mortality[1-4]

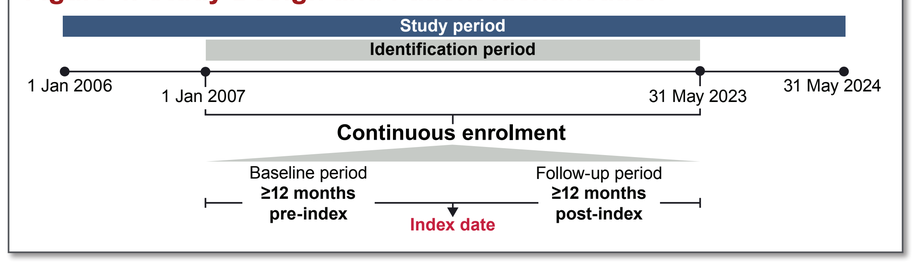
Objective

- To evaluate HCRU and costs in adults with HDV across levels of disease severity in inpatient and outpatient settings in the US

Methods

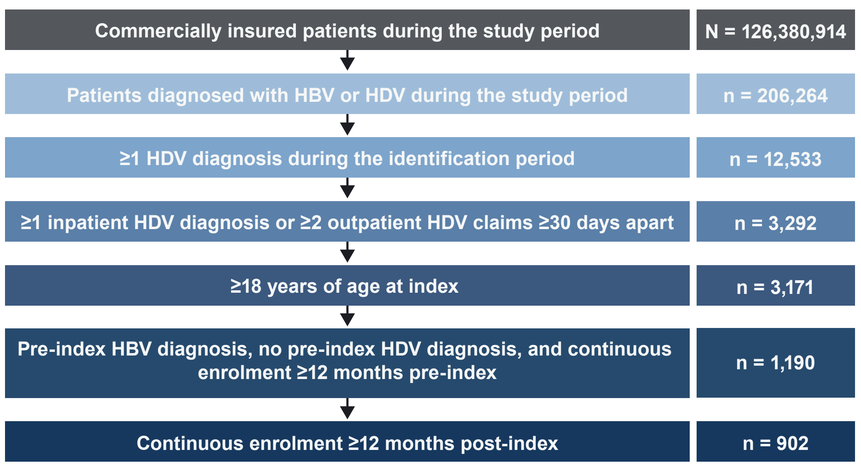
- A retrospective observational analysis of the PharMetrics database identified commercially insured patients aged ≥18 years with an HDV diagnosis (*International Classification of Diseases, Ninth/Tenth Revision, Clinical Modification* [*ICD-9/10-CM*]) within the study period (1 Jan 2006 through 31 May 2024)
- The index date was defined as the first HDV diagnosis claim between 1 Jan 2007 and 31 May 2023
- Patients were required to have ≥12 months of continuous enrolment pre- and post-index date
- Mean per-patient-per-month (PPPM) HCRU and costs (summed amounts paid by the patient [deductible, copay, and coinsurance] and insurance [paid]) were assessed for NCD, CC, DC, HCC, and LT
- Descriptive statistics were summarised and comparisons were made using Mann-Whitney U and chi-square tests

Figure 1. Study Design and Patient Identification



Results

Figure 2. Patient Attrition Flow Chart



HBV, hepatitis B virus; HDV, hepatitis delta virus.

- Among 126,380,914 patients identified within the database, 902 with HDV infection met the enrolment criteria and were included

Table 1. Baseline Demographics

	Overall N = 902	NCD n = 622	CC n = 51	DC n = 155	HCC n = 43	LT n = 31
Proportion with disease state, %	—	69	6	17	5	3
Age, y, mean (SD)	48 (11.1)	47 (11.0)	51 (11.4)*	51 (10.3)*	53 (11.1)*	56 (9.6)*
Sex, n (%)						
Female	375 (42)	282 (45)	13 (25)*	60 (39)	13 (30)	7 (23)*
Male	527 (58)	340 (55)	38 (75)*	95 (61)	30 (70)	24 (77)*
Geographic region, n (%)						
Northeast	218 (24)	151 (24)	10 (20)	36 (23)	14 (33)	7 (23)
Midwest	145 (16)	99 (16)	12 (24)	26 (17)	5 (12)	3 (10)
South	178 (20)	123 (20)	12 (24)	30 (19)	5 (12)	8 (26)
West	342 (38)	236 (38)	16 (31)	61 (39)	16 (37)	13 (42)
Unknown	19 (2)	13 (2)	1 (2)	2 (1)	3 (7)*	0
Payer channel, n (%)						
Commercial	772 (86)	537 (86)	44 (86)	133 (86)	32 (74)*	26 (84)
Self-insured	130 (14)	85 (14)	7 (14)	22 (14)	11 (26)*	5 (16)

*P <.05 compared with NCD.
CC, compensated cirrhosis; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LT, liver transplantation; NCD, noncirrhotic disease; y, year.

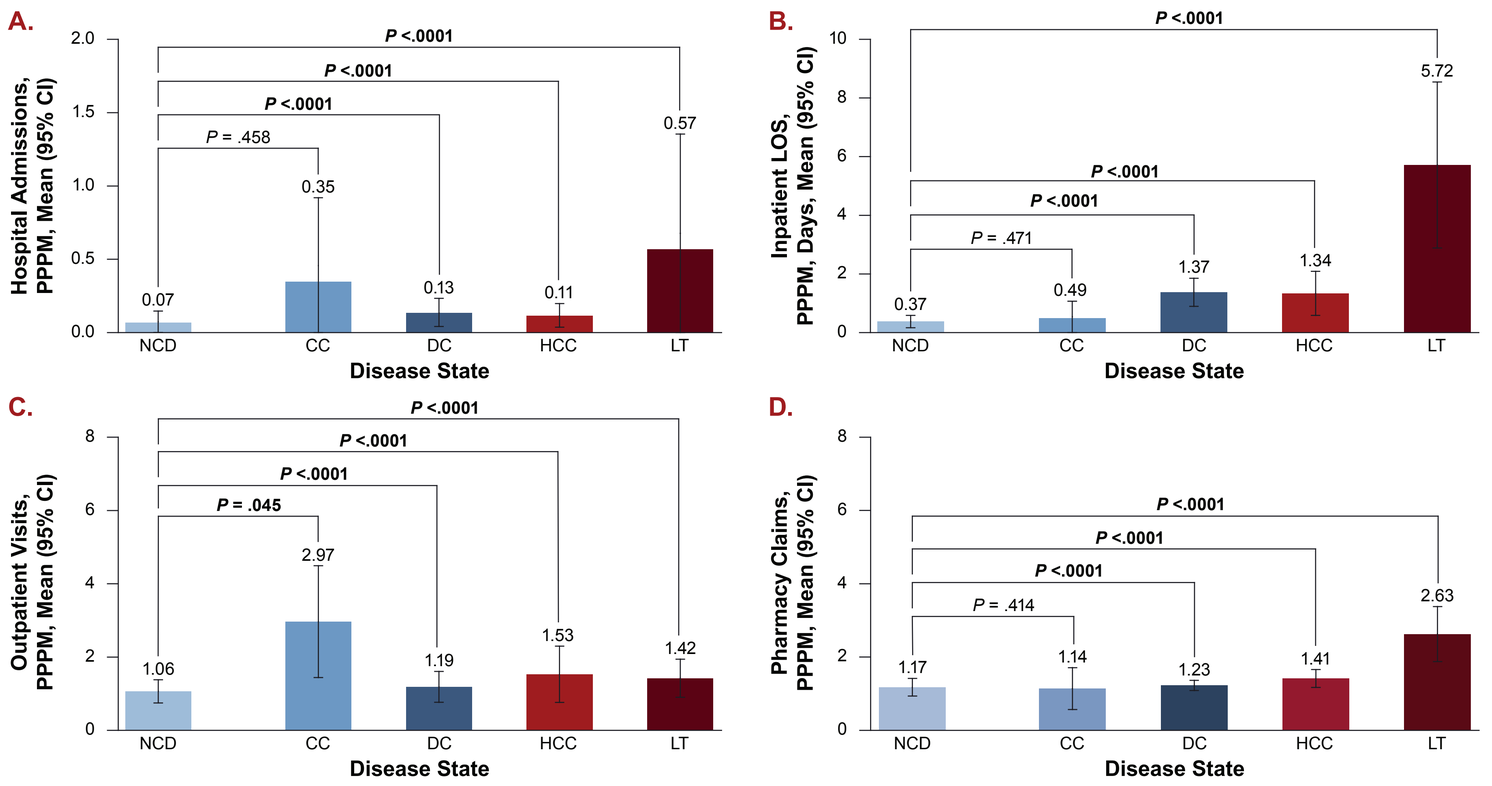
Table 2. Baseline Disease Characteristics

	Overall N = 902	NCD n = 622	CC n = 51	DC n = 155	HCC n = 43	LT n = 31
QCCI score, mean (SD)	2.7 (2.80)	2.0 (2.02)	2.2 (2.26)	4.2 (3.45)*	5.4 (2.79)*	6.3 (4.72)*
Comorbidity profile, n (%)						
HCV	185 (21)	95 (15)	12 (24)	48 (31)*	18 (42)*	12 (39)*
History of smoking	83 (9)	37 (6)	2 (4)	28 (18)*	8 (19)*	8 (26)*
HIV	42 (5)	27 (4)	2 (4)	11 (7)	0	2 (6)
Hypertension	340 (38)	204 (33)	25 (49)*	67 (43)*	22 (51)*	22 (71)*
Mental health disorder	91 (10)	48 (8)	3 (6)	30 (19)*	5 (12)	5 (16)
Obesity	95 (11)	60 (10)	5 (10)	19 (12)	5 (12)	6 (19)
STIs	173 (19)	94 (15)	13 (25)	48 (31)*	9 (21)	9 (29)*
Substance abuse	10 (1)	3 (<1)	0	5 (3)*	0	2 (6)*

*P <.05 compared with NCD.
CC, compensated cirrhosis; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; LT, liver transplantation; NCD, noncirrhotic disease; QCCI, Quan-Charlson Comorbidity Index; STI, sexually transmitted infection.

- Overall, patients had a mean (SD) age of 48 (11.1) years, and most (58%) were male
  - Patients with NCD at baseline (BL) were statistically younger than patients with more severe disease
  - A greater proportion of patients with more severe disease at BL were male compared with those with NCD

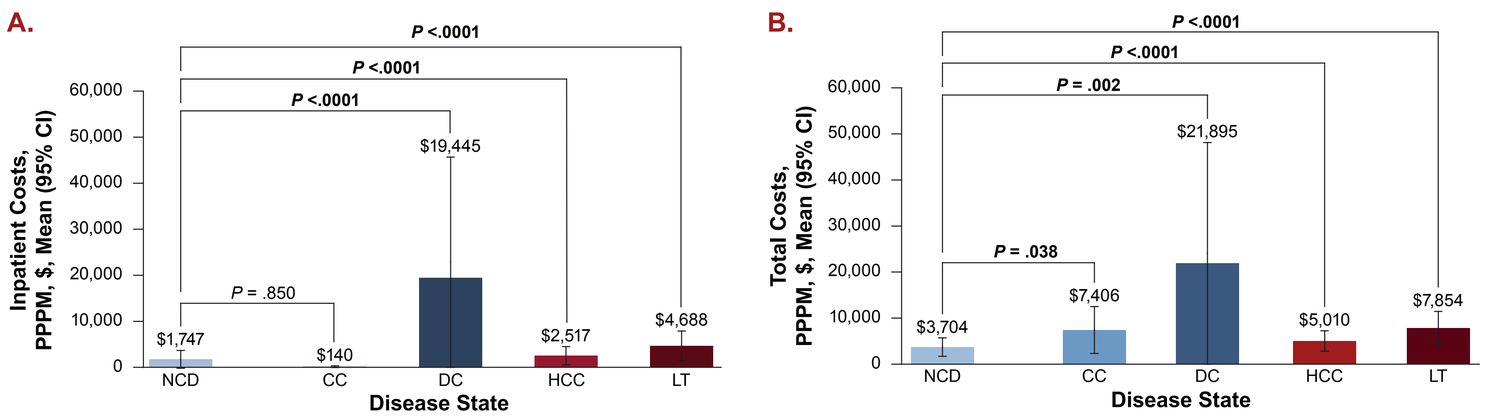
Figure 3. (A) Mean All-Cause Hospital Admissions, (B) Inpatient Length of Stay, (C) Outpatient Visits, and (D) Pharmacy Claims PPPM in Patients With HDV Across Various Disease States



Bold *P*-values indicate statistical significance.
CC, compensated cirrhosis; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; HDV, hepatitis delta virus; LOS, length of stay; LT, liver transplantation; NCD, noncirrhotic disease; PPPM, per-patient-per-month.

- In most cases, compared with patients with HDV and NCD at BL, those with more advanced disease states had significantly higher numbers of hospital admissions, outpatient visits, and pharmacy claims and a significantly longer inpatient length of stay PPPM

Figure 4. Average (A) Inpatient and (B) Total Costs PPPM



Bold *P*-values indicate statistical significance.
CC, compensated cirrhosis; DC, decompensated cirrhosis; HCC, hepatocellular carcinoma; LT, liver transplantation; NCD, noncirrhotic disease; PPPM, per-patient-per-month.

- Patients with DC, HCC, and LT had significantly higher all-cause inpatient costs PPPM compared with those with NCD
- Patients with CC, DC, HCC, and LT had significantly higher total costs PPPM compared with those with NCD
- The largest absolute difference in inpatient costs and total costs was observed in patients with DC, for which patients spent $17,698 and $18,191 more per month, respectively, than those with NCD spent

Limitations

- The limitations of any retrospective claims study apply; diagnoses made via *ICD-9/10-CM* codes are subject to miscoding and can lead to misclassification bias, and time of diagnosis may not correspond to the time of infection; therefore, results may reflect delayed HCRU and costs
- This study may have underestimated the actual number of individuals with HDV infection due to a lack of approved assays and suboptimal screening practices to determine HDV status
- Indirect costs are not factored into the analysis, which may lead to an underestimation of economic burden associated with HDV infection

References: **1.** Gilman C, et al. *World J Gastroenterol.* 2019;25(32):4580-97. **2.** Miao Z, et al. *J Infect Dis.* 2020;221(10):1677-87. **3.** Muhammad H, et al. *World J Hepatol.* 2021;13(3):291-9. **4.** Muhammad H, et al. *J Liver Transpl.* 2021;4:100046.

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