

# Healthcare Resource Utilisation and Costs Among Terminal, Hospitalised Adults With Hepatitis Delta Virus or Hepatitis B Virus Mono-infection in Italy

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## Conclusions

- In Italy, healthcare resource utilisation (HCRU), including length of stay, and costs were similarly high in terminal patients with hepatitis delta virus (HDV) vs hepatitis B virus (HBV) only
- These results highlight the need for enhanced screening/treatment practices to offset the high economic and health-related burden associated with HDV and HBV
- Future research should evaluate the impact of novel treatments for HDV and HBV on HCRU and costs at end of life

## Plain Language Summary

- People living with hepatitis delta virus spent the same amount of time in hospital and had similarly high healthcare costs in the 12 and 6 months prior to death compared with people living with hepatitis B virus alone

## Introduction

- Hepatitis delta virus (HDV) is a virus that relies on the presence of hepatitis B virus (HBV) infection to replicate and causes a more severe form of viral hepatitis than HBV mono-infection (HBV only)<sup>1,2</sup>
- HDV infection carries a greater risk for liver-related morbidity and mortality compared with HBV only<sup>3</sup>

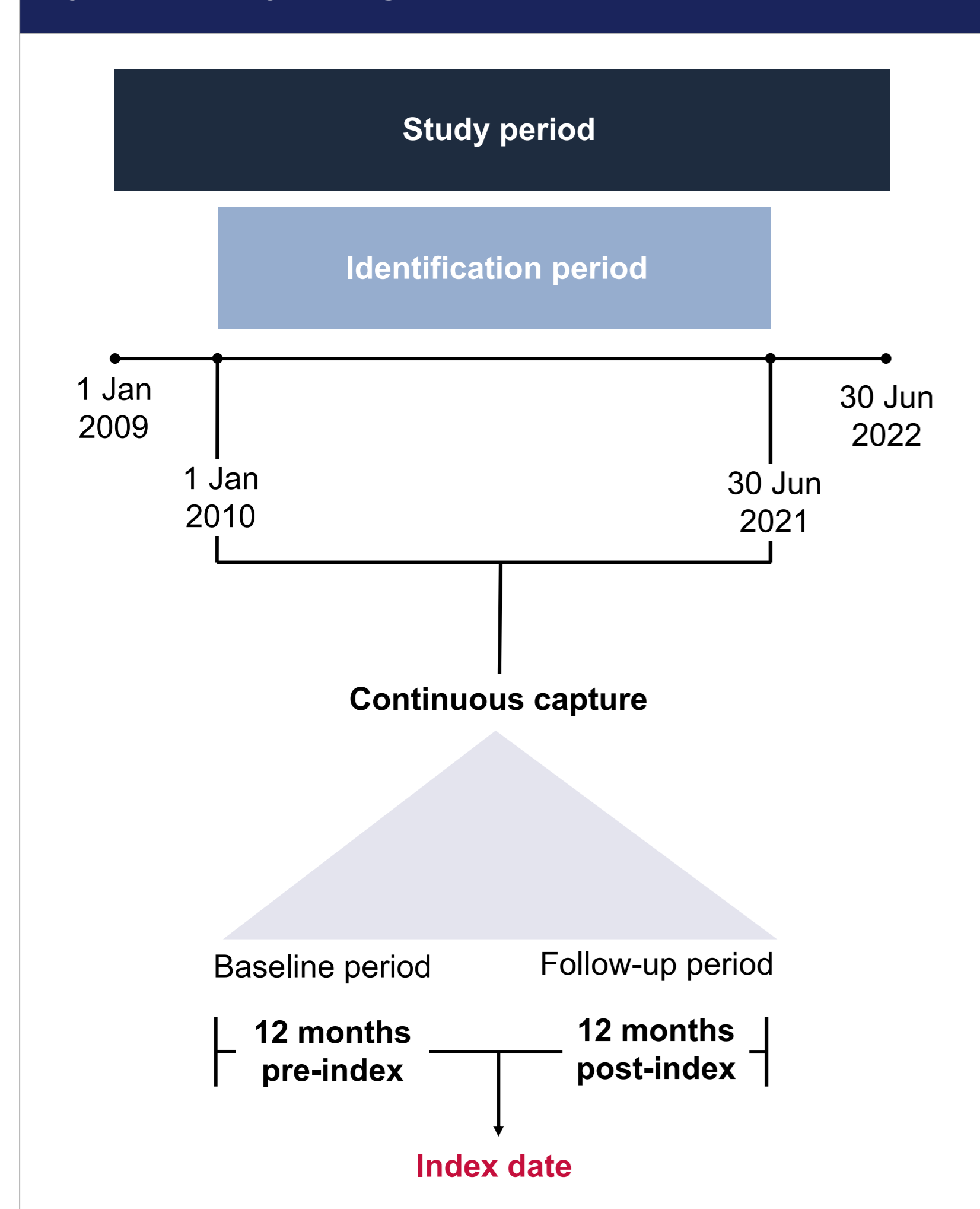
## Objective

- To compare estimates of terminal healthcare resource utilisation (HCRU) and costs between adults with HDV vs HBV only in the inpatient setting in Italy

## Methods

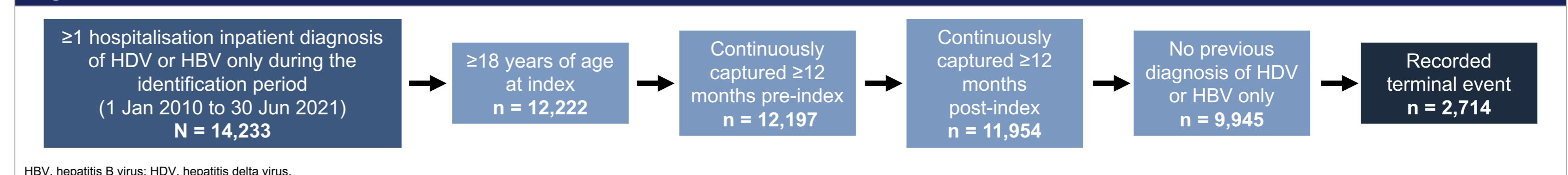
- In this retrospective observational study, administrative database claims from local health units in Italy representing >12 million individuals were screened from 1 Jan 2009 to 30 Jun 2022
- The study population included adult patients (≥18 years of age) with an inpatient claim (using ICD-9-CM) of any HDV or HBV only diagnosis
- Patients were included if they had ≥12 months of continuous capture before and after diagnosis, and excluded if they had any prior HDV or HBV only diagnosis
- The index date was defined as the first date of either HDV or HBV only diagnosis between 1 Jan 2010 and 30 Jun 2021
- Baseline (BL) characteristics were assessed over the 12-month period before each patient's index date and included age, sex, and comorbidities
- Analysis
  - Inverse probability of treatment weighting (IPTW) was calculated using a propensity score (probability of having HDV vs HBV only, given BL variables) to generate weights
  - In terminal patients, the all-cause and disease-specific HCRU and costs were compared via Mann-Whitney U test in the 12- and 6-month periods before death; descriptive statistics were summarised

## Figure 1 Study Design



## Results

### Figure 2 Patient Attrition Flow Chart



- After screening, 2,714 patients (HDV, n = 161; HBV only, n = 2,553) were included in the final analytical cohort

### Table 1 Demographics and Baseline Characteristics

Baseline Variables	Before IPTW			After IPTW		
	Patients With HDV n = 161	Patients With HBV Only n = 2,553	P-Value	Patients With HDV n = 2,891	Patients With HBV Only n = 2,717	P-Value
Age, years, mean (SD)	68.2 (12.6)	69.6 (12.2)	.144	69.8 (11.9)	69.4 (12.3)	.735
Sex, male	114 (70.8)	1,712 (67.1)	.325	2,062 (71.3)	1,827 (67.2)	.021
QCCI, mean (SD)	2.6 (2.2)	2.4 (2.1)	.430	2.5 (2.2)	2.4 (2.1)	.888
<b>Comorbidities</b>						
No cirrhosis	83 (51.6)	1,564 (61.3)	.014	1,497 (51.8)	1,656 (60.9)	<.001
Compensated cirrhosis	47 (29.2)	527 (20.6)	.010	924 (32.0)	566 (20.8)	<.001
Decompensated cirrhosis	31 (19.3)	462 (18.1)	.712	471 (16.3)	495 (18.2)	.183
Hepatocellular carcinoma	27 (16.8)	262 (10.3)	.009	471 (16.3)	281 (10.3)	<.001
Liver transplant	7 (4.3)	19 (0.7)	<.001	191 (6.6)	20 (0.7)	<.001
Hypertension	110 (68.3)	1,781 (69.8)	.700	2,005 (69.4)	1,898 (69.9)	.756
Hepatitis C virus	65 (40.4)	314 (12.3)	<.001	395 (13.7)	387 (14.2)	.655
HIV	11 (6.8)	47 (1.8)	<.001	104 (3.6)	56 (2.1)	.017
Mental health disorder	41 (25.5)	604 (23.7)	.601	868 (30.0)	643 (23.7)	<.001
Nonalcoholic steatohepatitis	7 (4.3)	83 (3.3)	.451	124 (4.3)	88 (3.2)	.152
Alcohol use disorder	11 (6.8)	158 (6.2)	.743	290 (10.0)	171 (6.3)	<.001
Substance abuse	5 (3.1)	32 (1.3)	.049	97 (3.4)	35 (1.3)	<.001
History of smoking	0 (0)	7 (0.3)	.506	0 (0)	8 (0.3)	.047

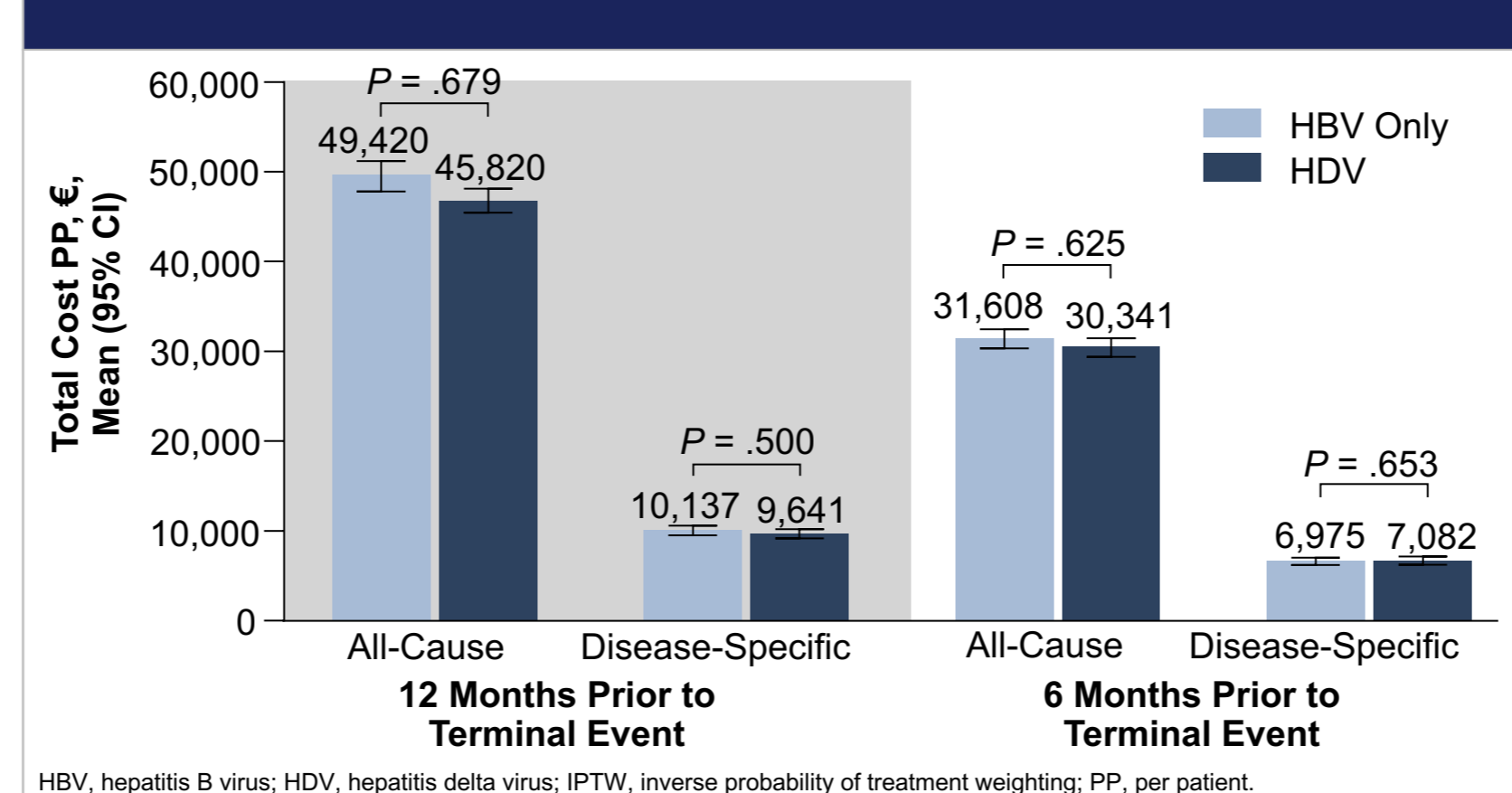
- No differences in age were observed between the HDV and HBV only groups (before IPTW, P-value = .144; after IPTW, P-value = .735)
- The number of males between groups was similar before IPTW, but higher in patients with HDV after IPTW
- After IPTW, the non-liver-related comorbidities hypertension, hepatitis C virus, and nonalcoholic steatohepatitis were well matched between the HDV and HBV only groups
- Liver-related comorbidities were not included in the IPTW matching process as they are associated with HDV

### Table 2 IPTW Terminal Care HCRU for All Terminal Patients With HDV or HBV Only

Variables	Patients With HDV n = 2,891	Patients With HBV Only n = 2,717
<b>HCRU in the year before death</b>		
Total inpatient visits, n		
All-cause	7,861	7,771
Disease-specific	2,067	2,001
<b>HCRU in the 6 months before death</b>		
Total inpatient visits, n		
All-cause	5,794	5,474
Disease-specific	1,536	1,447

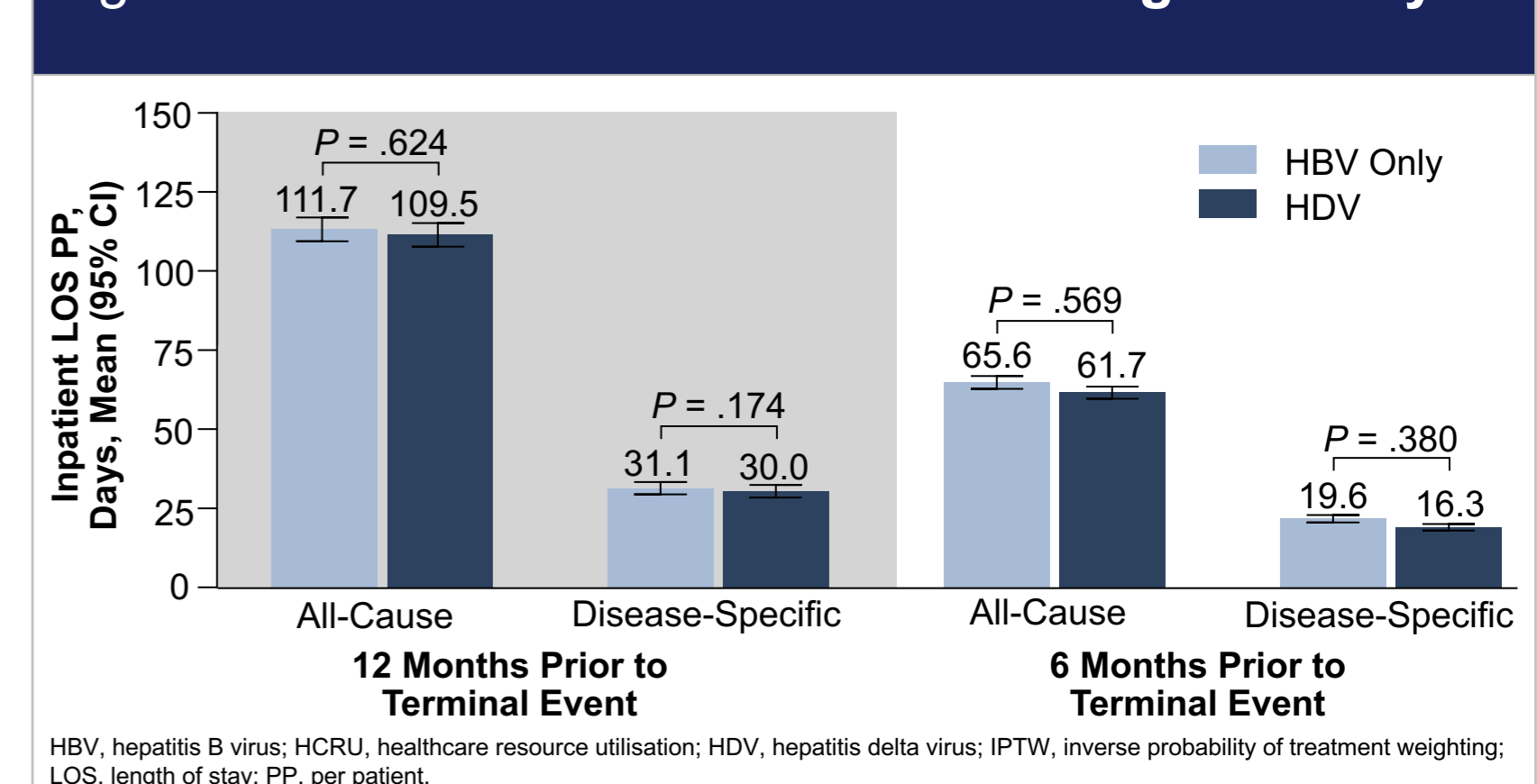
HBV, hepatitis B virus; HDV, hepatitis delta virus; IPTW, inverse probability of treatment weighting; PP, per patient.

### Figure 4 IPTW Terminal Care Costs: Total Cost Per Patient



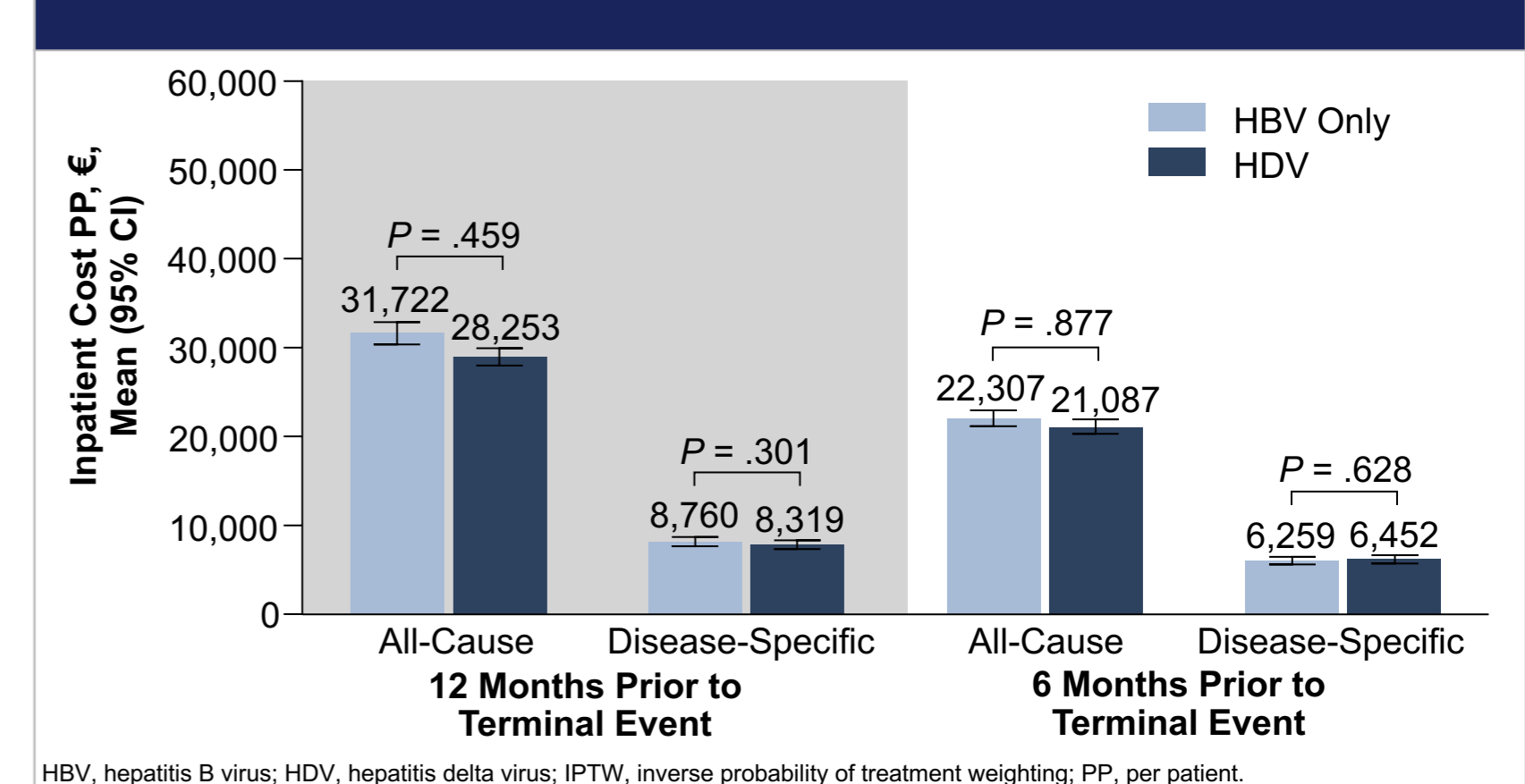
HBV, hepatitis B virus; HDV, hepatitis delta virus; IPTW, inverse probability of treatment weighting; PP, per patient.

### Figure 3 IPTW Terminal Care HCRU: Length of Stay



HBV, hepatitis B virus; HDV, hepatitis delta virus; IPTW, inverse probability of treatment weighting; LOS, length of stay; PP, per patient.

### Figure 5 IPTW Terminal Care Costs: Inpatient Cost Per Patient



HBV, hepatitis B virus; HDV, hepatitis delta virus; IPTW, inverse probability of treatment weighting; PP, per patient.

- In the 6 months before death, the all-cause and disease-specific inpatient length of stay were similar for patients in both groups
- The all-cause and disease-specific mean total cost per patient (€) were similarly high in both populations

## Limitations

- As is common in retrospective claims analyses, a limitation of this study was the use of diagnoses made via ICD-9-CM codes, which are subject to issues caused by miscoding that can lead to misclassification bias
- Although IPTW was performed to account for confounding factors, the lack of approved assays as well as suboptimal screening practices to determine HDV and HBV status could cause an underestimation of each population