

Direct Healthcare Costs of Cirrhosis and Overt Hepatic Encephalopathy in the United States

Arun B. Jesudian, MD¹, Debbie Goldschmidt, PhD², Jerome Bedard, MSc³, Sharat Shankar, MSc⁴, Patrick Gagnon-Sanschagrín, MSc³, Leonardo Passos Chaves, MD⁵, Olamide Olujuhngbe, PharmD⁵, Annie Guérin, MSc³

¹Weill Cornell Medicine, New York, NY, USA, 10065
²Analysis Group Inc., New York, NY, USA, 10036
³Analysis Group ULC, Montréal, QC, Canada, H3B 0G7
⁴Analysis Group ULC, Toronto, ON, Canada, M5X 1A9
⁵Bausch Health, Bridgewater, NJ, USA, 08807

STUDY OBJECTIVE

To assess the direct healthcare costs of patients with cirrhosis, separately for patients without and with overt hepatic encephalopathy (OHE), in the United States (US) using administrative claims data.

KEY MESSAGES

Cirrhosis is associated with a substantial economic burden, with mean annual healthcare costs of \$46,184 per patient even in the absence of OHE.

Progression to OHE is associated with a marked increase in costs, reaching \$78,301 annually - an incremental burden of \$32,117 per patient, largely driven by inpatient care (79.7% of the difference).

At the national level, cirrhosis represents an estimated \$106.8 billion in annual healthcare costs, increasing to \$124.2 billion when accounting for patients who progress to OHE, an additional \$17.4 billion attributable to OHE.

CONCLUSION

Cirrhosis imposes a high economic burden on the US healthcare system, which increases substantially with progression to OHE.

The incremental costs associated with OHE are primarily driven by inpatient utilization, highlighting the clinical and economic consequences of disease progression.

These findings underscore the importance of strategies that optimize cirrhosis management and prevent or delay progression to OHE to reduce both patient burden and healthcare system costs.

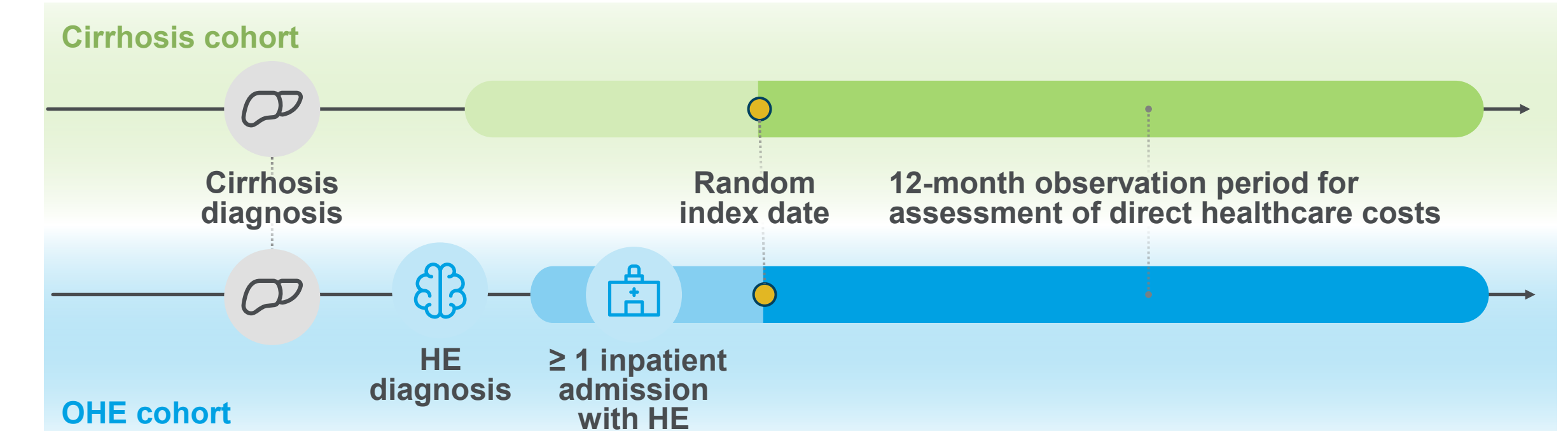
BACKGROUND

- Cirrhosis is a common and growing public health concern in the United States (US) that can lead to major complications despite treatment, requiring high healthcare resource utilization¹
- Overt hepatic encephalopathy (OHE) is a debilitating complication of cirrhosis that leads to recurrent hospitalizations and substantial burden on the healthcare system²

METHODS

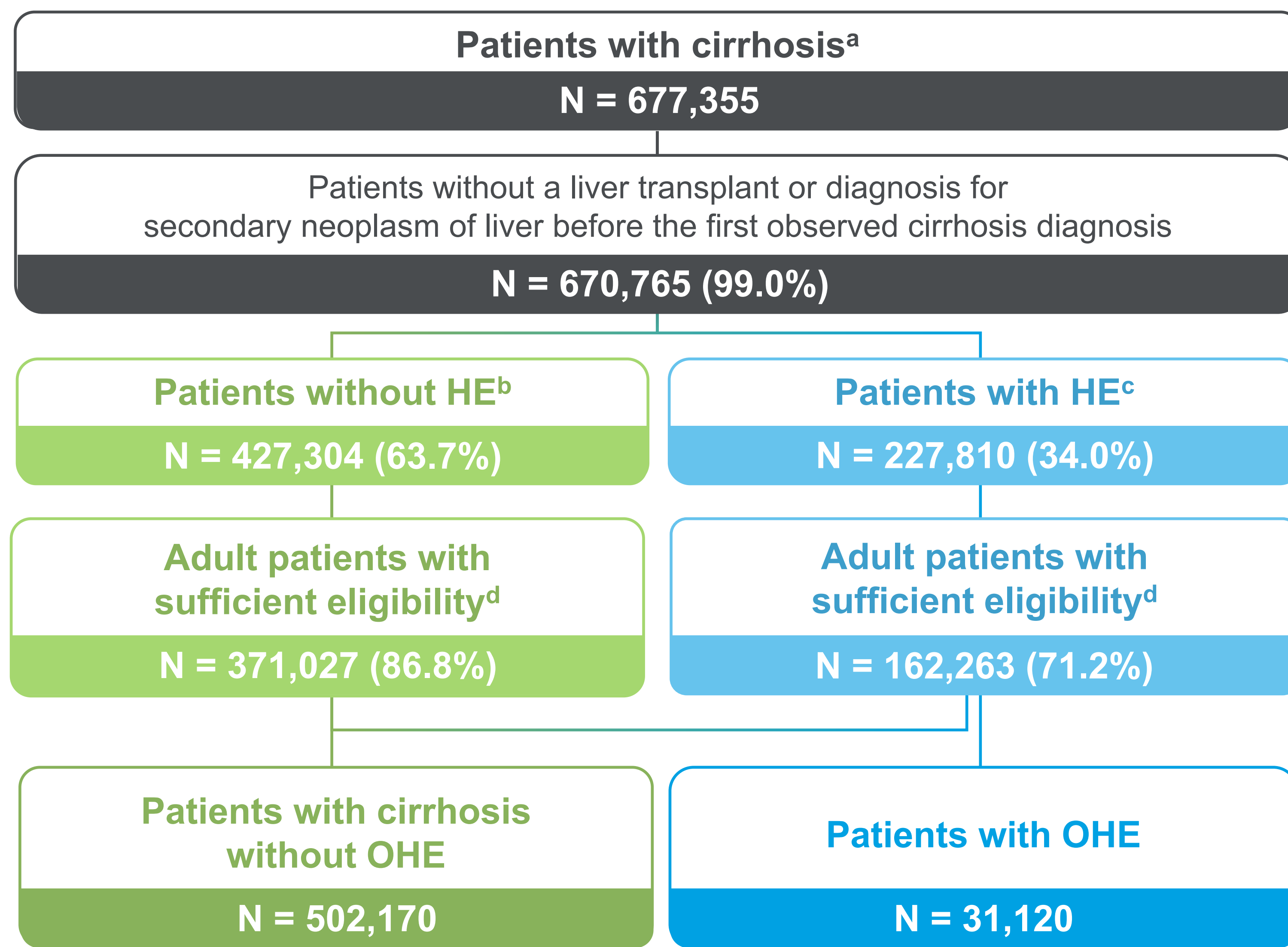
- Retrospective cohort study using Komodo Research Data (KRD 01/2016 – 06/2024), a US insurance claims database
- Study population:** Adult patients with cirrhosis were identified and stratified into the following mutually exclusive cohorts:
 - Cirrhosis cohort:** Patients with cirrhosis without OHE, including patients with HE
 - OHE cohort:** Patients with cirrhosis and an OHE episode, defined as an inpatient admission with HE
- The index date was randomly selected from dates with ≥12 months of continuous enrollment; dates with <12 months of follow-up due to death were also eligible
- All-cause healthcare costs (2025 USD) were measured over the 12-month post-index period; follow-up was truncated at death or liver transplantation, with \$0 costs assigned thereafter
- Cohorts were reweighted using entropy balancing on age, sex, race/ethnicity, region, health plan, and index year

Figure 1. Study design



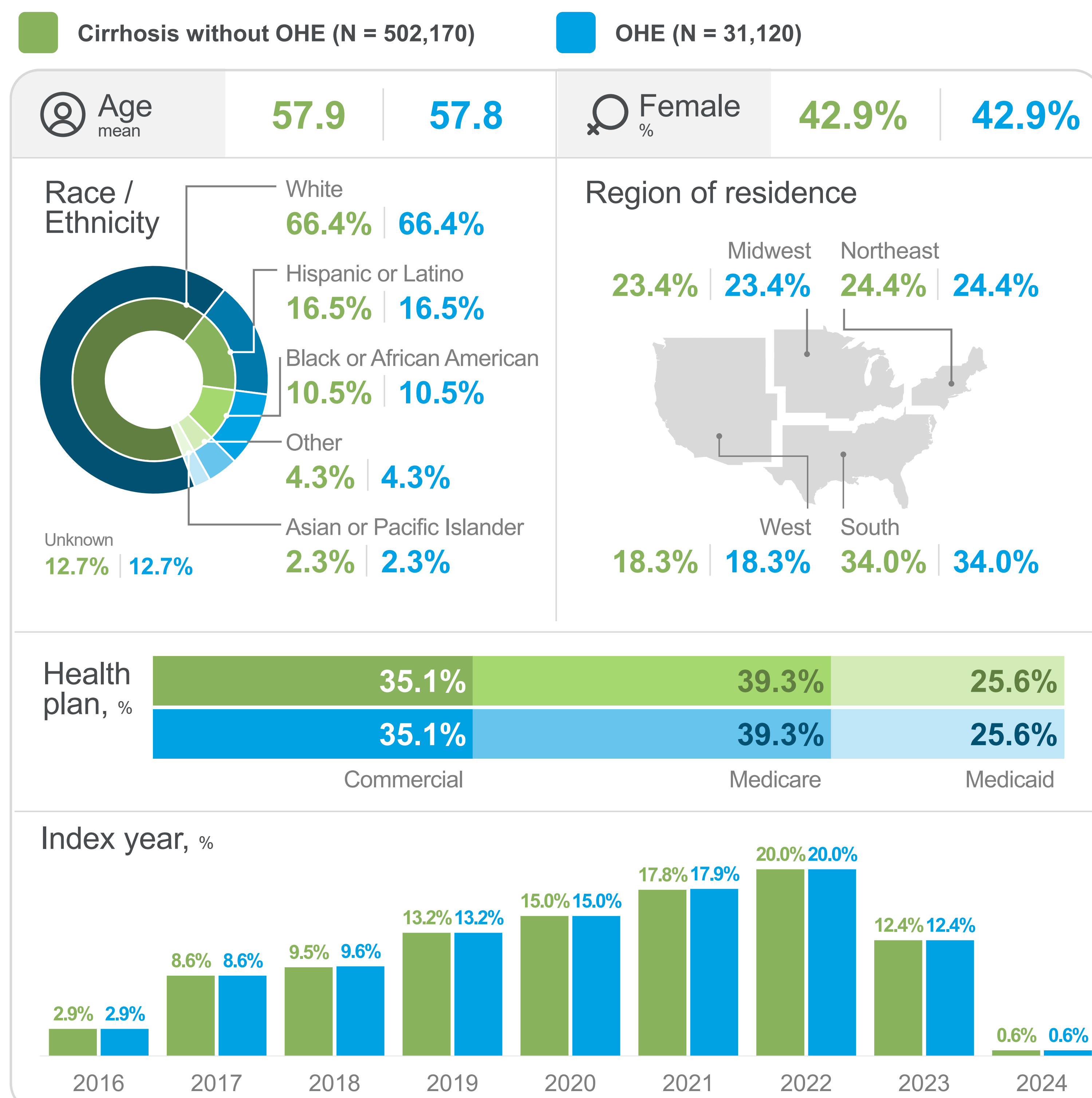
RESULTS

Figure 2. Patient selection



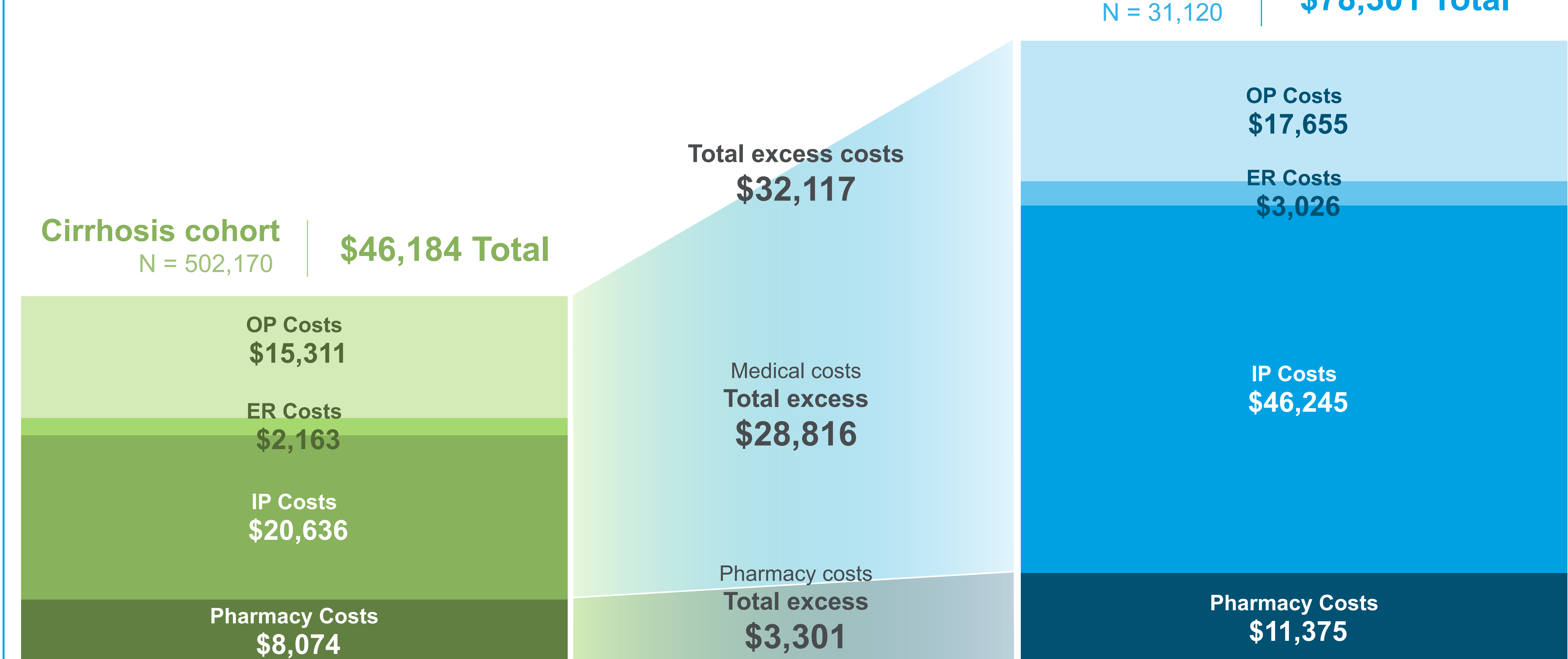
HE: hepatic encephalopathy; N: number; OHE: overt hepatic encephalopathy
 a. Patients with ≥2 diagnoses of cirrhosis on distinct dates ≥ 30 days apart were included; b. Patients with no diagnosis of HE and no treatment with rifaximin at any time were included; c. Patients with ≥1 diagnosis of HE at any time were included; d. Patients aged ≥18 years and with ≥12 months of continuous health plan enrollment unless they died or had a liver transplant were included.

Figure 3. Patient demographics (after balancing)



N: number; OHE: overt hepatic encephalopathy

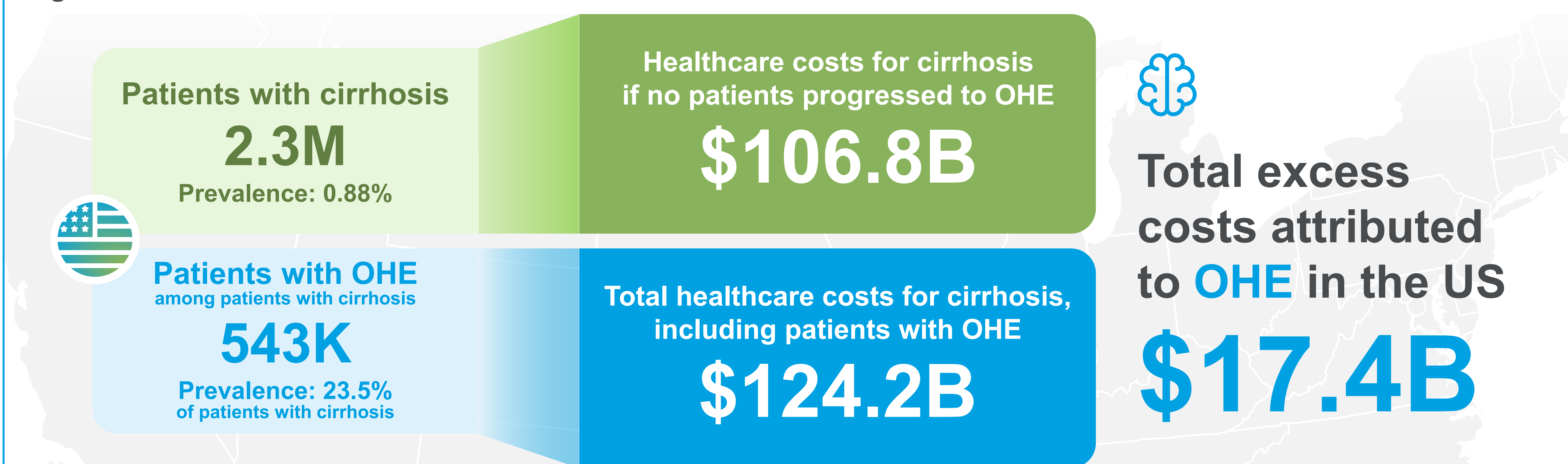
Figure 4. Annual all-cause healthcare costs, mean (PPPY)



Annual all-cause healthcare costs (PPPY, 2025 USD) ^e	Cirrhosis cohort (N = 502,170)	OHE cohort (N = 31,120)	Average excess costs	Proportion of excess costs by component
Total healthcare costs, mean ± SD [median]	46,184 ± 103,460 [18,407]	78,301 ± 126,329 [38,788]	32,117	
Medical costs	38,110 ± 98,630 [11,336]	66,926 ± 119,989 [26,608]	28,816	89.7%
OP costs	15,311 ± 72,516 [5,517]	17,655 ± 44,646 [6,405]	2,345	7.3%
Home-health/SNF-related costs	1,554 ± 20,342 [0]	2,143 ± 10,636 [0]	589	1.8%
Other OP costs ^f	13,756 ± 69,116 [4,969]	15,512 ± 42,582 [5,364]	1,756	5.5%
ER costs	2,163 ± 7,409 [16]	3,026 ± 9,096 [224]	862	2.7%
IP costs	20,636 ± 59,279 [0]	46,245 ± 102,300 [8,484]	25,609	79.7%
Pharmacy costs	8,074 ± 25,428 [1,205]	11,375 ± 28,402 [2,485]	3,301	10.3%

ER: emergency room; IP: inpatient; N: number; OP: outpatient; PPPY: per-patient-per-year; SD: standard deviation; SNF: skilled nursing facility
 e. Costs were assessed after the cohorts were balanced using entropy balancing; f. Other OP costs include OP visit costs.

Figure 5. Healthcare costs at the national level^g



B: billion; M: million; K: thousands; OHE: overt hepatic encephalopathy
 g. National healthcare costs were estimated by multiplying mean annual per-patient healthcare costs for individuals with cirrhosis (without OHE) and with OHE by the corresponding population sizes, derived from U.S. Census Bureau population estimates (2023) and Wong RJ et al. Clin Transl Gastroenterol. 2025. <https://doi.org/10.14309/ctg.0000000000000823t>.

References
 1. Vastrup H et al. Hepatic encephalopathy guideline. Hepatology. 2014;60(2):715-735.
 2. Harris KB et al. Healthcare burden of HE. Clin Liver Dis. 2024;28(2):265-272.

Limitations
 The study is subject to common limitations inherent to claims data, including potential coding inaccuracies, missing data, and limited availability of clinical information. Classification of HE and OHE relied on an ICD-10-CM diagnosis code and use of treatment, which may lead to misclassification of patients.

Disclosure
 ABJ has provided paid consulting services to Salix/BHC, Mallinckrodt Pharmaceuticals, and Madrigal Pharmaceuticals. Other authors: DB, JB, SS, PGS, and AG are employees of Analysis Group ULC, a consulting company that has provided paid consulting services to Bausch Health, LPC and OO are employed by Bausch Health. This study was undertaken by Analysis Group ULC sponsored by Bausch Health.



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 Corresponding author: Arun B. Jesudian, MD.