Economic Burden of Gastroesophageal Reflux Disease, Barrett's Esophagus, and Esophageal Neoplasia in the United States

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BACKGROUND

- Long-term gastroesophageal reflux disease (GERD) is a risk factor for Barrett's esophagus (BE) which can progress to dysplasia (indefinite-, low-, and high-grade) and ultimately esophageal adenocarcinoma (EAC)¹
- BE is the only known precursor to EAC,^{2,3} one of the most lethal cancers in the US⁴
- ◆ A study reported that the overall healthcare expenditures among Medicaid beneficiaries with BE increased from \$182,399 in 1995 to \$623,864 in 1999;⁵ in 2015, the annual healthcare expenditures for esophageal disorders exceeded \$18 billion in the US⁶
- As the incidence of BE and EAC rises over time,^{2,7} an up-to-date assessment of the economic burden among patients with GERD, BE, and esophageal neoplasia (EN) is warranted to capture the variability in costs of care by disease stage

OBJECTIVE

To evaluate healthcare resource utilization (HRU) and direct healthcare costs associated with GERD, BE, and EN in the US and gain an understanding of the economic burden among these patients which may serve as a benchmark to assist in improving the clinical management (screening and surveillance) of BE

METHODS

Study Design and Data Source

- Retrospective cohort design using IBM Truven Health MarketScan® databases: Commercial Claims and Encounters and Medicare Supplemental and Coordination of Benefits (2015–2019)
- Data were de-identified and comply with the HIPAA

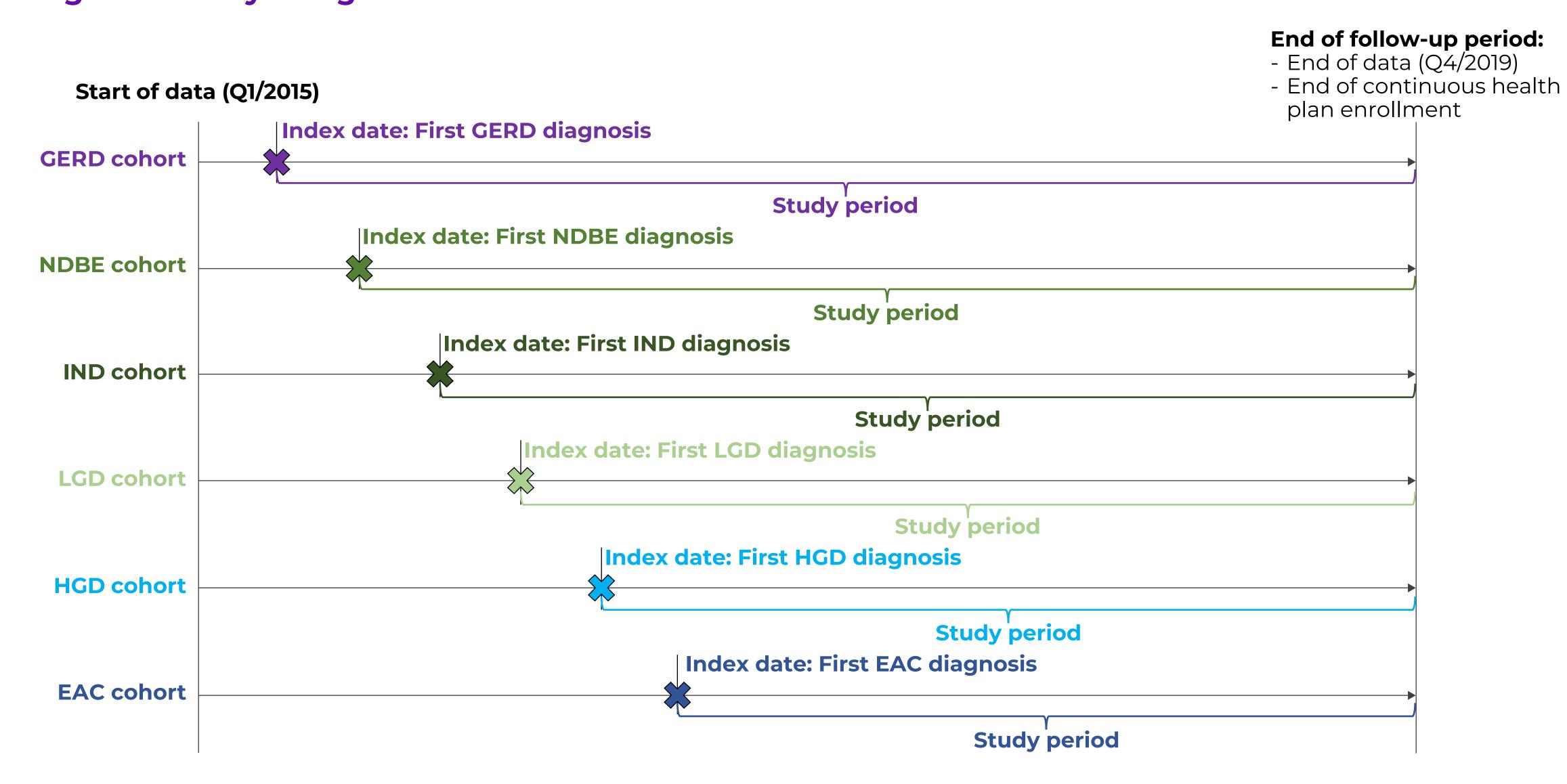
Study Population

- Adult patients with ≥ 1 month of continuous health plan enrollment (medical and pharmacy) after the index date (defined in **Figure 1**) were classified into 6 mutually exclusive cohorts based on their most advanced stage of disease:
- GERD cohort: Patients had ≥ 2 medical claims with a diagnosis for GERD on distinct calendar dates OR had ≥ 1 medical claim with a diagnosis for GERD AND ≥ 1 treatment for GERD preceded by a GERD diagnosis

 NDBE (non-dysplastic BE) cohort: Patients had ≥ 1 medical claim with a diagnosis for NDBE*

- IND (indefinite dysplasia) cohort: Patients
 had ≥ 1 medical claim with a diagnosis for IND*
- LGD (low-grade dysplasia) cohort: Patients
 had ≥ 1 medical claim with a diagnosis for LGD*
- HGD (high-grade dysplasia) cohort: Patients had ≥ 1 medical claim with a diagnosis for HGD*
- EAC cohort: Patients had ≥ 1 medical claim with a diagnosis for EAC
- * Healthcare organizations nationwide switched from the ICD-9 billing code system to the more detailed ICD-10 on October 1, 2015. ICD-10-CM diagnosis codes include the level of information needed to identify NDBE, IND, LGD, and HGD in medical claims.

Figure 1. Study design



Outcomes and Statistical Analysis

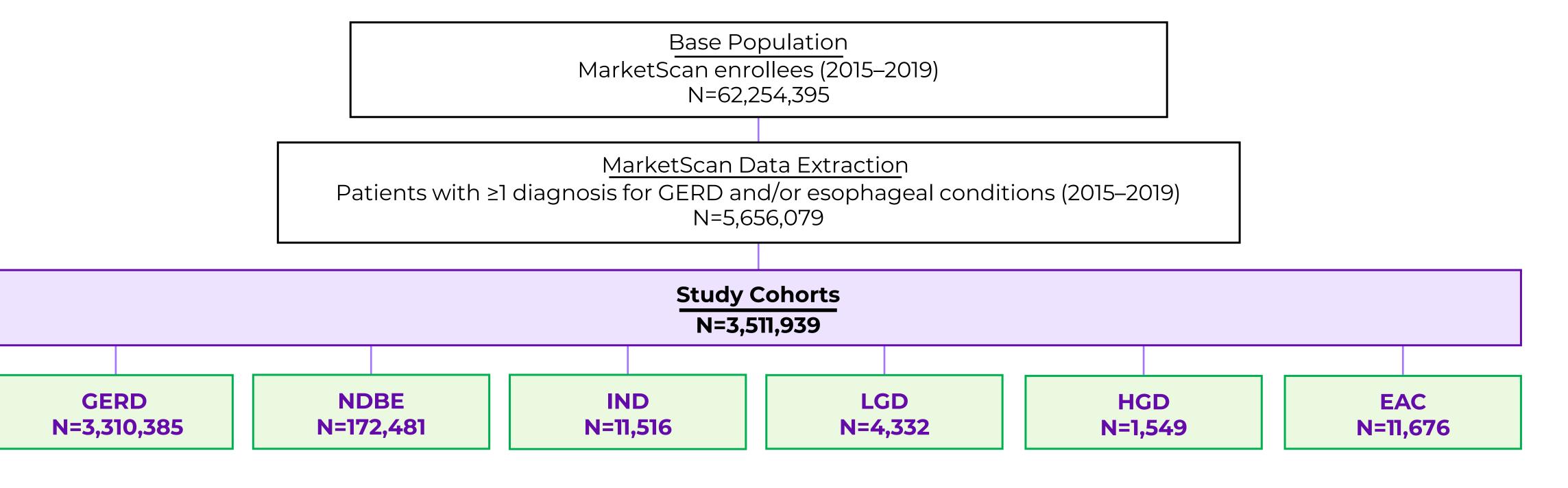
- Disease-related HRU and direct healthcare costs measured during the study period were reported descriptively for each cohort
- Disease-related HRU and costs were identified using claims with a diagnosis code, procedure code for a diagnostic test or treatment, or NDC code for a treatment for GERD, NDBE, IND, LGD, HGD, or EAC

Proportion of patients with ≥ 1 event and annual mean number of inpatient (IP) admissions, days
 with office visits and emergency department (ED) visits were reported per patient

 Annual mean total costs, including medical and pharmacy costs, were measured from a societal perspective (i.e., amounts reimbursed by payers and patients' out-of-pocket costs) and reported per patient (USD2020)

RESULTS

Figure 2. Sample selection



Demographics

- Cohorts comprised a clinically representative sample of patients with EAC and its precursors
- Mean age: 57–62 years
- Majority were female in GERD cohort (60%) and male in NDBE and EN cohorts (56–77%)
- Average of 17–23 months of follow-up; 49–67% of patients had ≥ 12 months

Table 1. Patient characteristics

	GERD N=3,310,385	NDBE N=172,481	IND N=11,516	LGD N=4,332	HGD N=1,549	EAC N=11,676
Age, years; mean ± SD [median]	51.02 ± 14.97 [52.00]	57.05 ± 12.16 [58.00]	58.07 ± 11.74 [58.00]	60.12 ± 11.27 [60.00]	61.29 ± 10.93 [61.00]	62.79 ± 12.03 [62.00]
Female, N (%)	1,972,415 (59.6)	75,712 (43.9)	4,746 (41.2)	1,434 (33.1)	359 (23.2)	2,936 (25.1)
Region of residence, N (%)						
South	1,621,109 (49.0)	71,407 (41.4)	4,047 (35.1)	1,659 (38.3)	571 (36.9)	4,469 (38.3)
Midwest/North Central	699,450 (21.1)	38,393 (22.3)	3,200 (27.8)	1,072 (24.7)	380 (24.5)	3,135 (26.8)
Northeast	578,927 (17.5)	41,045 (23.8)	2,775 (24.1)	1,078 (24.9)	413 (26.7)	2,624 (22.5)
West	405,824 (12.3)	21,452 (12.4)	1,479 (12.8)	519 (12.0)	185 (11.9)	1,434 (12.3)
Unknown	5,075 (0.2)	184 (0.1)	15 (0.1)	4 (O.1)	O (O.O)	14 (0.1)
Charlson Comorbidity Index [†] , mean ± SD	0.99 ± 1.66	1.06 ± 1.71	1.08 ± 1.73	1.14 ± 1.80	1.29 ± 1.88	5.63 ± 2.73
Duration of study period (month), mean ± SD [median]	22.92 ± 15.94 [19.74]	18.86 ± 13.33 [15.63]	17.64 ± 12.83 [14.57]	18.19 ± 12.92 [15.00]	18.05 ± 13.21 [14.24]	16.59 ± 13.92 [11.91]
≥ 12 months, N (%)	2,218,827 (67.0)	104,101 (60.4)	6,571 (57.1)	2,589 (59.8)	885 (57.1)	5,756 (49.3)

[†]Charlson Comorbidity Index was assessed during the study period.

Disease-related HRU

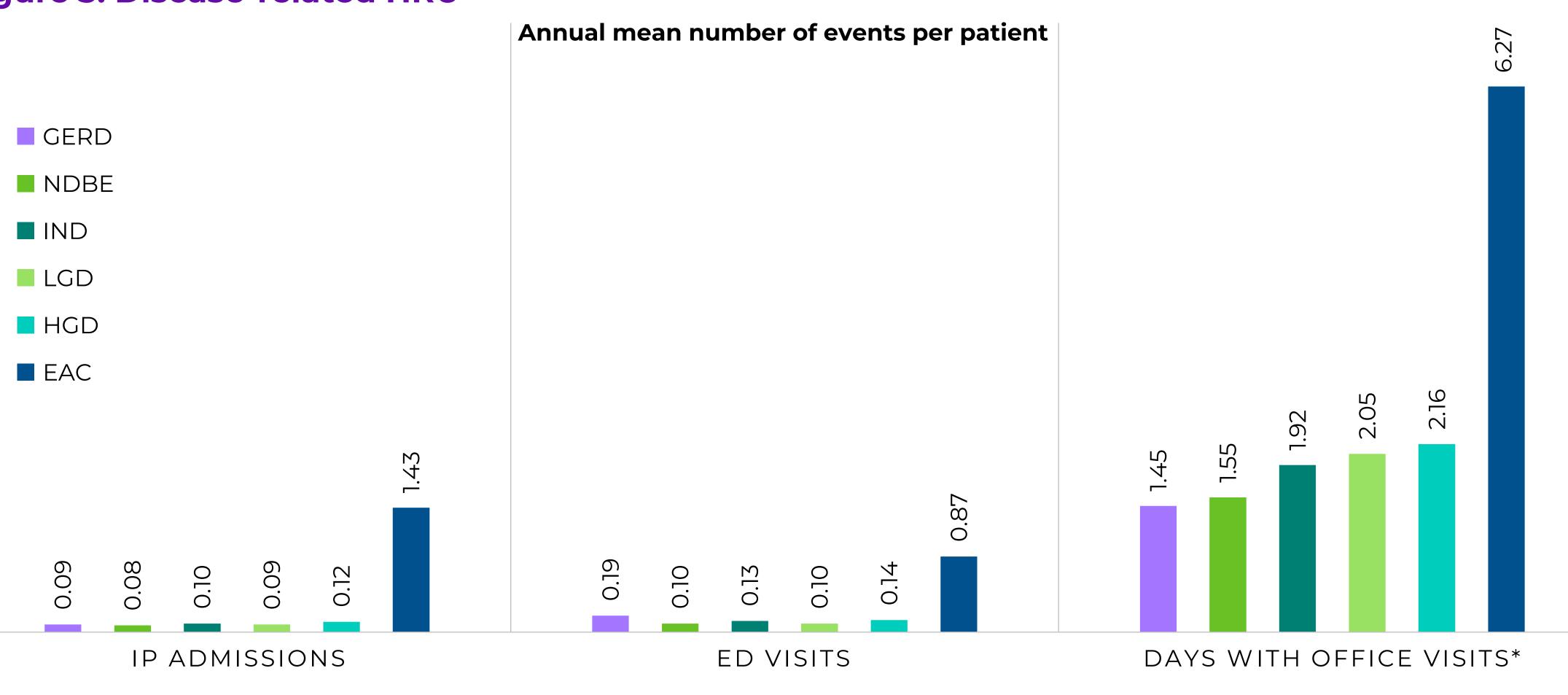
 53% of patients with EAC had ≥ 1 IP admission while it was only 7% for patients with NDBE (during a slightly shorter average follow-up period for EAC, with a mean follow-up period of 17 and 19 months, respectively)

Table 2. Proportion of patients with ≥ 1 disease-related HRU event during the study period

Proportion of patients with ≥ 1 event, %	GERD N=3,310,385	NDBE N=172,481	IND N=11,516	LGD N=4,332	HGD N=1,549	EAC N=11,676
Duration of study period (month), mean ± SD [median]	22.92 ± 15.94 [19.74]	18.86 ± 13.33 [15.63]	17.64 ± 12.83 [14.57]	18.19 ± 12.92 [15.00]	18.05 ± 13.21 [14.24]	16.59 ± 13.92 [11.91]
IP admissions	9.1%	7.3%	8.4%	8.3%	10.8%	53.3%
ED visits	13.4%	8.0%	8.9%	8.2%	9.7%	29.5%
Days with office visits*	77.7%	71.5%	76.7%	78.3%	75.9%	82.1%

- High utilization of disease-related office visits*, and low utilization of disease-related IP services among
 patients across all cohorts
- Disease-related IP utilization was observed to be 17 times higher among patients with EAC than those with NDBE

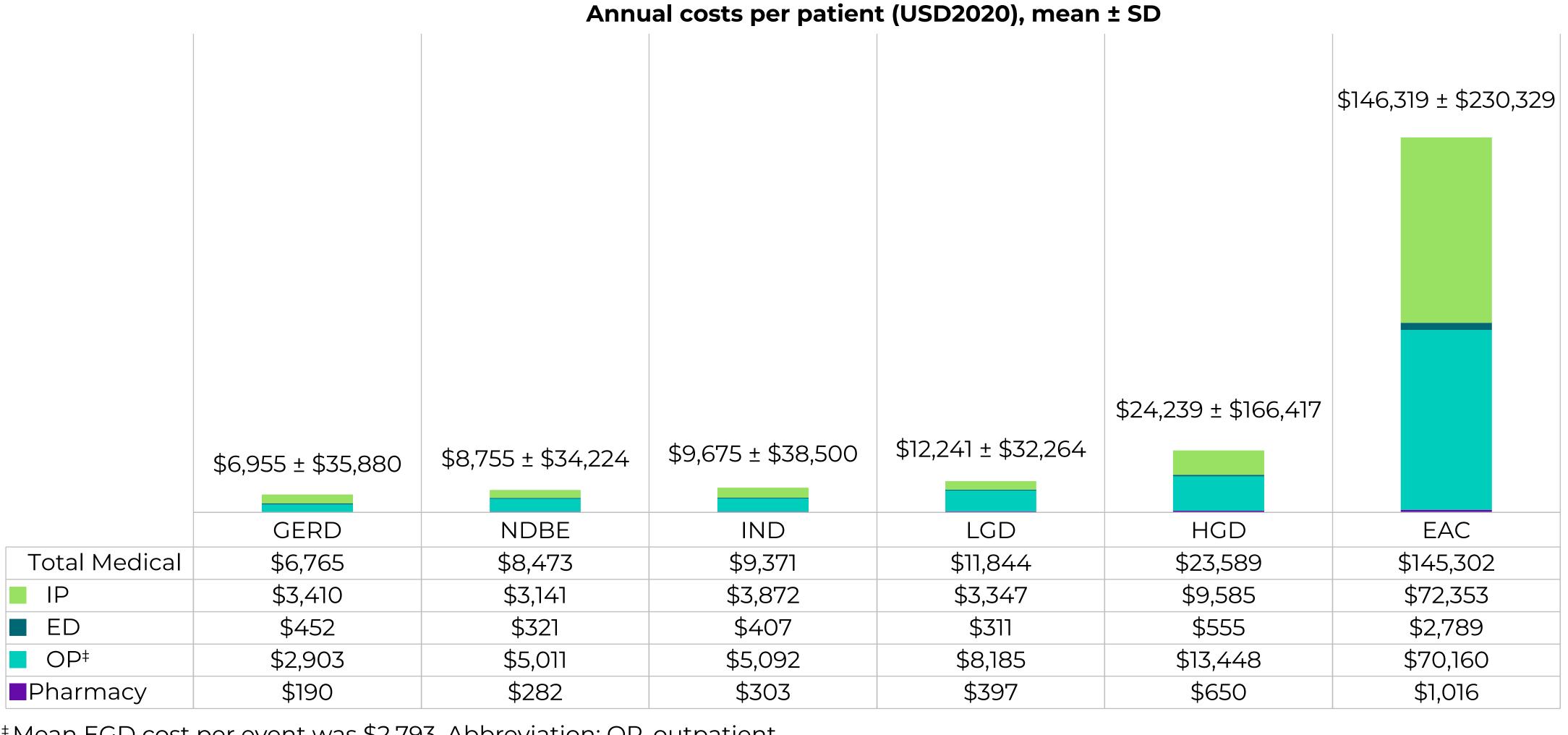
Figure 3. Disease-related HRU



*Office visits excluded days with outpatient services such as laboratory tests, imaging, mental health services, drug administration, skilled nursing facilities, and home care services.

- Medical costs was the major driver of total disease-related direct healthcare costs across all cohorts
- The burden increased with disease severity; patients with EAC incurred 16 times higher total cost than those with NDBE

Figure 4. Disease-related direct healthcare costs



Mean EGD cost per event was \$2,793. Abbreviation: OP, outpatient

Costs were adjusted for inflation using the US Medical Care component of the Consumer Price Index and reported in 2020 US dollars

LIMITATIONS

- Retrospective, claims-based analysis limited to commercially insured patients
- Lab test results were not available
- Identification of cohorts was mainly based on diagnosis codes in claims
- Reasons for diagnosis/procedure codes are not available in claims
- Possible data omissions and inaccuracies
- Since over-the-counter treatments are not available in claims, self-management of the disease was not captured

CONCLUSIONS

- Patients with GERD, Barrett's esophagus, and esophageal neoplasia had important diseaserelated healthcare resource utilization and direct healthcare costs, most notably for office visits and inpatient admissions
- This study provides an overview of an increasing burden of illness; as patients progressed from GERD to Barrett's esophagus to EAC, they incurred substantially higher disease-related healthcare resource utilization and associated costs
- Study findings suggest the need for frequent monitoring for early identification of high-risk individuals prior to progression to EAC to potentially improve clinical and economic outcomes in this population

References

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