

INTRODUCTION

- Myasthenia gravis (MG) is a rare neuromuscular disorder characterized by skeletal muscle weakness and fatigue.¹
- In the United States (US), the prevalence of MG was 37 per 100,000 individuals in 2021.²
- Due to the severity and comorbidities of the disease, as well as the high costs of MG treatments, the associated economic burden is significant.³
- Few studies have investigated healthcare costs and resource utilization (HCRU) in MG patients.⁴ However, these estimates are outdated, using data from years ago, and lacked a suitable comparator group for comprehensive analysis.
- The absence of a comprehensive cost-of-illness study makes it challenging to accurately assess the true economic burden of MG and its implications for the US healthcare system.

OBJECTIVE

- To estimate healthcare costs and resource utilization associated with MG during the first year following diagnosis by from a payer's perspective.

METHOD

Study Design	Retrospective Cohort Study
Data Source	Merative™ MarketScan® Databases: Commercial Claims and Medicare Supplemental
Study Period	January 2016 - December 2021
Study Cohorts	<p>MG Cohort</p> <ul style="list-style-type: none"> Have ≥2 claims with diagnoses of MG (ICD-10 codes: G70.00 - G70.02) Index date on the date of first MG diagnosis Have 1-year continuous enrollment (baseline and follow-up period) <p>Control Cohort</p> <ul style="list-style-type: none"> Do not have MG diagnosis during the study period Assigned with a random index-date meeting the 1-year continuous enrollment 1:10 exact matched by age group, geographic location, plan types, index year, Charlson Comorbidity Index (CCI) scores, and MG comorbidities (Hypertension, Hyperlipidemia, Gastroesophageal reflux disease [GERD], Hypothyroidism)
Primary Outcomes	<p>1-Year Total Healthcare Costs Impacted by MG Diagnosis</p> <ul style="list-style-type: none"> Paid amount (2021 USD) for claims from inpatient, outpatient and pharmacy settings
Secondary Outcomes	<p>1-Year HCRU Impacted by MG Diagnosis</p> <ul style="list-style-type: none"> Number of hospital admissions Length of hospital stay [LOS] Number of emergency department [ED] Number outpatient visits
Data Analysis	<p>Demographic & Clinical Characteristics</p> <ul style="list-style-type: none"> Descriptive statistics: mean ± standard deviation [SD], frequency & percentage Chi-square test (categorical variables) Two-sample T-test (continuous variables) <p>Healthcare Costs & HCRU</p> <ul style="list-style-type: none"> Descriptive statistics of the baseline and one-year post-index HCRU <ul style="list-style-type: none"> mean ± SD, median and interquartile range [IQR] Difference-in-difference (DID) estimates from multivariable linear regression model <ul style="list-style-type: none"> Post-Index Cost - Baseline Cost = $X\beta + \epsilon$, where X as a matrix of MG & Covariates* <ul style="list-style-type: none"> *Covariates: cerebrovascular disease, paralysis, diabetes, renal diseases, rheumatic disease, cancer, metastatic cancer, AIDS Sensitivity analysis <ul style="list-style-type: none"> Excluding patients with outlier defined by top 1% of the post-index costs

RESULTS

TABLE 1. Matched Baseline Characteristics

Matched Characteristics	%	
Age Group	<18	2.6%
	18 – 44	21.9%
	45 – 64	55.1%
	≥65	20.4%
Female vs. Male	59.9% vs. 40.1%	
Commercial vs. Medicare	79.6% vs. 20.4%	
CCI Score	0-1	71.1%
	2-3	19.1%
	4 ≤	9.8%
MG-related Comorbidity	Hypertension	44.0%
	Hyperlipidemia	44.0%
	GERD	19.0%
	Hyperthyroidism	19.5%

CCI, Charlson Comorbidity Index; GERD, gastroesophageal reflux disease

TABLE 2. Baseline Clinical Characteristics, Selected

Chronic Conditions	MG (N=3,700)	Control (N=37,000)
Myocardial Infarction	70 (1.9%)	667 (1.8%)
Congestive Heart Failure	162 (4.4%)	1,667 (4.5%)
Peripheral Vascular Disease	272 (7.4%)	2,463 (6.7%)
Cerebrovascular Disease*	555 (15.0%)	2,205 (6.0%)
Chronic Pulmonary Disease	648 (17.5%)	6,194 (16.7%)
Hemiplegia/Paraplegia*	72 (2.0%)	235 (0.6%)
Diabetes (w/o complication)*	664 (18.0%)	7,794 (21.1%)
Renal Disease*	193 (5.2%)	2,264 (6.1%)
Peptic Ulcer Disease	34 (0.9%)	393 (1.1%)
Rheumatic Disease*	224 (6.1%)	1,198 (3.2%)
Cancer*	275 (7.4%)	3,613 (9.8%)
Metastatic Cancer*	36 (1.0%)	531 (1.4%)
AIDS/HIV*	10 (0.3%)	212 (0.6%)

*Patient characteristics that were significantly (p<0.05) different between the MG and Control cohorts.

FIGURE 1. Total Healthcare Costs, 1-Year Before and After Index date

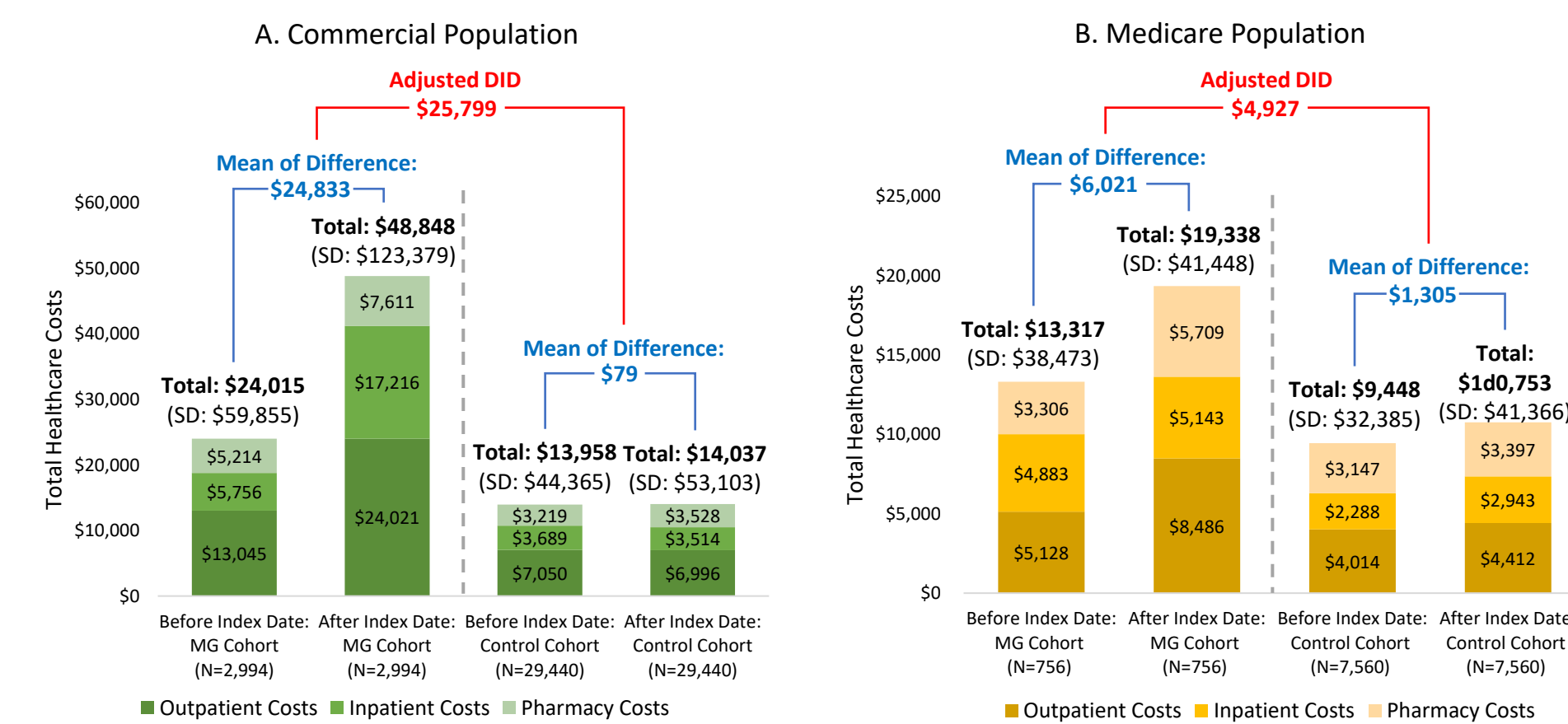
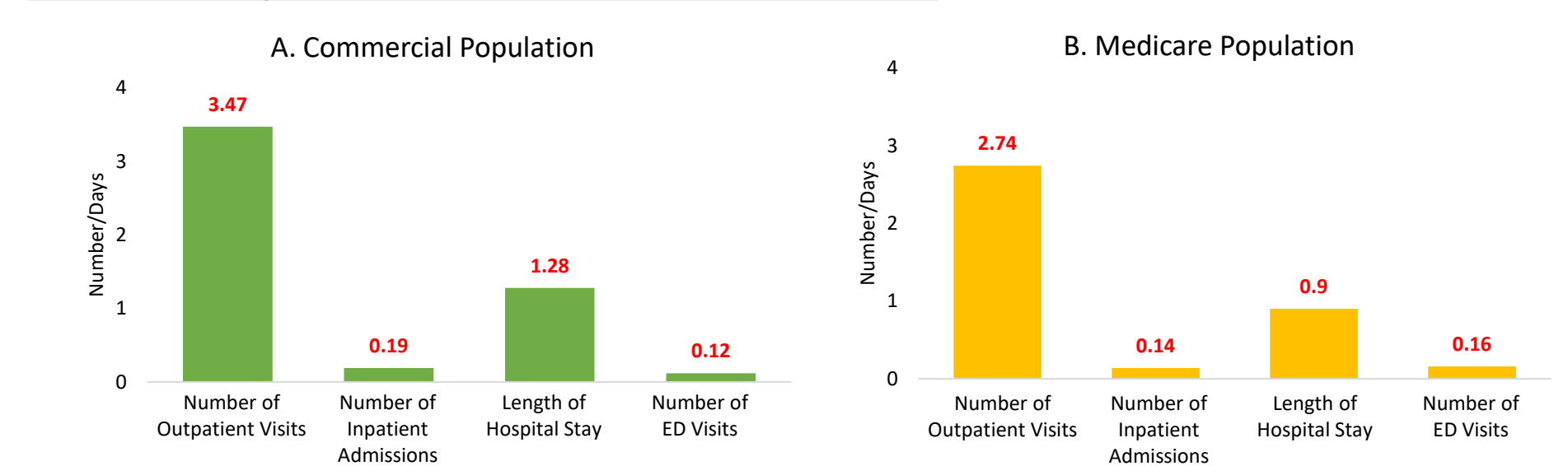


FIGURE 2. MG Impact on HCRU, Difference-in-Difference Estimates



RESULTS

Patient Characteristics (Tables 1 and 2)

- After exact matching, 3,700 patients were included in the MG cohort, while 37,000 patients without an MG diagnosis were included in the control cohort.
- The matched analytic cohort consists of 80% of commercial and 20% Medicare-insured patients.
- The mean age of patients was 54 years old, and 59.9% of the patients were female.
- MG patients have mild-to-moderate CCI score profile.
- Hypertension, hyperlipidemia, GERD, and hypothyroidism were prevalent in the MG patient population.

Cost & HCRU Outcomes

- The DID estimates of the total healthcare cost impacted by MG diagnosis in Commercial and Medicare patients were \$25,799 and \$4,927, respectively (p<0.01) (**Figure 1**).
- In the sensitivity analysis, the DID estimates of the total healthcare cost impacted by MG diagnosis in Commercial and Medicare patients were \$21,151 and \$3,454, respectively (p<0.01) (**Table 3**).
- MG diagnosis had significant impacts on HCRU across all healthcare settings (**Figure 2**).

TABLE 3. Sensitivity Analysis, Excluding Patients with Extreme (Top 1%) Cost Outcome

	Commercial Population				Medicare Population			
	MG cohort		Control Cohort		MG Cohort		Control Cohort	
	Pre-Index	Post-Index	Pre-Index	Post-Index	Pre-Index	Post-Index	Pre-Index	Post-Index
DID estimates, adjusted	\$21,151				\$3,454			
Pre-Post Difference	\$17,986		-\$2,113		\$3,179		-\$269	
Total Healthcare Costs (SD)	\$22,278 (49,261)	\$40,263 (76,333)	\$12,402 (36,529)	\$10,289 (21,935)	\$13,145 (38,558)	\$16,324 (28,406)	\$8,143 (23,146)	\$7,874 (15,799)
Pharmacy Costs	\$4,791	\$6,665	\$2,838	\$3,048	\$3,269	\$4,556	\$2,440	\$2,561
Inpatient Costs	\$5,253	\$12,168	\$3,309	\$1,782	\$4,833	\$4,055	\$1,975	\$1,525
Outpatient Costs	\$12,234	\$21,430	\$6,255	\$5,458	\$5,043	\$7,713	\$3,729	\$3,788

DID, difference-in-difference

LIMITATIONS

- Analysis of a retrospective claims database is subject to miscoding and misclassification bias.
- The source of data only includes direct medical costs to payers, and services not claimed by the payers would not be captured in the data. Consequently, the costs and HCRU are likely underestimated.
- The study population is limited to individuals with employer-based commercial or Medicare supplemental coverage. Therefore, the study findings cannot be generalized to certain subgroups of the US population, such as the underinsured, Medicaid enrollees, or veterans.

CONCLUSION

- We estimated total healthcare costs and HCRU after initial MG diagnosis from US payer perspective.
- Individuals diagnosed with MG show significantly higher healthcare costs and HCRU compared to those without MG. In the commercial population, MG was associated with \$25,799 during the initial year post-diagnosis, whereas it was associated with \$4,927 in the Medicare population.
- Future studies can investigate the long-term healthcare costs and HCRU associated with MG patients.

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