Disease Burden in Patients with Generalized Myasthenia Gravis

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Introduction

- Myasthenia gravis (MG) is a rare but chronic autoimmune disorder of the neuromuscular junction characterized by dysfunction of the post-synaptic membrane; resulting in muscle weakness, fatigue and impaired functioning and social life.[1,2]
- Despite newer treatments for generalized myasthenia gravis (gMG), an estimated 10–20% of patients do not achieve an adequate response or are intolerant to conventional treatment.[3]
- Factors like disability, drug- or surgery-associated adverse events, gMG crises, gMG-related hospitalizations, and comorbidities contribute to the disease burden in gMG patients.[4]

Objective

- The objective of the present study was to investigate the burden of gMG using recent medical claims data in the United States (US).

Methods

Data Source

- De-identified data on basic patient demographics and treatment details collected from medical and pharmacy claims were obtained from the Optum Clinformatics database.[5]
- The database also includes laboratory test results, hospitalization history and provider data allowing a comprehensive and holistic evaluation of healthcare utilization.

Study Population

- Adult patients with an established diagnosis of gMG (ICD-10-CM codes G70.00/ G70.01, ≥1 diagnosis of gMG made by a neurologist), from 01 January 2022 to 31 December 2023 were identified.
- Patients had to have ≥1 claim in the inpatient setting or ≥2 claims in the outpatient setting.
- Only patients with gMG with ≥3-month continuous medical/prescription insurance enrollment were included in the study.

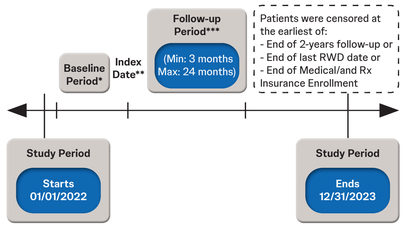
Outcomes

- Data on patient characteristics, comorbidities, and treatment details were collected during the 12-month baseline period.
- Clinical events were tracked during the follow-up phase, which extended from the index date to at least 3 months and up to 2 years or until December 31, 2023, whichever was earlier.
- Minimum study period was 3 months.
- Disease burden was assessed through the incidence of:
  - Medication use – oral corticosteroids or rescue treatments such as immunoglobulin (Ig) or plasma exchange (PLEX)
  - MG-related hospitalizations, emergency room (ER) visits, and intensive care unit (ICU) stay
  - Acute respiratory failure
  - Assisted procedures like mechanical ventilation, and gastrostomy tube insertion
- Analyses were performed for the entire eligible population and for patients with and without targeted immunotherapy.
  - Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab
  - Targeted immunotherapy could be given anytime during the 2-year follow-up period

Statistical Analyses

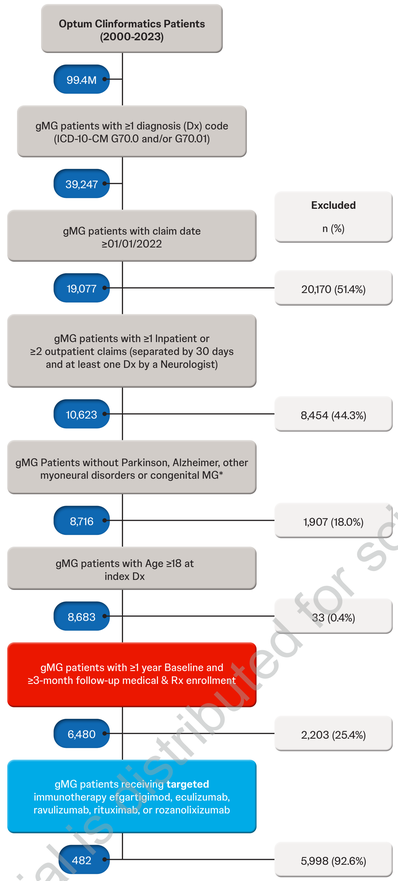
- Frequency and percentage were reported for categorical variables while mean and standard deviation (SD) were reported for continuous variables.
- All data analyses were conducted using SAS version 9.4.

Figure 1. Study design



*Baseline period is defined as the 12-month period prior to index date.
**The index date is defined as the first eligible gMG diagnosis date (from 01/01/2022 to follow-up period end).
***Study follow-up period starts at index date and ends with the earliest of a) end of 2-year RWD follow-up, b) End date of last RWD, c) End/discontinuation of medical and prescription insurance date.
gMG=Generalized Myasthenia Gravis; Rx=Prescription; RWD=Real-world data.

Figure 2. Population selection flowchart



Footnote for ICD-10 codes.
*The following ICD-10-CM codes are used to identify the listed conditions; Parkinson's disease (G20.x; G21.x), Alzheimer's disease (ICD-10-CM: G30.x), other myoneural disorders (G70.1, G70.8x, G70.9), congenital myasthenia gravis (G70.2).
gMG=Generalized Myasthenia Gravis; ICD-10-CM=International Classification of Diseases 10th Revision, Clinical Modification; MG=Myasthenia Gravis; Rx=Treatment.

Results

- A total of 6480 gMG patients were identified and followed for up to 24 months (median: 556 days).
- More than 75% patients were >65 years of age.
- Overall, 482/6480 patients with gMG received targeted immunotherapy.
- Corticosteroid use was recorded in 28.0% of patients, with 17.4% of these receiving prednisone equivalent doses ≥10 mg/day; **Table 1**.

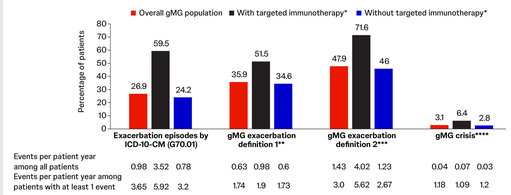
Table 1: Baseline demographic characteristics of patients with gMG

	Overall gMG N=6480	With Targeted immunotherapy* n=482	Without Targeted immunotherapy* n=5998
Age categories, years, n (%)			
18-40	201 (3.1)	17 (3.5)	184 (3.1)
41-65	1204 (18.6)	132 (27.4)	1072 (17.9)
66-75	2386 (36.8)	178 (36.9)	2208 (36.8)
>75	2689 (41.5)	155 (32.2)	2534 (42.2)
Gender, n (%)			
Female	3025 (46.7)	209 (43.4)	2816 (46.9)
Male	3455 (53.3)	273 (56.6)	3182 (53.1)
Race, n (%)			
Asian	143 (2.2)	10 (2.1)	133 (2.2)
Black	577 (8.9)	38 (7.9)	539 (9.0)
Hispanic	507 (7.8)	50 (10.4)	457 (7.6)
White	4858 (75.0)	342 (71.0)	4516 (75.3)
Missing/Unknown	395 (6.1)	42 (8.7)	353 (5.9)
Corticosteroid use, n (%)**			
< 10 mg prednisone equivalent	686 (10.6)	50 (10.4)	636 (10.6)
≥10 mg prednisone equivalent	1128 (17.4)	167 (34.6)	961 (16.0)
None	4666 (72.0)	265 (55.0)	4401 (73.4)
Payer, n (%)			
Commercial	994 (15.3)	86 (17.8)	908 (15.1)
Medicare	5486 (84.7)	396 (82.2)	5090 (84.9)
Charlson Comorbidity Index; mean±SD* **	2.8±2.8	2.8±2.9	2.8±2.8
Elixhauser score; mean±SD* **	4.8±3.45	5.0±3.50	4.8±3.45

*Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab.
**Oral corticosteroid use during baseline period (only ≥14 day-supply records are included).
***CCI and Elixhauser scores are calculated using score specific disease domains as below:
CCI: Myocardial infarction, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, connective tissue disease-rheumatic disease, peptic ulcer disease, mild liver disease, diabetes without complications, diabetes with complications, paraplegia and hemiplegia, renal disease, cancer, moderate or severe liver disease, metastatic carcinoma and AIDS/HIV.
Elixhauser score: Congestive heart failure, cardiac arrhythmia, valvular disease, pulmonary circulation disorders, peripheral vascular disorders, hypertension uncomplicated, hypertension complicated, paralysis, other neurological disorders, chronic pulmonary disease, diabetes uncomplicated, diabetes complicated, hypothyroidism, renal failure, liver disease, peptic ulcer disease excluding bleeding, AIDS/HIV, lymphoma, metastatic cancer, solid tumor without metastasis, rheumatoid arthritis/collagen, coagulopathy, obesity, weight loss, fluid and electrolyte disorders, blood loss anemia, deficiency anemia, alcohol abuse, drug abuse, psychoses and depression.
These domains are identified using ICD-10-CM codes during baseline period (Up to 1 year prior to their index gMG diagnosis). The scores are "sum" of these domains for each patient. Each domain in Elixhauser index score has a weight of one. The weights in CCI score, changes depending on the severity of the disease and can go up to six.[6]
AIDS/HIV=Acquired immune deficiency syndrome/human immunodeficiency virus; CCI=Charlson Comorbidity Index; gMG=Generalized Myasthenia Gravis; ICD-10-CM=International Classification of Diseases 10th Revision, Clinical Modification; SD=Standard deviation.

- Disease burden remained high amongst the 482 patients who received targeted immunotherapy during the study period.
- Overall 26.9% patients experienced exacerbations (ICD-10-CM [G70.01]); (rate per patient-year in patients with at least one event: 3.65) while 3.1% patients experienced gMG crisis (rate per patient-year in patients with at least one event: 1.18; **Figure 3**).

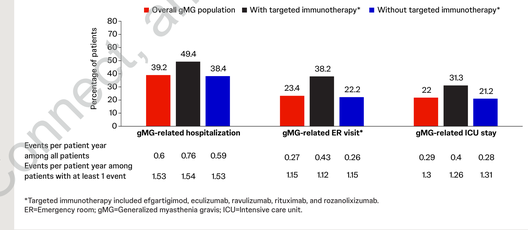
Figure 3. Exacerbation and gMG crisis



*Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab.
**([PLEX OR IV/SC Ig] AND MG related hospitalization]).
***([PLEX OR IV/SC Ig] AND MG related hospitalization]) OR Exacerbation episodes by ICD-10 (G70.01).
****Mechanical ventilation (inpatient) AND Acute respiratory failure (inpatient).
gMG=Generalized Myasthenia Gravis; ICD-10-CM=International Classification of Diseases 10th Revision, Clinical Modification; IV=Intravenous; Ig=Immunoglobulin; PLEX=Plasma exchange; SC=Subcutaneous.

- Overall, 39.2% patients experienced gMG-related hospitalizations (rate per patient-year in patients with at least one event: 1.53); 23.4% gMG-related ER visits (rate per patient-year in patients with at least one event: 1.15); and 22.0% gMG-related ICU stay (rate per patient-year in patients with at least one event: 1.30; **Figure 4**).

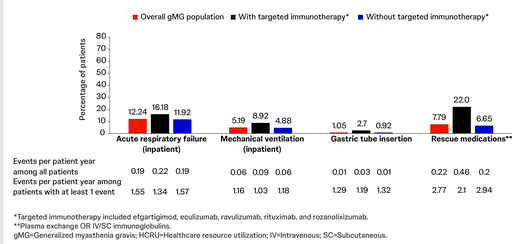
Figure 4. Patients requiring ER visit or hospitalization



*Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab.
ER=Emergency room; gMG=Generalized myasthenia gravis; ICU=Intensive care unit.

- Acute respiratory failure was noted in 12.2% patients (rate per patient-year in patients with at least one event: 1.55), while 5.2% patients (rate per patient-year in patients with at least one event: 1.16) required mechanical ventilation and 1.0% (rate per patient-year in patients with at least one event: 1.29) had gastric tube insertion; **Figure 5**.

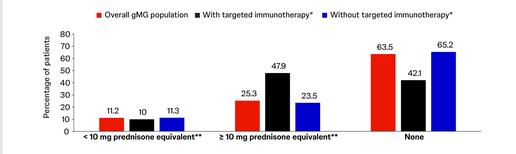
Figure 5. Other HCRU in gMG patients



*Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab.
**Plasma exchange OR IV/SC immunoglobulins.
gMG=Generalized myasthenia gravis; HCRU=Healthcare resource utilization; IV=Intravenous; SC=Subcutaneous.

- Use of oral corticosteroid at lower dosage (<10 mg prednisone equivalent) was similar in patients treated with or without targeted immunotherapy; however, more patients in targeted immunotherapy group (47.9%) received ≥10 mg prednisone equivalent dosage than without targeted immunotherapy group (23.5%); **Figure 6**.

Figure 6. Oral corticosteroid use during follow-up



*Targeted immunotherapy included efgartigimod, eculizumab, ravulizumab, rituximab, and rozanolixizumab.
**Oral corticosteroid use during follow-up period (only ≥14 day-supply records).
gMG=Generalized Myasthenia Gravis.

Conclusions

Despite recent diagnostic and therapeutic advancements, a significant disease burden persists in gMG patients, highlighting an ongoing unmet medical need.

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