

CHARACTERISTICS AND HEALTHCARE UTILIZATION OF PATIENTS WITH MYASTHENIA GRAVIS WHO DEVELOPED EXACERBATION



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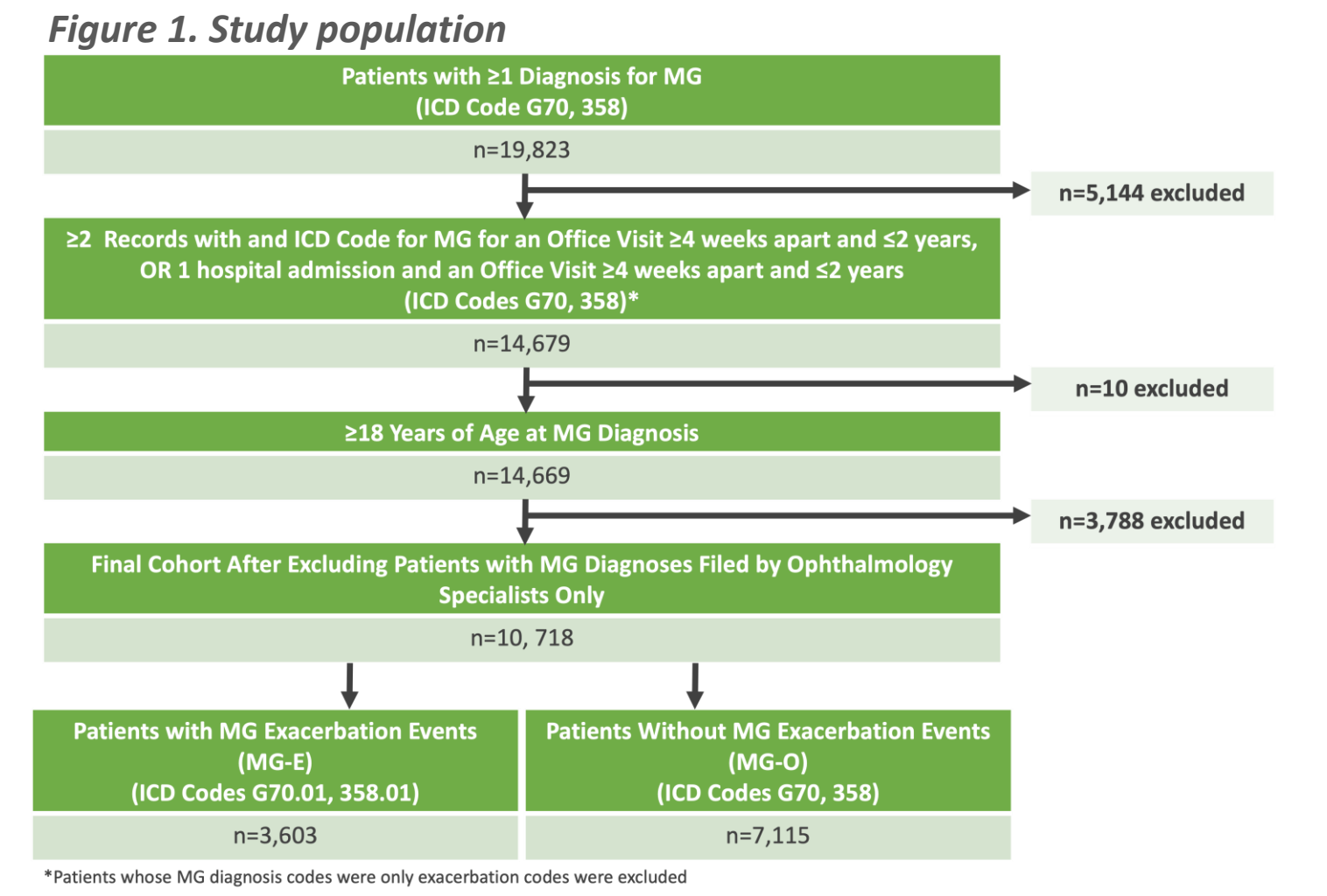
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INTRODUCTION AND OBJECTIVE

- Introduction**
- Myasthenia gravis (MG) is an IgG-mediated autoimmune neurological condition affecting patients’ muscle strength, and often results in impairment of vision, speech, swallowing/chewing, respiration, and limb strength.¹
 - MG is estimated to affect up to 60,000 individuals in the US.²
 - Patients with MG may experience exacerbations and life-threatening myasthenic crisis, which may necessitate mechanical ventilation.³
- Study Objective**
- This study aimed to describe the characteristics of patients with MG who developed exacerbations (MG-E) and compare their healthcare utilization (HRU) to those with MG who did not experience exacerbations (MG-O).

METHODS

- Data Source and Study Population**
- Data was extracted from the National Veterans Affairs (VA) Health Care Network electronic health from 1999 and 2022.
 - The database contains electronic medical record (EMR) data from over 1,700 sites of care serving ~8.76 million veterans each year.
 - Adult patients with a diagnosis for MG were identified as described in **Figure 1** and classified into 2 cohorts: patients with MG and ≥1 exacerbation as based on ICD codes G70.01 and 358.01 (MG-E cohort), and patients with MG but without exacerbation (MG-O).



- Statistical Analysis**
- Patients were followed from index date (defined as the first diagnosis for MG) until death, enrollment end date, or end of the study (03/15/2022).
 - Descriptive statistics compared the baseline characteristics between patients with MG-E and MG-O. Two sample t-tests and chi-square tests were performed to evaluate statistical significance.
 - Kaplan-Meier (KM) analysis and Cox regression were used to estimate the risk of exacerbation among patients with MG from first diagnosis and were stratified by race/ethnicity as well as other patient characteristics.
 - The HRU over entire study follow-up, as well as per-patient-per-year (PPPY) HRU, were compared between MG-E and MG-O. Two sample t-tests were performed for statistical significance comparison.
 - To further characterize the clinical burden of MG exacerbation, the risk of intubation (used as a proxy for MG crisis) was compared between MG-E and MG-O using KM method and Cox regression model.

RESULTS

- Patient Characteristics**
- Of the 10,718 patients included in the analysis, 3,603 (33.6%) of patients with MG developed exacerbations (MG-E) over a median follow-up of 6.8 years in comparison to patients without exacerbation (MG-O) (**Table 1**).
 - More patients with MG-E had early-onset MG (age at initial MG diagnosis <50 years) and higher mean Charlson Comorbidity Index scores before their first MG diagnosis (**Table 1**).

Table 1. Key baseline characteristics			
Characteristics	MG-E (n=3,603)	MG-O (n=7,115)	p-value
Follow up years (mean, SD)	8.11 (5.00)	7.62 (4.86)	<0.0001
Age at MG diagnosis date (mean, SD)	68.01 (11.67)	71.71 (11.26)	
Early onset MG (age at initial diagnosis <50), n (%)	278 (7.72)	359 (5.05)	<0.0001
Male, n (%)	3,416 (94.81)	6,845 (96.21)	0.0007
Race, n (%)			
White	2,720 (75.49)	5,220 (73.37)	
African-American	355 (9.85)	471 (6.62)	
Hispanic	213 (5.91)	250 (3.51)	<0.0001
Others	20 (0.56)	48 (0.67)	
Unknown	267 (7.41)	1,067 (15.00)	
Region, n (%)			
Midwest	974 (27.03)	2001 (28.12)	
Northeast	414 (11.49)	1054 (14.81)	<0.0001
South	1096 (30.42)	2384 (33.51)	
West	1119 (31.06)	1676 (23.56)	
Obesity status at time of diagnosis			
Body Mass Index (BMI) (mean, SD)	30.76 (6.17)	29.85 (5.69)	<0.0001
Obesity rate (BMI >30), n, (%)	1,712 (49.49)	2,937 (43.18)	<0.0001
Charlson comorbidity index score at baseline			
Charlson comorbidity index (mean, SD)	0.86 (1.38)	0.59 (1.13)	<0.0001

BMI= body mass index, MG= myasthenia gravis, MG-E= myasthenia gravis with exacerbation, MG-O= myasthenia gravis without exacerbation, SD= standard deviation

- Exacerbation Characteristics**
- Approximately 32% of the 3,603 patients had >5 recurrent exacerbation events over the duration of study follow-up, with an average of 1.34 (SD 2.50) exacerbations per year (**Figure 2**).
 - Cumulative incidence of exacerbation increased over the course of MG, from 11% at the time of diagnosis to 45% at 15 years post diagnosis (**Figure 3**).
 - The risk of exacerbation varied significantly by racial/ethnicity groups. African American & Hispanic patients had a 22% and 44% increased hazard of exacerbation compared to White patients (p <0.001) (**Figure 4**).
 - Other factors impacting the risk of exacerbation included (data not shown):
 - Region: Patients in the Western region were 1.27 times more likely to develop exacerbations; patients in the Northeast were 0.84 times less likely to develop exacerbations vs patients in the Midwest.
 - Early onset MG: Patients with early onset disease were 1.24 times more likely to develop exacerbations.
 - Obesity: Obese patients were 1.24 times more likely to develop exacerbations.
 - Other comorbidities: Patients with comorbidities such as diabetes, chronic obstructive pulmonary disease, coronary artery disease, and sleep disorders had a higher risk of exacerbation, ranging from 1.1 to 2.2 times higher.

Figure 2. Distribution of exacerbation events over the follow-up period

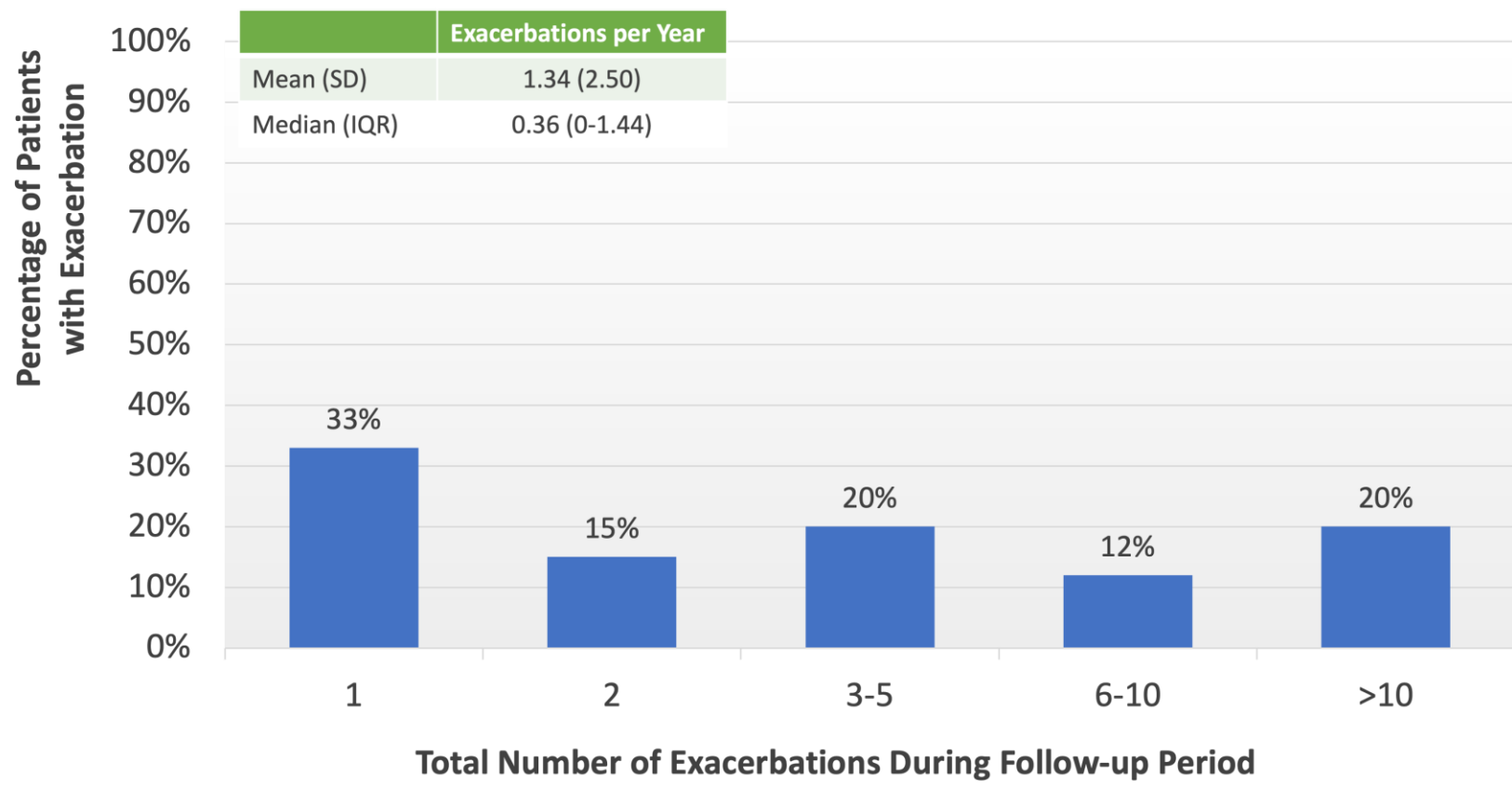


Figure 3. Cumulative incidence of exacerbation from first MG diagnosis

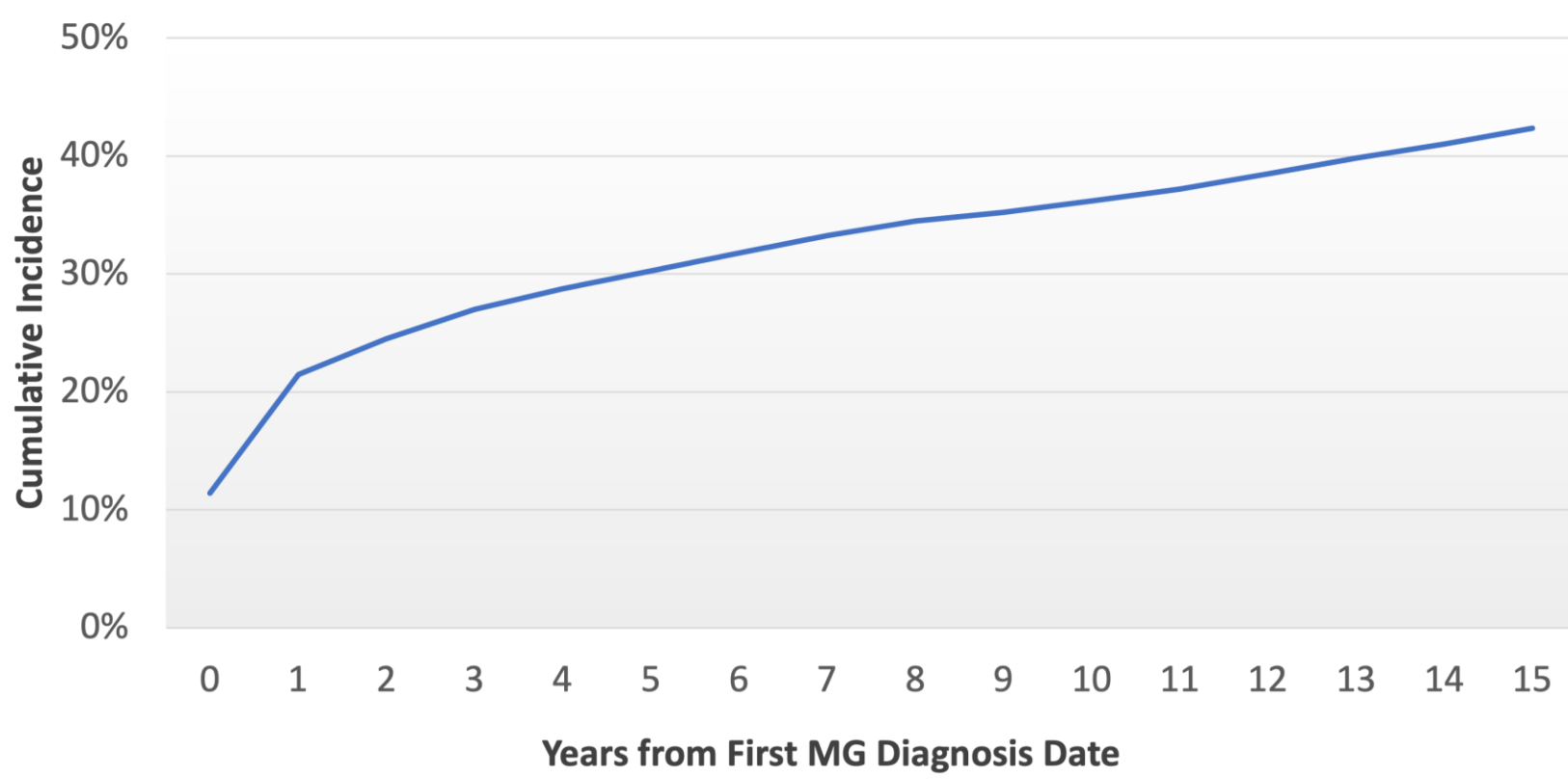
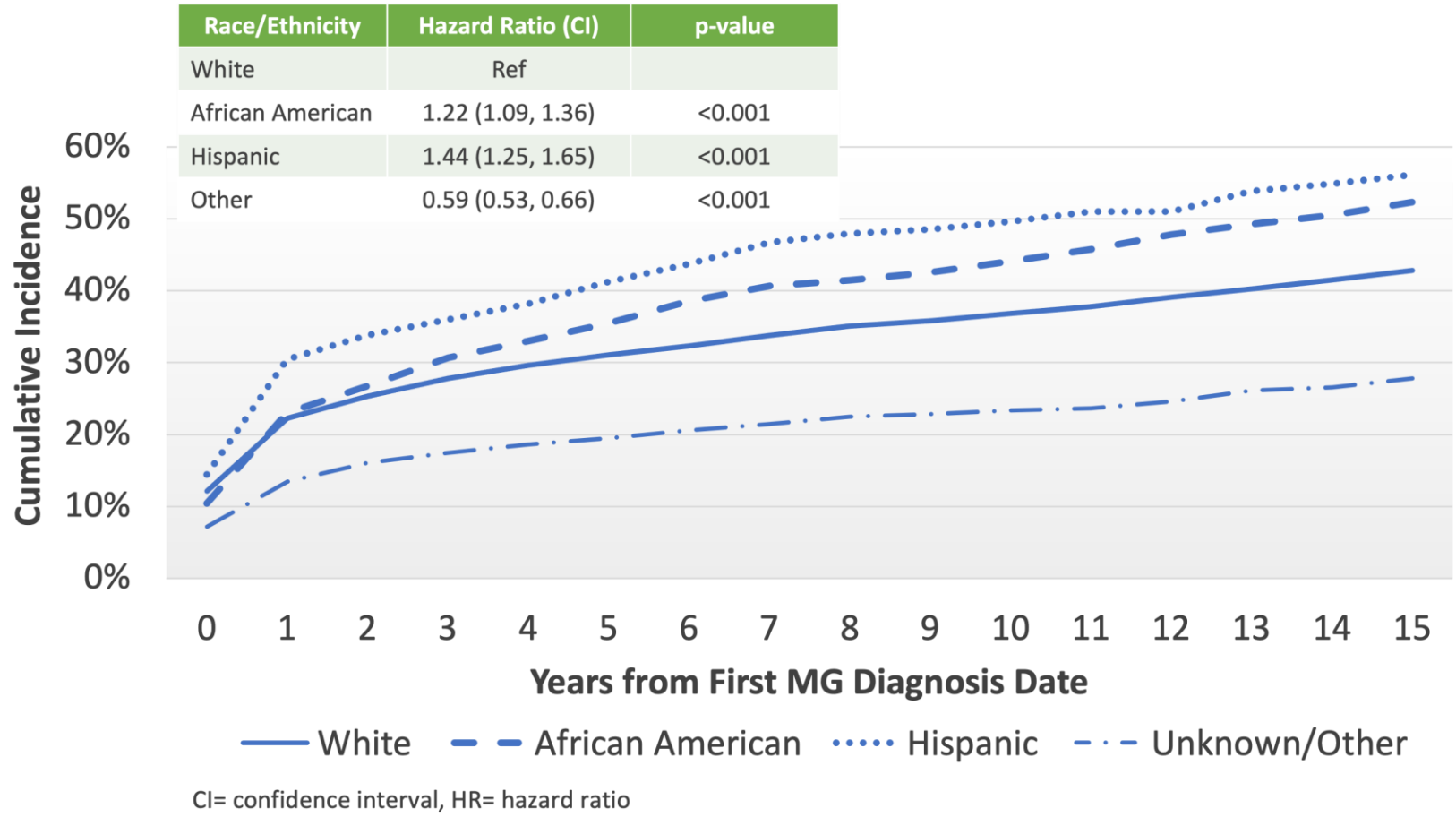


Figure 4. Cumulative incidence of exacerbation by race/ethnicity

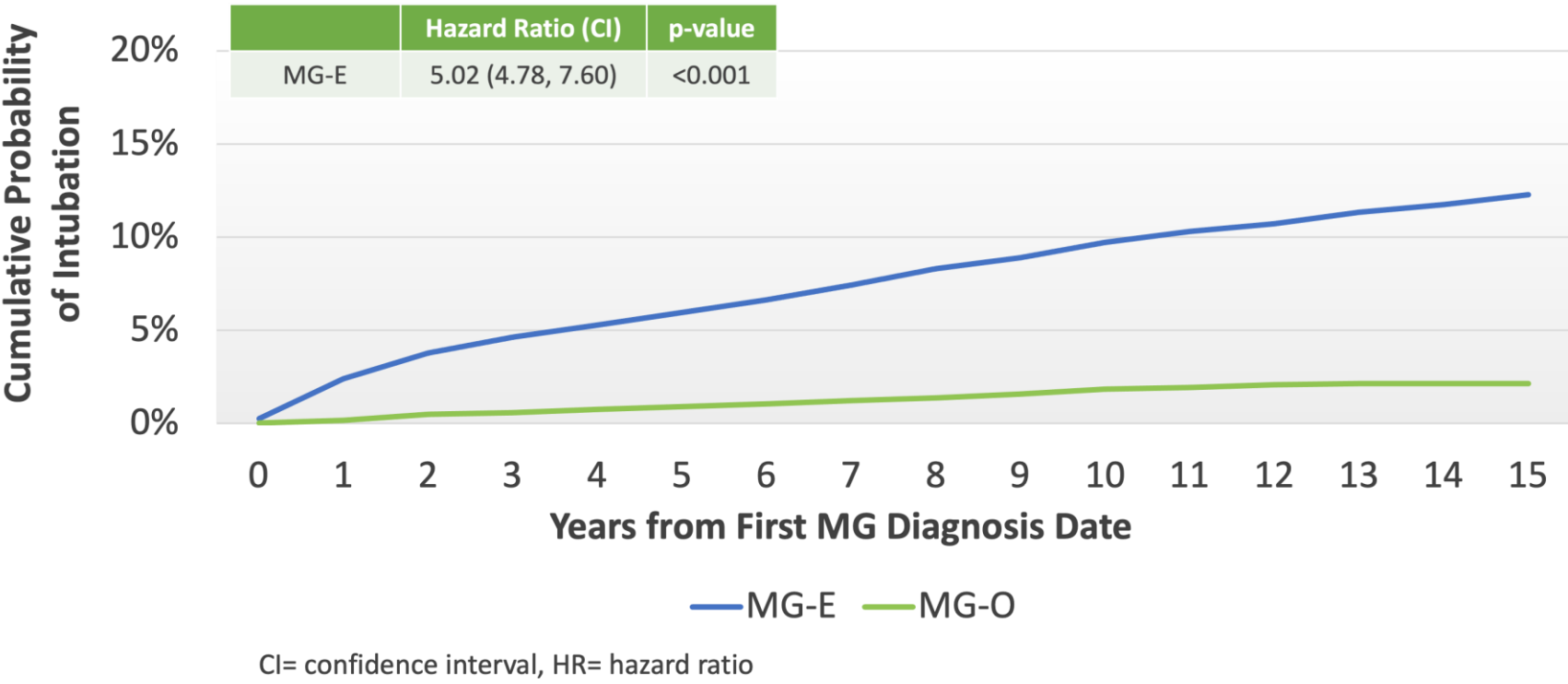


- Economic and Clinical Burden Associated with MG Exacerbation**
- Healthcare resource utilization: Patients with MG-E had significantly increased HRU than patients with MG-O after the initial MG diagnosis (p <0.001 for all categories of HRU) (**Table 2**).
 - Intubation risk: Patients with MG-E were five times more likely to be intubated compared to patients with MG but no exacerbation (**Figure 5**).

Table 2. Healthcare utilization			
HRU category	MG-E (n = 3,603)	MG-O (n = 7,115)	p value
Hospitalization			
Patients with hospitalization, n (%)	2,185 (60.6)	1,735 (24.4)	<0.0001
Length of stay, mean (SD)	60.7 (199.41)	40.76 (145.76)	0.0005
Number of hospitalizations, mean (SD)	2.83 (4.65)	0.81 (2.32)	<0.0001
ICU			
Patients with ICU stay, n (%)	952 (26.4)	507 (7.1)	<0.0001
Days of ICU stay, mean (SD)*	23.86 (94.71)	12.6 (27.86)	0.0089
Number of ICU stays, mean (SD)	0.47 (1.06)	0.1 (0.43)	<0.0001
ED visits			
Patients with ED visits, n (%)	2,410 (66.9)	2,367 (32.5)	<0.0001
Number of ED visits, mean (SD)	5.07 (9.03)	1.82 (5.30)	<0.0001
Outpatient visits			
Patients with outpatient visits, n (%)	3,600 (99.9)	2,367 (32.5)	0.8086
Number of outpatient visits, mean (SD)	183.03 (177.61)	98.46 (125.45)	<0.0001
Per-patient-per-year HRU			
Hospitalization	0.47 (0.83)	0.14 (0.43)	<0.001
Length of stay	5.99 (21.48)	1.81 (12.81)	<0.001
ICU stay	0.08 (0.24)	0.02 (0.11)	<0.001
Days of ICU	1.23 (9.67)	0.17 (1.37)	<0.001
ED visits	0.69 (1.14)	0.26 (0.82)	<0.001
Outpatient visits	25.05 (19.17)	14.08 (14.53)	<0.001

*Note: The length of stay is estimated among patients with hospitalization or ICU stay.

Figure 5. Kaplan-Meier curve for intubation event by cohort



CONCLUSIONS

- Approximately one-third of MG patients experienced exacerbations, with higher incidences seen among Hispanic and African American patients.
- MG exacerbation is associated with higher HRU and intubation risk and inflicts a substantial burden of disease on MG patients.

References

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