# Evidence of misdiagnosis in administrative claims data for individuals with myasthenia gravis

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### Introduction

- Misdiagnosis occurs when the named diagnosis given to a patient does not represent the patient's true condition<sup>1</sup>
- The true incidence of misdiagnosis is not easily assessed, but several studies comparing the initial and final diagnosis during a hospitalization demonstrate discordance of 9% or greater<sup>2,3</sup>
- Establishing a diagnosis of MG, a rare neuromuscular disorder, can be complicated by variations in symptom presentation

### **Study objectives**

• To estimate the prevalence of misdiagnosis in MG and establish whether social determinants of health are associated with misdiagnosis in MG<sup>4</sup>

### Methods

- Total study period: September 1, 2017 to August 31, 2022 (Figure 1)
- Patient selection period: September 1, 2018 to August 31, 2022
- Inclusion criteria:
- $\ge 2$  outpatient claims  $\ge 90$  days apart or one inpatient claim with an ICD-10-CM G70.0x
- $\ge 18$  years of age at index
- $A \ge 12$ -month pre-index baseline period with continuous claims coverage
- $-A \ge 12$ -month post-index follow-up period with continuous claims coverage
- $\geq 1$  pharmacy claim in the study period Assignment to a ZIP5 code (based on PCP ZIP code)
- Exclusion criteria:
- History of MG, thymectomy, AChEI, or biologic treatment during the Exclusion and Diagnostic Assessment Periods
- Covariate measures:
- Demographics: age, sex, insurance type
- Comorbidities: medical and psychiatric

 Measures assessing social determinants of health included community risk measures of housing, food, economic, transportation, health literacy, social connectedness, and digital landscape. Individuals were assigned to a community (i.e., ZIP5) based on rendering PCP address

### Figure 1 Study design



- Outcome measures:
- Possible misdiagnosis: defined by select conditions with  $\geq 1$  medical claim(s) before index followed by absence of corresponding medical claims following index
- Conditions included stroke, COPD, chronic fatigue syndrome, MS, thyroid eye disease, Hashimoto's thyroiditis, malignant thymus neoplasm, Guillain-Barré syndrome, Graves' disease, systemic lupus erythematosus, amyotrophic lateral ALS, and myositis
- Analysis:
- Univariate analysis of possible misdiagnoses and time from initial misdiagnosis to index. Unadjusted comparison of measures assessing social determinants of health by those with and without possible misdiagnosis - Logistic regression of baseline characteristics associated with misdiagnosis
- (yes=1, no=0)- Chi-squared test for categorical variables and Student's t-test for continuous
- variables

### Results

- A total of 3,873 individuals met the eligibility criteria and were included
- Possible misdiagnosis was present in 425 (11.0%) of the eligible individuals
- Most common possible misdiagnoses were stroke (5.5%), COPD (4.5%), chronic fatigue syndrome (2.2%), Graves' disease (1.5%), MS (1.4%), and Guillain-Barré syndrome (1.1%) (**Figure 2**)
- Of those with a possible misdiagnosis, most (51.5%) received only one possible misdiagnosis, while 30.1% received two, and 18.4% received three or more possible misdiagnoses
- Of those with a possible misdiagnosis, 56.0% received that diagnosis more than 6 months before the initial MG diagnosis (**Figure 3**)
- Individuals who were assigned to geographies with high-risk housing (p<0.10) or</li> high-risk social connectedness (p<0.05) scale scores were more likely to receive a possible misdiagnosis (**Figure 4**)
- dysarthria, dysphagia, and diplopia, were all associated with elevated likelihood of receiving a misdiagnosis (Figure 5)
- (anxiety), social connectedness risk, and receiving the initial MG diagnosis in an inpatient facility were all associated with elevated odds of receiving a possible misdiagnosis (**Figure 5**)

## misdiagnosis



### **Figure 3** Percent distribution of time from first possible misdiagnosis date to initial MG diagnosis date (n=425)



**Figure 4** Percent of population assigned to high-risk communities, by presence or absence of a possible misdiagnosis (n=3,873)

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### Summary and conclusions

![](_page_0_Picture_53.jpeg)

Receiving a possible misdiagnosis is associated with an extended period of time before receiving the MG diagnosis suggesting a delay in initiating appropriate treatment

![](_page_0_Picture_55.jpeg)

The association of misdiagnosis with being diagnosed as an inpatient also suggests the possibility of harm to the patient resulting from the possible misdiagnosis

![](_page_0_Picture_57.jpeg)

Almost half of individuals with a possible misdiagnosis received two or more diagnoses

![](_page_0_Picture_59.jpeg)

Residing in a high-risk community was associated with elevated odds of possible misdiagnosis

![](_page_0_Picture_61.jpeg)

Uncommon presentations of MG can also result in misdiagnosis. Symptoms such as slurred speech, dysphagia,<sup>1</sup> and hemibody weakness<sup>2</sup> may increase risk of incorrect diagnosis of MG as stroke

### **Figure 5** Adjusted OR and 95% CI for factors associated with receiving a possible misdiagnosis

![](_page_0_Figure_64.jpeg)

Abbreviations: AChEI, acetylcholinesterase inhibitor; ALS, amyotrophic lateral sclerosis; CCI, Charlson Comorbidity Index; CI, confidence interval; COPD, chronic obstructive pulmonary disease; ED, emergency department; HCRU, health care resource utilization; ICD-10-CM, International Classification of Diseases, 10th Revision, Clinical Modification MG, myasthenia gravis; MS, multiple sclerosis; OR, odds ratio; PCP, primary care provider; ZIP, Zone Improvement Plan. Author disclosures: This study was funded by UCB. Editorial assistance was provided by Ogilvy Health, London, UK, which was funded by UCB. Judith Thompson and Bo Zhance are employees of UCB. Joshua N. Liberman and Jonathan Darer are employees of Health Analytics and were contracted by UCB to carry out the analysis. References: 1. Committee on Diagnostic Error in Health Care, et al. Improving diagnosis in health care. Washington, DC, US: National Academies Press, 2015. 2. Chatterjee S, et al. Gap analysis between provisional diagnosis and final diagnosis in government and private teaching hospitals: a record-linked comparative study. J Family Med Prim Care. 2016;5:637–640 3. Katongole SP, et al. Prevalence and classification of misdiagnosis among hospitalised patients in five general hospitals of Central Uganda. Clin Audit. 2022;14:65–77.

![](_page_0_Picture_66.jpeg)

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