Trends in Hospital Admissions and Readmissions for Patients with MG from U.S. National Research Databases

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INTRODUCTION

Background

- Myasthenia Gravis (MG) is an autoimmune disorder characterized by fluctuations in muscle weakness and variable involvement of ocular, bulbar, respiratory, and limb muscles.
  - Myasthenic crisis with respiratory failure (MG crisis) is the most serious manifestation of MG. [1]
- Estimated prevalence has varied widely and increased over time, with estimates of approximately 20 per 100,000 cases in the U.S.[2-5]
- Recent studies have found increasing rates of hospitalization for disease worsening and differences in incidence rates and disease severity between young (≤50 years) and old (>50 years) MG patients. [6]
- Detailed analyses of these trends and close examination of trends for older MG patients have not been conducted. Nationally representative estimates on hospital admissions, readmissions, and mortality in patients with MG and MG crisis are limited.

OBJECTIVES

Aim

- Describe population trends in hospitalizations and re-admission rates for MG exacerbations and crises and identify differences by age groups.

METHODS

Data Source

- Data from the Nationwide Inpatient Sample (NIS) from 2010-2019 and Medicare Limited Dataset (LDS) from 2010-2020, were used to characterize patient demographics and trends in hospitalizations, mortality and readmissions related to MG exacerbations and crises.

Study Patients

- MG patients with acute exacerbation (MGAE) were identified through ICD-9 or ICD-10-CM MG diagnosis codes in the principal position (ICD-9-CM: 358.01; ICD-10-CM: G70.01).
- Myasthenic crisis was identified by a principal diagnosis of MG plus at least one of: a secondary diagnosis of respiratory failure, a procedure code for endotracheal intubation, or a procedure code for CPAP/BiPAP noninvasive ventilation.

Outcomes

- For each data set, we examined patient characteristics, number of MG discharges, and in-hospital mortality.
  - For LDS, we also examined length of stay (LOS) per hospitalization, 30-day readmissions and 30-day post-discharge mortality.

Data Analysis

- A model of 30-day readmissions, in-hospital mortality, and 30-day mortality with logistic regression and a time trend, controlling for admission-level characteristics (age, sex, race, region, and payer (for NIS)) Total discharges were included as a covariate to control for population and health utilization trends.
- For LDS data, which allows identification of individual patients, we clustered standard errors (SEs) at the patient level.
- To test for trends in discharges, we tested both Poisson and negative binomial models using a likelihood ratio test to select the best-fitting model.
  - We tested different parametrizations of time trends as noted above.

Table 1. ***Patient and Admission Characteristics***

Admission characteristic	LDS admission level (2010–2020), N=21,571	NIS admission level** (2010–2019), N=56,822
Age group (%)		
18–44	N/A	12,827 (22.6%)
45–64		17,613 (31.0%)
65–84	18,897 (87.6%)	23,391 (41.2%)
85+	2,674 (12.4%)	2,992 (5.3 %)
Sex (%)		
Female	9,950 (46.1%)	32,823 (57.8%)
Region (%)		
Northeast	4,046 (18.8%)	10,845 (19.1%)
Midwest	4,933 (22.9%)	10,880 (19.1%)
South	9,531 (44.2%)	24,876 (43.8%)
West	3,019 (14.0%)	10,222 (18.0%)
Unknown	42 (0.2%)	N/A
Race (%)		
White	19,904 (92.3%)	37,430 (65.9%)
Black	820 (3.8%)	9,742 (17.1%)
Asian	170 (0.8%)	1,011 (1.8%)
Hispanic	263 (1.2%)	5,162 (9.1%)
North American Native	70 (0.3%)	176 (0.3%)
Other	187 (0.9%)	1,310 (2.3%)
Unknown	157 (0.7%)	N/A
Crisis admissions (%)		
% with MG crisis	6,191 (28.7%)	12,558 (21.1%)

Figure 1. ***MGAE Discharges (NIS)***

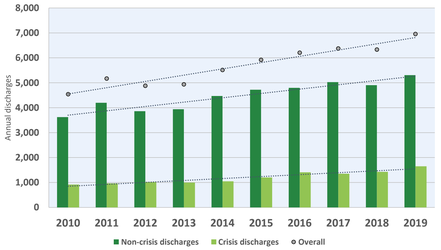
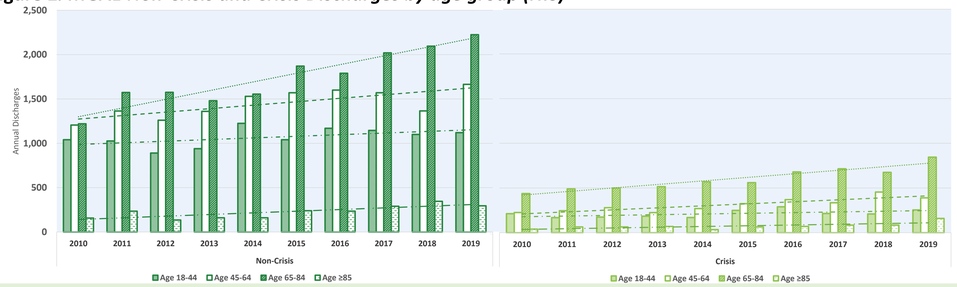


Figure 2. ***MGAE Non-Crisis and Crisis Discharges by age group (NIS)***



RESULTS

Patient and Hospitalization Characteristics: Using NIS data, nearly half of all hospitalizations were for older patients (age ≥ 65); 1 in 5 was with crisis. Most patients were female (57.8%) and white (65.9%) (Table 1).

NIS Discharges: Using NIS data, hospitalizations for MGAE increased substantially: with an unadjusted linear trend, the calculated average increase was 5.1% per year. Non-crisis discharges formed the majority of MGAE discharges (78.9%), with higher rates in older patients (Figures 1, 2).

LDS Discharges: LDS findings are similar to NIS data, with an average yearly increase of 4.5% for all discharges: 3.9% for non-crisis, and 6.7% for crisis (Figure 3).

LDS 30-Day All-Cause Readmissions: Using LDS data, readmission rates (≤30 days from discharge) were consistently ~ 20% (19.3% - 21.4%) for crisis and non-crisis hospitalizations, higher than the Medicare average [7]

Length of Stay: Using LDS data, LOS for crisis hospitalizations showed more variation than non-crisis and was lower toward the end of the study period (E.g.: Age 65-84, Mean LOS: 2010 : 29.7 days vs. 2020: 19.5 days) (Figure 4).

Mortality

- The NIS in-hospital mortality rate averaged 1.8% , reflecting mortality in all age groups.
- The LDS in-hospital mortality rate was considerably higher (5.1%), reflecting mortality in older patients (ages ≥ 65) (Figure 5).
  - Notably, the LDS study period extended through 2020, with the highest observed in-hospital death rate of 6% (coinciding with the COVID-19 pandemic).
- The average 30-day post-discharge mortality rate over the study period for admissions in the LDS data was 9.4%, but this varied by presence of crisis and was the highest for older patients.

CONCLUSION

Key Findings

- Annual hospitalizations for MG with acute exacerbation and MG crisis increased significantly from 2010-2019
- Older patients (age ≥ 65) have had the largest increase in MGAE hospitalizations
- Readmission rates for older patients were higher than the average for all Medicare hospitalizations
- LDS data suggests that mortality in older patients is nearly 3 times higher than mortality for all age groups
- LDS data further indicates that, for older patients, mortality within 30-days of hospital discharge is even higher than in-hospital mortality; this has not been previously studied

Figure 3. ***MGAE Discharges (LDS)***

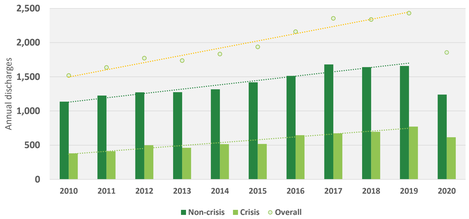


Figure 4. ***LOS per Admission (LDS)***

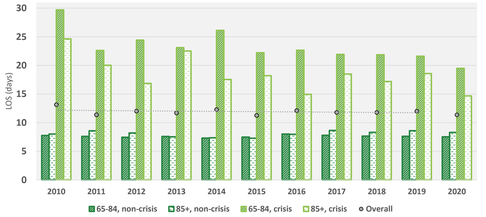
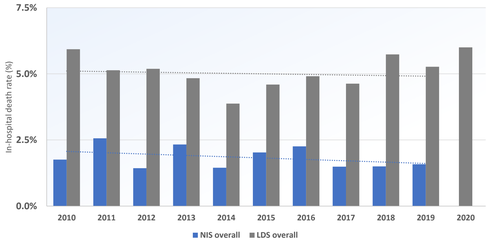


Figure 5. ***Annual in-hospital mortality rate, overall (NIS and LDS)***



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