Real-world Characterization of Challenges Related to the Identification and Management of Myasthenia Gravis Crisis

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INTRODUCTION

- Myasthenia gravis (MG) is a rare, chronic, autoantibody-mediated neuromuscular disorder affecting approximately 60,000 individuals in the United States[1]
- Up to 20% of people with MG experience MG crisis requiring mechanical ventilation[2]
- Real-world understanding of the care of individuals with MG crisis has not been well described, including the patterns of onset and challenges related to standard MG therapies

OBJECTIVE

- To characterize the identification, clinical presentation, and management challenges related to individuals with MG crisis based upon chart review of neurologist clinical progress notes

METHODS

Study design

- This was a retrospective, cross-sectional analysis of de-identified neurologist notes

Data source

- Medical transcriptions from Amplity Insights were used, including the full text from dictated clinical notes covering 150,000 physicians from over 40,000 clinics and hospitals in the United States between 2017 and 2022
- A natural language processing model was developed to identify candidate neurologist notes referencing MG crisis

Analysis

- A rules-based natural language processing model, developed using spaCy (an open-source NLP library), was used to create an analyzable dataset; the performance of the NLP model was assessed against manual annotations using Prodigy
- A natural language processing model was applied and individual charts were identified if they mentioned MG crisis or MG *and* terms related to mechanical ventilation, including intubation, respiratory failure, and bilevel positive airway pressure
- Individual notes that revealed a history of an MG crisis were manually reviewed; positive patients had all neurologist notes abstracted for details related to the MG crisis, such as how the MG crisis was documented, triggering events, and difficulties with standard MG treatments
- Summary rates of MG documentation that identify gMG crisis events were calculated, and difficulties with treatments were described
- Standard MG therapies included acetylcholinesterase inhibitors, corticosteroids, plasmapheresis, intravenous immunoglobulin, azathioprine, rituximab, eculizumab, and mycophenolate

RESULTS

- Of 137 patients with MG crisis, the majority were identified by the terms "MG" and "crisis" (**TABLE 1**)

TABLE 1. Characteristics of patients with documented MG crisis

Population attribute, n (%)	Patients with documented MG crisis (N=137)
Use of terms "MG" and "crisis"	100 (73)
MG with history of mechanical ventilation as a result of MG	37 (27)
History of multiple MG crises	19 (14)
History of recurrent crises within 4 weeks	11 (8)
Presence of an MG crisis triggering event	33 (24)
Pneumonia	13 (9)
Urinary tract infection	5 (4)
Any difficulties with MG standard therapies	62 (45)
Adverse effects	44 (32)
Limited or poor response	16 (12)
Interaction or concern related to treatment and comorbidity	11 (8)
Limited access due to insurance or prior authorization	3 (2)
Limited access due to poor availability at treatment facility	3 (2)
Treatments associated with difficulties	
Pyridostigmine	27 (20)
Intravenous immunoglobulin	23 (17)
Corticosteroids	19 (14)
Plasmapheresis	12 (9)
Azathioprine	12 (9)
Mycophenolate	1 (1)
Eculizumab	1 (1)
Rituximab	1 (1)

MG, myasthenia gravis.

- A history of multiple MG crises was found in 19 (14%) patients and 18 (13%) patients reported pneumonia and urinary tract infection as triggering events for MG crisis
- A total of 62 (45%) patients with MG crisis reported difficulties with MG standard therapies. Adverse effects (32%) and poor treatment response (12%) were the highest reported difficulties with MG therapies. Pyridostigmine (20%) and intravenous immunoglobulin (17%) treatments were highly associated with medication difficulties
- Closer examination of physician notes for the 137 patients with documented MG crisis who had MG treatment difficulties revealed specific issues with different standard MG therapies (**TABLE 2**)

TABLE 2. MG treatment difficulties due to adverse effects, limited therapeutic response, interactions with comorbid conditions, poor availability, or problems with insurance or prior authorization

MG treatment (treatment difficulties[a]), n (%)	N=137
Pyridostigmine (adverse effects, 20; limited response, 5; comorbid conditions, 3)	27 (20)
Intravenous immunoglobulin (adverse effects, 8; limited response, 9; comorbid conditions, 4; poor availability at treatment facility, 1; insurance or prior authorization, 2)	23 (17)
Corticosteroids (adverse effects, 12; limited response, 4; comorbid conditions, 3)	19 (14)
Plasmapheresis (adverse effects, 6; limited response, 3; comorbid conditions, 1; poor availability at treatment facility, 2)	12 (9)
Azathioprine (adverse effects, 9; limited response, 2; comorbid conditions, 1; insurance or prior authorization, 1)	12 (9)
Mycophenolate (adverse effects, 1)	1 (1)
Eculizumab (adverse effects, 1)	1 (1)
Rituximab (adverse effects, 1)	1 (1)

[a]Some treatments were associated with more than one type of difficulty for the same patient.
MG, myasthenia gravis.

LIMITATIONS

- The unstructured nature of the dataset and cross-sectional analysis limit the generalizability of the results, and the ability to make associations with other variables
- Future research efforts may want to consider using longitudinal datasets coupled with structured data to enhance real-world evidence generation

CONCLUSIONS

- MG crises represent unpredictable and potentially life-threatening events
- Neurologist documentation of MG crisis highlights the challenges of clinical management, including difficulties with multiple standard MG treatments
- Adverse effects, poor treatment response, and interaction with comorbidities are frequent challenges related to MG treatment in MG crisis

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DISCLOSURES

JP, **ZC**, and **AB** are employees of Janssen Scientific Affairs, LLC, **JD**, and **XY** are employees of Health Analytics. **PP** was an employee of Health Analytics at the time the study was conducted. **RG** is an advisor for Janssen Scientific Affairs, LLC, and is a speaker and advisor for Argenx, UCB, and Alexion.

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AUTOANTIBODY: MG