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Using cognitive interviews to develop a conceptual claims-based algorithm to identify patients with neuromyelitis optica spectrum disorder

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Objective

To develop an algorithm to identify patients with NMOSD in healthcare claims data sets

Background

Neuromyelitis optica spectrum disorder (NMOSD) is an inflammatory autoimmune disorder of the central nervous system (CNS) primarily characterized by acute attacks on the optic nerves, spinal cord, brain and brainstem

- These unpredictable attacks often lead to permanent neurological deficits and disability, including blindness and paralysis
- The economic and social burden of NMOSD is significant

Being able to identify patients with NMOSD using International Classifications of Diseases (ICD) codes and distinguish them from patients with multiple sclerosis (MS), myelin oligodendrocyte glycoprotein-antibody associated disease (MOGAD) and other CNS inflammatory disorders, would enable a more precise estimation of the burden of NMOSD. In this study, we conducted cognitive interviews with NMOSD experts in order to develop a claims-based algorithm

Methods

Interviews

We recruited 3 neurologists from across the United States:

1. **Massachusetts**
2. **Oregon**
3. **Texas**

We conducted **2 cognitive interviews** with each expert to develop candidate algorithms capable of accurately identifying patients with NMOSD using healthcare claims data alone

First Round

During the first-round interviews, experts were asked which diagnoses, medications and procedures available in claims data would identify patients with NMOSD and distinguish them from patients with related neurological conditions

Second Round

During the second-round interviews, experts reviewed potential criteria that could be included in the final candidate algorithms

Using the results of these interviews, we developed a primary algorithm and several alternative versions

Results

The primary algorithm developed is as follows:

≥18 years old **AND** ≥1 NMOSD diagnosis **OR** (≥1 transverse myelitis **AND** optic neuritis diagnosis) **AND** ≥1 NMOSD drug[a]

OR

≥2 NMOSD diagnoses ≥90 days apart

AND NOT any of the following exclusion criteria:

- MS diagnosis or MS-specific disease-modifying therapy[a] after the last NMOSD diagnosis or NMOSD drug[a]
- Sarcoidosis diagnosis after the last NMOSD diagnosis
- ≥1 immune checkpoint inhibitor[a]

Iterations of this algorithm included sequentially adding or removing various elements (e.g., ≥2 NMOSD diagnoses ≥90 days apart, ≥1 NMOSD drug, sarcoidosis or MS diagnoses

[a]Table 1. Drugs included in algorithm

Disease	Drugs included in algorithm
NMOSD	Azathioprine, bortezomib, eculizumab, inebilizumab, mycophenolate mofetil, rituximab, satralizumab and tocilizumab
MS	Alemtuzumab, interferon beta, cladribine, daclizumab, dimethyl fumarate, fingolimod, glatiramer acetate, mitoxantrone, natalizumab, ocrelizumab, ofatumumab, ozanimod, siponimod and teriflunomide
Immune checkpoint inhibitors	Atezolizumab, avelumab, cemiplimab, durvalumab, ipilimumab, nivolumab and pembrolizumab

Conclusions

- We developed a primary algorithm and alternative versions that can be used to improve identification of patients with NMSOD in healthcare claims
- The algorithms have inherently high face validity because the items included are based on clinical expertise and practice
- Algorithm testing and validation using both medical chart review and billing data is ongoing and is expected to substantiate our algorithms

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