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Development and Validation of a Claims-Based Algorithm to Identify Patients With Neuromyelitis Optica Spectrum Disorder

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BACKGROUND

- There is no validated algorithm to identify patients with neuromyelitis optica spectrum disorder (NMOSD) in healthcare claims data
- *International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)* diagnosis codes exist for NMO, transverse myelitis (TM) and optic neuritis (ON), all of which may be found in patients with NMOSD
- Whether these codes can be used to identify patients with NMOSD and distinguish them from patients with diseases similar to NMOSD (e.g. multiple sclerosis [MS] and myelin oligodendrocyte glycoprotein antibody–associated disease [MOGAD]) is unknown

OBJECTIVE

- To develop and test the performance of a healthcare claims-based algorithm to identify patients with NMOSD

METHODS

- We developed algorithms of *ICD-10-CM* diagnosis codes and medications through structured cognitive interviews with neurologists
- We tested algorithm sensitivity and specificity in the billing and medication data (as a proxy for a healthcare claims database) of a purposive sample of 101 adults with NMOSD, MS or MOGAD from 5 geographically diverse US neurology clinics to identify the best-performing algorithm
- We repeated these calculations on a subset that excluded patients with MOGAD, a rare condition that was oversampled in this study
- We then tested this algorithm's face validity using 2016–2019 data from IBM® MarketScan® Commercial and Medicare Supplemental databases
  - Algorithm-identified adult patients with NMOSD were required to have ≥1 year of continuous enrolment after a qualifying diagnosis code during the study period
  - Demographics and clinical characteristics were reported

RESULTS

- In a purposive sample of patients with NMOSD, MS and MOGAD (N=101), the mean (SD) age of patients with NMOSD was 50.1 (16.5) years and 78.0% were female (**Table 1**)
- The best-performing algorithm is shown in **Figure 1**
- In the billing and medication data, the algorithm had 82.0% sensitivity and 70.6% specificity in the full sample of patients (**Figure 2**)
  - Excluding patients with MOGAD, specificity increased to 96.7%
- When evaluated using claims data, the algorithm identified 382 patients with NMOSD
  - Mean (SD) age was 46.2 (13.3) years and 83.0% were female (**Figure 3**); 99.2% had ≥1 claim for NMO, 28.0% for ON and 17.0% for TM (**Figure 4**)

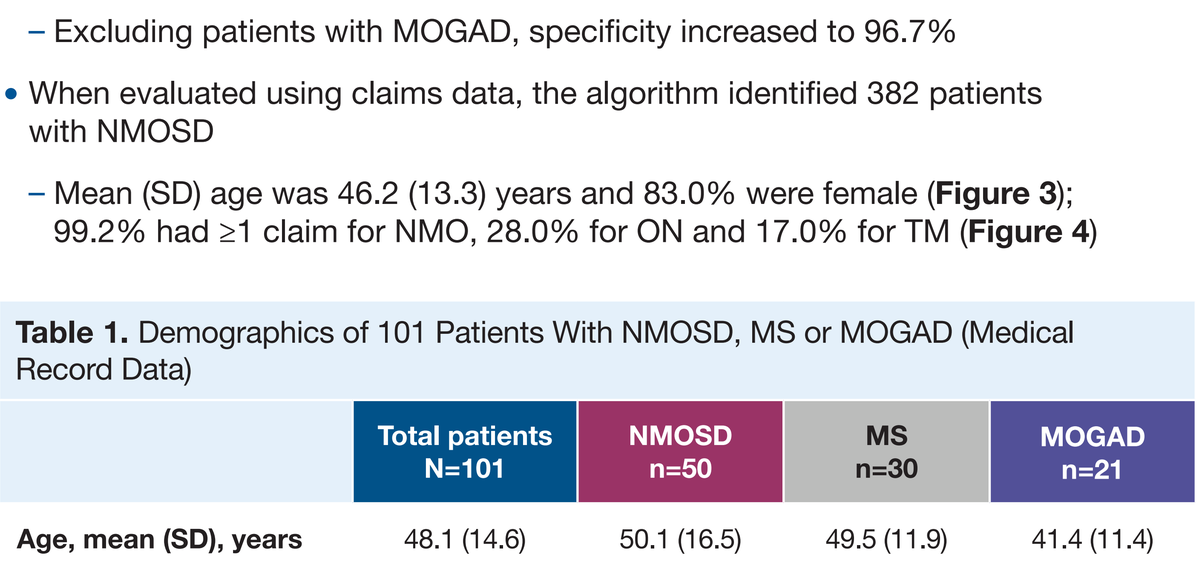
Table 1. Demographics of 101 Patients With NMOSD, MS or MOGAD (Medical Record Data)

	Total patients N=101	NMOSD n=50	MS n=30	MOGAD n=21
Age, mean (SD), years	48.1 (14.6)	50.1 (16.5)	49.5 (11.9)	41.4 (11.4)
Female, n (%)	72 (71.3)	39 (78.0)	22 (73.3)	11 (52.4)

MOGAD, myelin oligodendrocyte glycoprotein antibody-associated disease; MS, multiple sclerosis; NMOSD, neuromyelitis optica spectrum disorder.

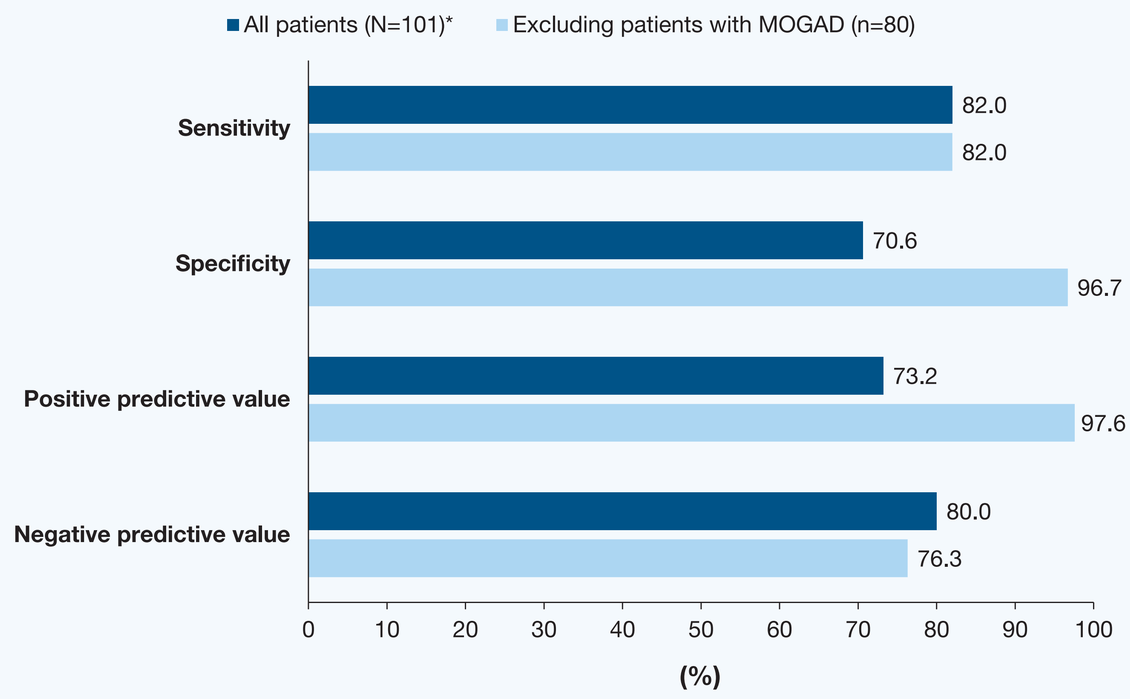
Algorithm performance

Figure 1. Best-Performing Algorithm



dx, diagnosis; *ICD-10-CM*, *International Classification of Diseases, Tenth Revision*, *Clinical Modification*; MS, multiple sclerosis; NMO, neuromyelitis optica; NMOSD, neuromyelitis optica spectrum disorder; ON, optic neuritis; TM, transverse myelitis.

Figure 2. Algorithm Performance in Billing and Medication Data



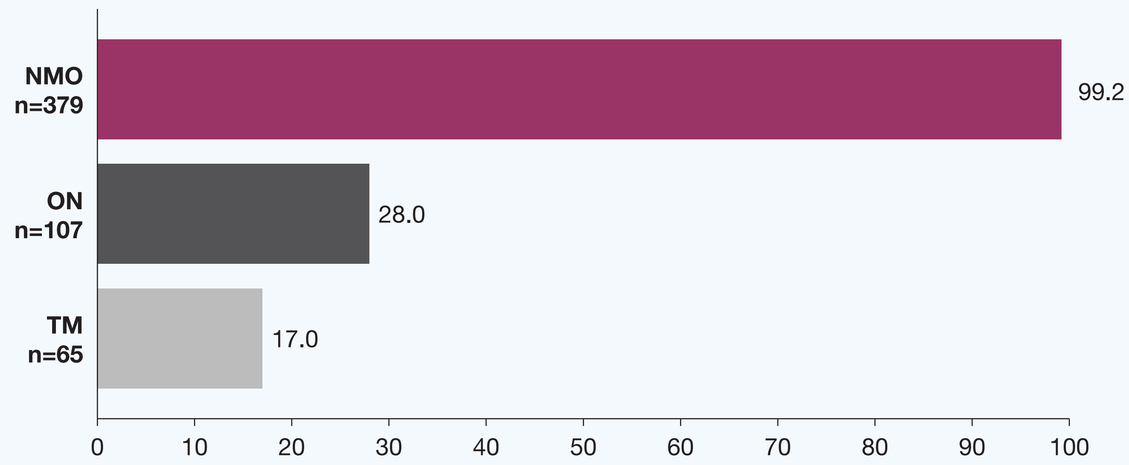
MOGAD, myelin oligodendrocyte glycoprotein antibody-associated disease; MS, multiple sclerosis; NMOSD, neuromyelitis optica spectrum disorder.
*Patients with NMOSD, MS and MOGAD.

Figure 3. Demographics of Patients With NMOSD Identified in Claims Data (N=382)

Age, mean (SD), years	**46.2 (13.3)**
Female, n (%)	**317 (83.0)**

NMOSD, neuromyelitis optica spectrum disorder.

Figure 4. Proportion of Patients With a Diagnostic Claim Code for NMO, ON or TM Among Patients With NMOSD Indentified in Claims Data (N=382)



NMO, neuromyelitis optica; NMOSD, neuromyelitis optica spectrum disorder; ON, optic neuritis; TM, transverse myelitis.

CONCLUSIONS

- This clinically derived algorithm **performed very well** in identifying true positive and negative patients in clinic billing and medication records, with a sensitivity of 82.0% and specificity ranging from 70.6% to 96.7%
- We used a purposive sample of patients with conditions that an ideal algorithm would screen out. To mimic healthcare claims data, our test data set did not include laboratory results and **thus presented a very high bar for the algorithm**
- When tested in healthcare claims data, **demographics and clinical characteristics were consistent with previously published clinical findings**
- This algorithm will **enable a more accurate estimation** of NMOSD disease burden (including comorbidities, cost and utilisation) as well as a better understanding of treatment patterns in future healthcare claims analyses

DISCLOSURES

A. Exuzides was an employee of Genentech, Inc., and shareholder of F. Hoffmann-La Roche Ltd at the time of the study and abstract submission. **I. Yermilov, H. Dalglish, S.N. Gibbs, S.R. Reddy, E. Chang, C. Paydar,** and **M.S. Broder** are employees of the Partnership for Health Analytic Research, LLC, which has received research funding from Akcea, Amgen, BioMarin Pharmaceuticals, Boston Scientific Corporation, Bristol Myers Squibb, Celgene, Delfi Diagnostics, Eisai, Exact Sciences, Genentech, Gilead, GRAIL, Greenwich Biosciences, Jazz, Mirum Pharmaceuticals, Nobelpharma, Novartis, Otsuka, PhRMA, Prothena, Recordati, Regeneron, Sanofi, Sunovion, Takeda and Verde Technologies and grants from Dompe US. **S. Cohan** has served as a consultant or advisory board member for AbbVie, Biogen, Bristol Myers Squibb, EMD Serono, Novartis and Sanofi Genzyme; and his institution has received research support from AbbVie, Adamas, Biogen, EMD Serono, Novartis, Roche Genentech and Sanofi Genzyme; and has received speaking honoraria from Biogen, Bristol Myers Squibb, EMD Serono and Sanofi Genzyme. **B. Greenberg** has received consulting fees from Alexion, Novartis, EMD Serono, Horizon Therapeutics, Genentech/Roche, Signant, IQVIA, Sandoz, Genzyme, Immunovant and PRIME Education; grant funding from NIH, Anokion, Clene Nanomedicine and Regeneron; serves as an unpaid member of the board of the Siegel Rare Neuroimmune Association and receives royalties from UpToDate. **M. Levy** has received consulting fees from Alexion, Viela Bio, Genentech/Roche, UCB Pharmaceuticals, Mitsubishi Pharmaceuticals and Sanofi and has received grant funding from NIH, Alexion, Bluerock, the Siegel Rare Neuroimmune Association, the Sumaira Foundation and Genentech.

A PDF of this poster can be downloaded by scanning the QR code

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