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

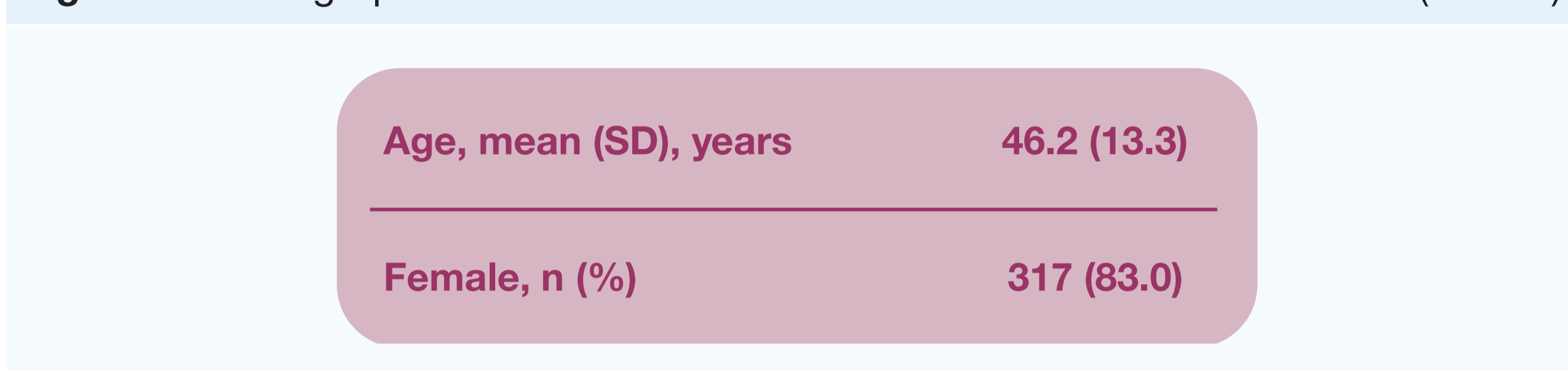**Figure 1.** Best-Performing Algorithm
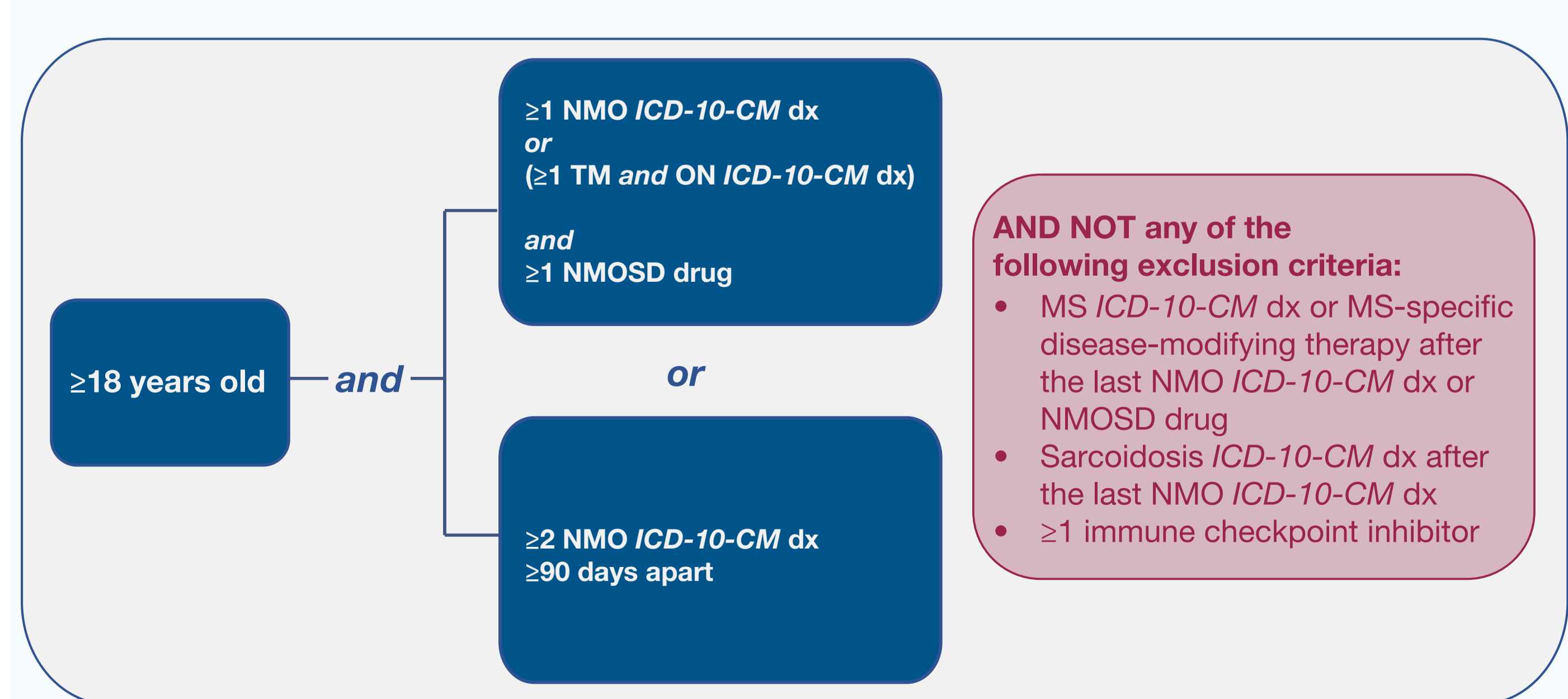
dx, diagnosis; *ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification*; MS, multiple sclerosis; NMO, neuromyelitis optica; NMOSD, neuromyelitis optica spectrum disorder; ON, optic neuritis; TM, transverse myelitis.

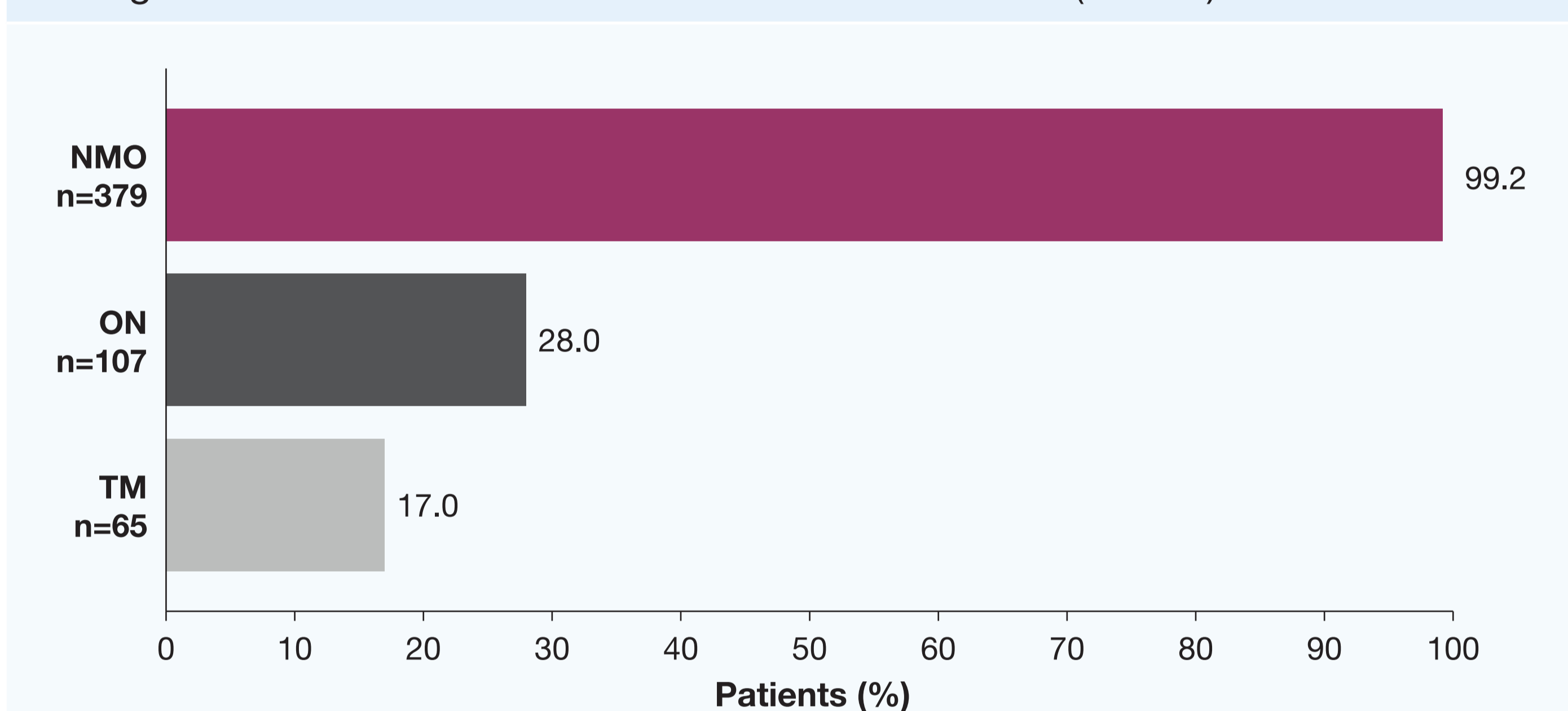**Figure 2.** Algorithm Performance in Billing and Medication Data
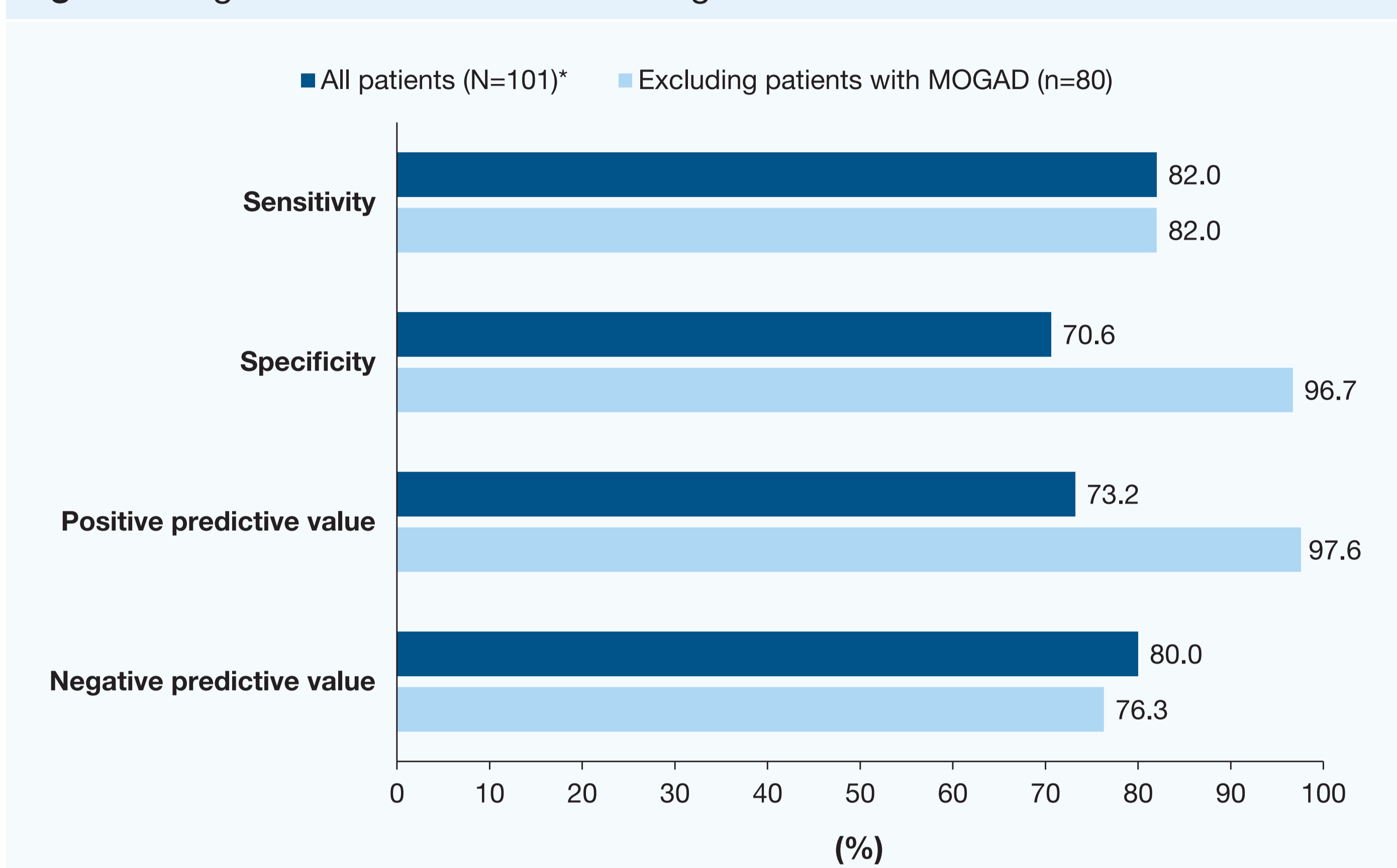
MOGAD, myelin oligodendrocyte glycoprotein antibody-associated disease; MS, multiple sclerosis; NMOSD, neuromyelitis optica spectrum disorder.
*Patients with NMOSD, MS and MOGAD.

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

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