



Misdiagnosis of Neuromyelitis Optica Spectrum Disorder as Multiple Sclerosis: Multi-institutional Database Analysis in the United States



HEALTH
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BACKGROUND

- Neuromyelitis Optica Spectrum Disorder (NMOSD) is an antibody-mediated inflammatory disease of the central nervous system (CNS) that targets the optic nerves, spinal cord, area postrema and certain brain regions.
- NMOSD patients may be misdiagnosed with the more common condition of MS, given some shared signs/symptoms.
- Misdiagnosed NMOSD patients may be exposed to particular MS disease-modifying therapies (DMTs) are ineffective or adverse in NMOSD.

METHODS

- This is a post hoc analysis study with de-identified aggregate data utilizing TriNetX.
- TriNetX is a collaborative health research network providing access to statistics on electronic medical records, including sixty-one health care organizations (HCOs) in the US.
- 7657 patients with the ICD-10 code of NMOSD (G36.0) were queried within the database from 2008 to 2022.
- Of the total, 3617 patients had ICD-10 codes for both NMOSD and MS (G35.0).
- We included patients with at least 3 visits with the ICD-10 codes of G36.0 or G35.0 after initial diagnosis to increase diagnosis sensitivity (**Figure 1**).

RESULTS

Table 1: Demographics of Identified Patients

	NMOSD Patients misdiagnosed as MS (n= 308)	MS Patients misdiagnosed as NMOSD (n= 189)	Patients diagnosed with MS and NMOSD interchangeably (n= 768)
Sex (Female, n (%))	218 (70.8)	138 (73.1)	602 (78.4)
Race, n(%)			
• White	183 (59.4)	100 (52.9)	407 (53.0)
• AI/AN	2 (0.6)	2 (1.1)	2 (0.3)
• Asian	6 (1.9)	2 (1.1)	15 (2.0)
• Black	53 (17.2)	46 (24.3)	222 (28.9)
• Unknown	64 (20.8)	39 (20.6)	122 (15.9)
Age (Median, [Range])	50 [15-89]	48 [7-87]	50 [9-90]
Geographic Distribution, n(%)			
• Midwest	44 (14.3)	27 (14.3)	115 (15.0)
• Northeast	83 (26.9)	38 (20.1)	205 (26.7)
• South	130 (42.2)	43.9 (83)	47.9 (36.8)
• West	38 (12.3)	36 (19.0)	64 (8.3)
• Unknown	7 (2.3)	5 (2.6)	16(2.1)
Years in the Healthcare system (Median, [Range])	6.4 [1.5-36.8]	5.5 [1.5-36.4]	7.2 [1.5-35.1]
Patients Alive (n(%))	292 (94.8)	179 (94.7)	718 (93.5)

Table 2: Frequency Measurement of three groups in TriNetX

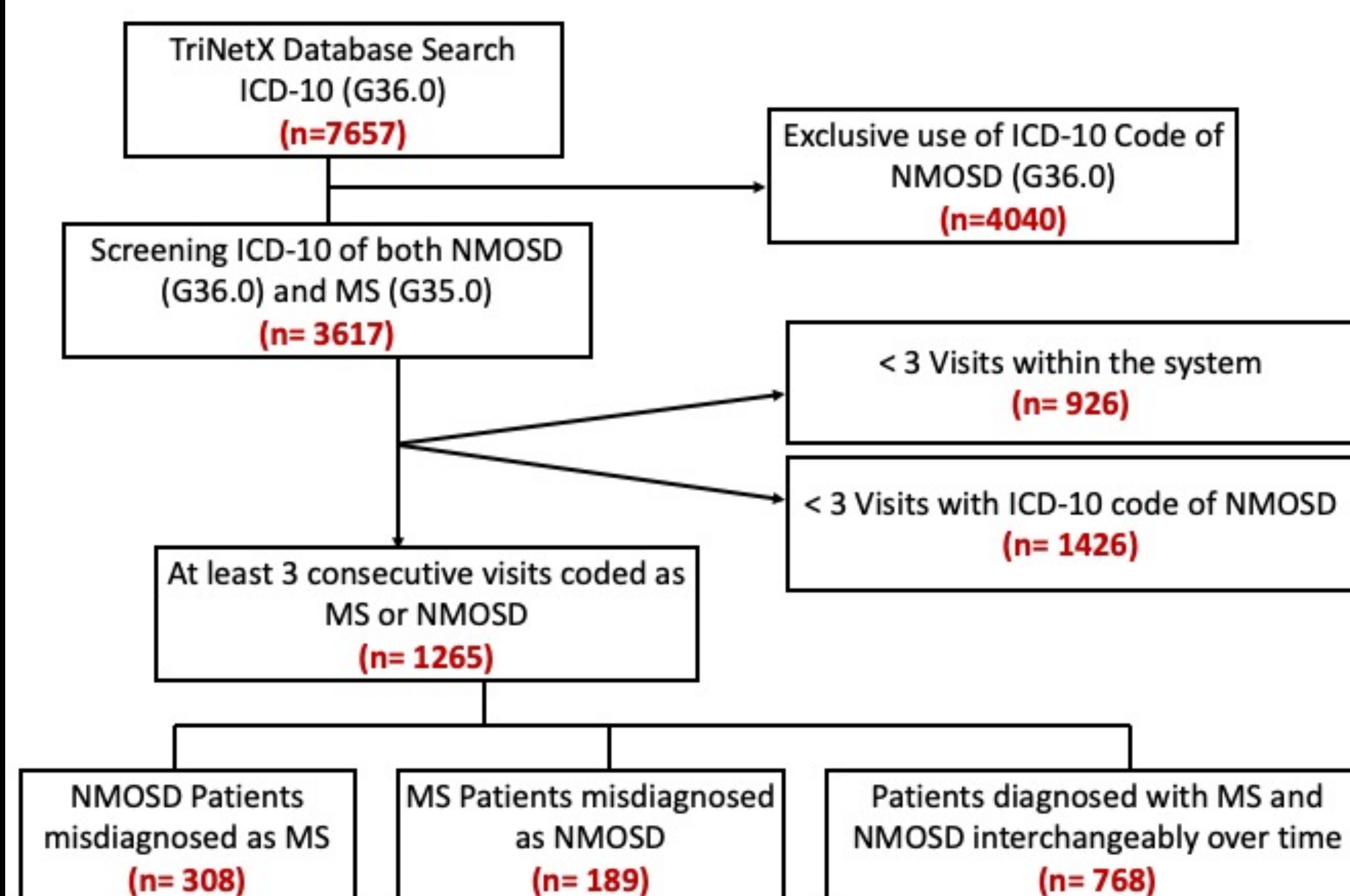
	NMOSD Patients misdiagnosed as MS	MS Patients misdiagnosed as NMOSD	Patients diagnosed with MS and NMOSD interchangeably
Prevalence Rate for NMOSD patients entering the group	0.04	0.02	0.10
Incidence Rate of misdiagnoses (per 1,000 persons-year)			
• Midwest	7.10	4.98	17.81
• Northeast	7.78	4.03	18.43
• South	5.18	3.81	13.89
• West	7.11	7.82	11.00
Risk Ratio of Inaccurate Diagnosis in NMOSD patients			
• Midwest	-	-	-
• Northeast	1.10	0.81	1.03
• South	0.82	0.77	0.78
• West	1.00	1.57	0.62

OBJECTIVES

- Ascertain the frequency of Neuromyelitis Optica Spectrum Disorder (NMOSD) misdiagnosis as Multiple Sclerosis (MS).
- Examine the frequency of misdiagnosis rates in the census regions in a national cohort.
- Identifying the frequency of NMOSD or MS related diagnosis procedures within each cohort.

METHODS

Figure 1: Flow Diagram of Study Inclusion



RESULTS

Table 3: Frequency of NMOSD/MS Diagnosis Procedures

	Accurately diagnosed NMOSD patients (n=4040)	NMOSD Patients misdiagnosed as MS (n=166)	MS Patients misdiagnosed as NMOSD (n=132)	Patients diagnosed with MS and NMOSD interchangeably (n=553)
Brain MRI, (Median, [Q1, Q3])	3 [1-6]	4 [2-8]	3 [2-5]	4 [2-7]
Spinal Cord MRI, (Median, [Q1, Q3])	4 [1-8]	4 [2-9]	4 [2-8]	6 [3-11]
Optical Coherence Tomography (OCT), (Median, [Q1, Q3])	2 [1-4]	3 [2-4]	2 [2-5]	2 [1-4]

CONCLUSION

- This is a large population-based study on patients with misdiagnosis of NMOSD or MS, providing insights into potential factors of misdiagnosis gaps nationwide.
- Of 7657 patients persistently coded as NMOSD, only 52.8% ultimately had the correct diagnosis of NMOSD, showing the importance of accurate diagnosis and coding by all clinicians.
- Patients are more likely to be diagnosed with MS/NMOSD interchangeably. This could be due to poor awareness amongst clinicians, healthcare utilization disruption/disparity, and/or seronegative NMOSD and otherwise complex presentations.
- NMOSD patients who are accurately diagnosed with NMOSD, have a higher median frequency of lumbar puncture than all misdiagnosed groups.
- Limitations: No availability of confirmatory CSF/serum serology for MS/NMOSD; Cross-sectional study limits the ability to determine the cause of misdiagnoses.

ACKNOWLEDGEMENTS

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