



# Depression and Anxiety in Neuromyelitis Optica Spectrum Disease (NMOSD): Analysis of a National Dataset

Esther Zeng<sup>1</sup>, Abigail H. Sorenson<sup>1</sup>, Tammy L. Smith MD, PhD<sup>2,3,4</sup>, Melissa Wright MD<sup>2</sup>, Aditi Sharma MD<sup>2</sup>, Trieste Francis BS<sup>2</sup>, John Rose MD<sup>2,3</sup>, Ka-Ho Wong MBA<sup>2</sup>, Stacey L. Clardy MD, PhD<sup>2,3</sup>

1. University of California-Berkeley, Berkeley CA, USA 2. Department of Neurology, University of Utah, Salt Lake City UT, USA. 3. George E. Wahlen Department of Veterans Affairs Medical Center, Salt Lake City, UT. 4. ARUP Laboratories, Salt Lake City, UT



## BACKGROUND

- NMOSD is an antibody-mediated autoimmune disorder affecting the central nervous system (CNS), mainly targeting the optic nerves and spinal cord
- In published literature, pooled from various countries, the prevalence of depression and anxiety in NMOSD patients has been reported at 40% (95% CI: 32-49%) and 45% (95% CI: 24-66%), respectively<sup>1</sup>

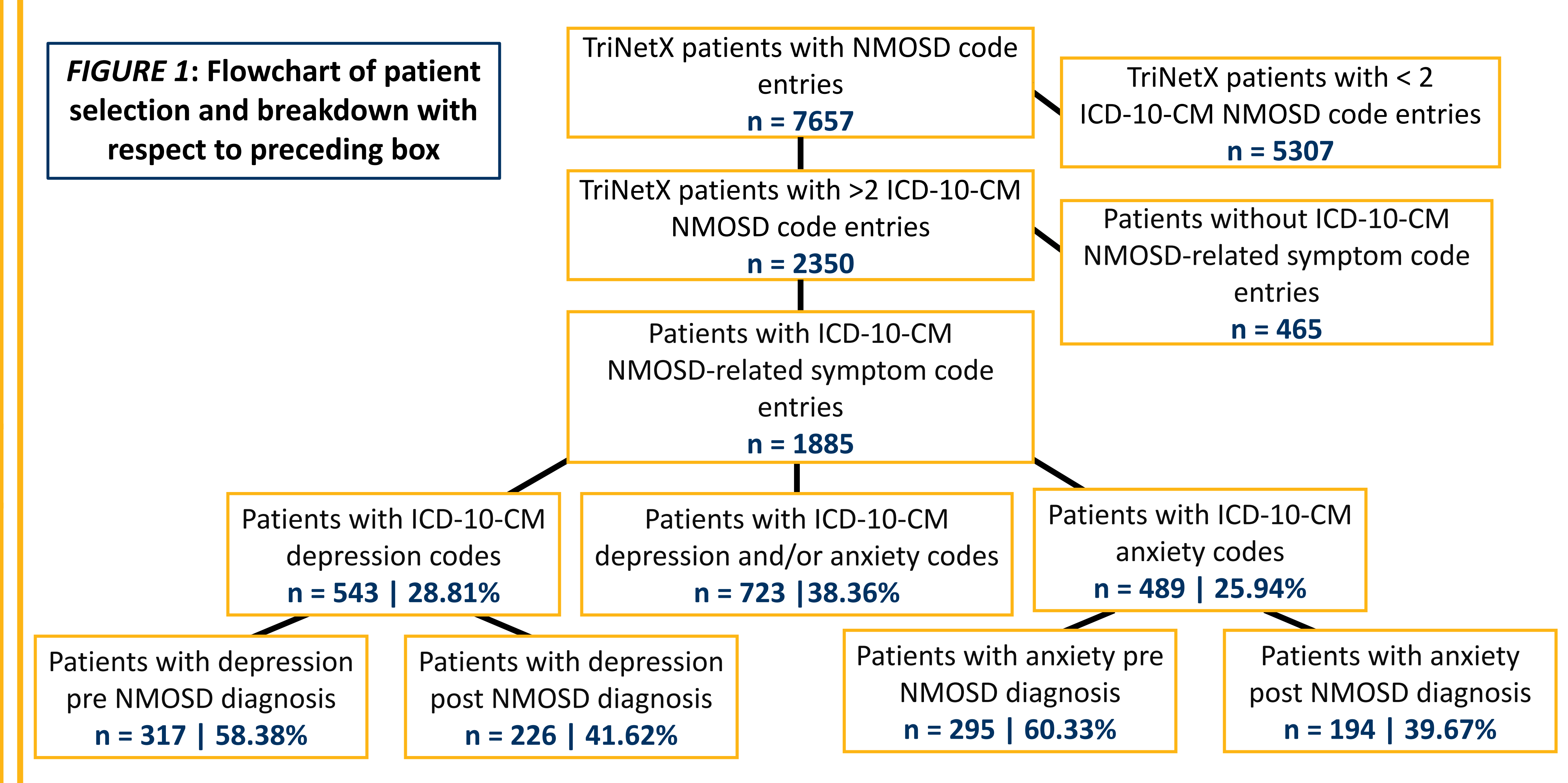
## OBJECTIVES

- Determine patterns of depression and anxiety in a neuromyelitis optica spectrum disease (NMOSD) population containing both seropositive and seronegative patients, both pre- and post-NMOSD diagnosis
- Examine demographic factors that may contribute to depression and anxiety in NMOSD patients

## METHODS

- Post hoc analysis study with a de-identified aggregate clinical patient dataset from TriNetX, which is a global research network covering 68 Healthcare Organizations
- NMOSD diagnosis dates restricted from 1992 to 2022
- 1885 patients with [NMOSD-related symptom code entries](#) and three or more NMOSD ICD-10-CM entries (G36.0) were included, with the third entry considered the official diagnosis
- Conducted demographic analysis by sorting on patients' first depression- and anxiety-related [ICD-10-CM code entry](#), noted for either pre- or post- NMOSD diagnosis
- Performed univariate Cox hazard models to determine demographic odds ratios and p-values for developing anxiety/depression post- NMOSD diagnosis (Figure 2)

## RESULTS



**Table 1: Univariate Cox Hazard models of demographic risks in respect to days between first corresponding condition diagnosis in patients pre/post NMOSD**

	Depression Post NMOSD (n=226)		Anxiety Post NMOSD (n=194)	
	Odds Ratio [95% CI]	p-value	Odds Ratio [95% CI]	p-value
Age	1.000 [0.993, 1.007]	0.996	0.989 [0.981, 0.996]	0.003
Sex (Reference Male)				
Female	1.142 [0.828, 1.575]	0.417	1.538 [1.053, 2.247]	0.026
Race (Reference White)				
American Indian/Alaska Native	2.771 [0.685, 11.207]	0.153	1.318 [0.184, 9.440]	0.783
Asian	0.812 [0.358, 1.842]	0.618	0.742 [0.303, 1.816]	0.513
Black/African American	0.984 [0.738, 1.313]	0.913	0.875 [0.643, 1.191]	0.395
Native Hawaiian/Pacific Islander	0.004 [0.000, 2.608e+21]	0.846	0.005 [0.000, 3.956e+21]	0.850
Unknown	0.670 [0.425, 1.055]	0.084	0.378 [0.209, 0.686]	0.001

**Table 2: Demographics of sex for depression/anxiety pre and post NMOSD diagnosis with % in respect to patients (n=1885)**

	Depression n (population %)		Anxiety n (population %)	
	Pre-NMOSD (n=317)	Post-NMOSD (n=226)	Pre-NMOSD (n=295)	Post-NMOSD (n=194)
Female	256 (13.58)	179 (9.50)	227 (12.04)	162 (8.59)
Male	61 (3.24)	47 (2.49)	68 (3.61)	32 (1.70)

## RESULTS(continued)

- Percentages of baseline, Non-NMOSD patients (n=124,311,970) in the TriNetx dataset that have depression are 7.41% and anxiety are 9.00%.
- Of 1885 NMOSD patients, there was a diagnosis of depression for 28.81%, anxiety 25.94%, and 38.36% for either and both conditions (Figure 1) – highlighting the prevalence of the two conditions in comparison to the baseline, NON-NMOSD population.
- There are more patients diagnosed with depression and anxiety **pre**-NMOSD diagnosis (Figure 1)
- There are no significant demographic risk factors for either anxiety or depression in the NMOSD patients (Figure 2)
- Demographically, female NMOSD patients make up a higher percentage of the depression and anxiety population than male NMOSD patients (Figure 3)

## CONCLUSION

- The approval of 4 effective disease-modifying therapies for NMOSD should now allow for a shift in clinic visit focus toward addressing and treating NMOSD-related symptoms, including management of depression/anxiety
- Limitations: dataset originates from an EHR, lacking granular clinician and patient information

## REFERENCES

1. Liu, Jianyi et al. "The prevalence of depression, anxiety, and sleep disturbances in patients with neuromyelitis optica spectrum disorders (NMOSD): A systematic review and meta-analysis." *Multiple sclerosis and related disorders* vol. 79 (2023): 105007. doi:10.1016/j.msard.2023.105007

## ACKNOWLEDGEMENTS

Funding was provided by the Sumaira Foundation Spark Grant and Berkeley Student Opportunity Fund



### NMOSD-related symptoms ICD-10 Codes

H46, H46.9, H46.13, H46.10, H46.11, H46.12, H46.1, H46.00,  
H46.8, H46.01, H46.02, H46.03, H46.0, G37.3

### Depression ICD-10 Codes

F33, F33.0, F33.1, F33.2, F33.3, F33.4, F33.40, F33.41, F33.42,  
F33.8, F33.9, F32.A, F32.8, F32.9, F32.89, F32.0, F32.1, F33.3,  
F32.5 , F33.42, F32.4, F32.2, F32.3, Z13.31, F43.21, F34.1

### Anxiety ICD-10 Codes

F41.9, F41.8, F41.1, F43.22, F41, F43.23, F06.4, F41.3, F41.0,  
F45.21, F40-F48, F40.10