

Characterizing Disease Progression in Multiple Sclerosis Subtypes Using RWD: Feasibility of Applying a Machine Learning Model to Address Missing Data



Pedro Alves, Zachary Bryant, Michelle Leavy, Gary Curhan, Costas Boussios, Carl D. Marci. | OM1, Inc, Boston, MA, USA

Disclosures

No outside funding was received for this work. The authors are employees of OM1, which is involved in issues related to the topic of this manuscript.

Background

Measurement of disability is an important component of monitoring disease progression in multiple sclerosis (MS). The Expanded Disability Status Score (EDSS) is a validated, clinician-administered scale for measuring disability that is widely used in clinical trials, but it is recorded inconsistently in real-world data (RWD) sources. A previously developed machine learning model was used to estimate EDSS scores at discrete time points using routinely-recorded unstructured clinical notes from neurologists and applied to RWD in patients with MS with very good performance.¹

Objective

The goal of this study was to assess the feasibility of using the model to reduce the number of missing scores for EDSS to support the characterization and understanding of disability progression in patients with relapsing remitting MS (RRMS) who are transitioning to secondary progressive MS (SPMS).

Methods

The model was applied to the OM1 MS PremiOM Dataset, a RWD source containing de-identified, deterministically linked clinical and administrative data from 2013 to 2021 on over 17,000 patients with MS managed by neurologists in the United States. Patients with RRMS and SPMS who had a clinician-administered or estimated EDSS score were included in the analytic cohort.

Results

The cohort included 4,366 patients. Of these, 3,568 were RRMS, 556 were SPMS, and 242 were transitioning from RRMS to SPMS. Patients in the RRMS subgroup were younger than patients in the other groups, while sex and race were similar across the subgroups (Figure 1). Between 2013 and 2021, 3,404 clinician-administered EDSS scores were documented. Application of the model resulted in an additional 46,644 estimated EDSS scores available for analysis, allowing for a more complete description of disability by age in RRMS and SPMS patients (Figure 2). The results show that patients who transition from RRMS to SPMS show increasing disability leading into the date of documented transition that continues over the course of the disease (Figure 3).

Figure 1. Cohort Demographics

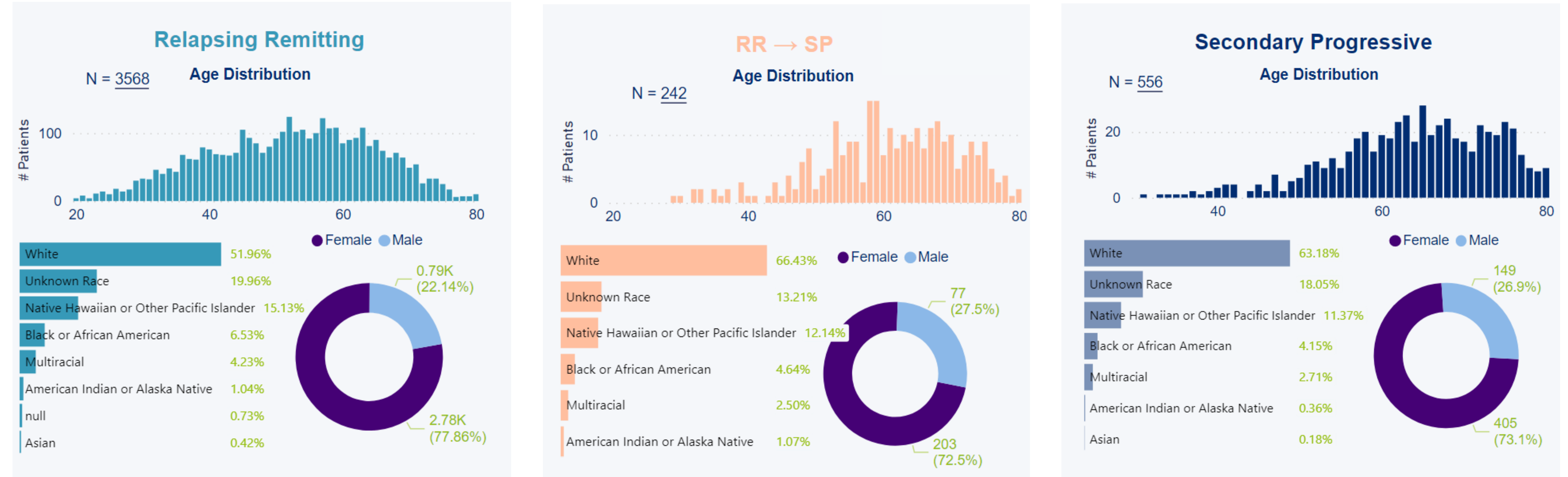


Figure 2. Clinician-Recorded EDSS and Estimated EDSS Scores in the RWD Source

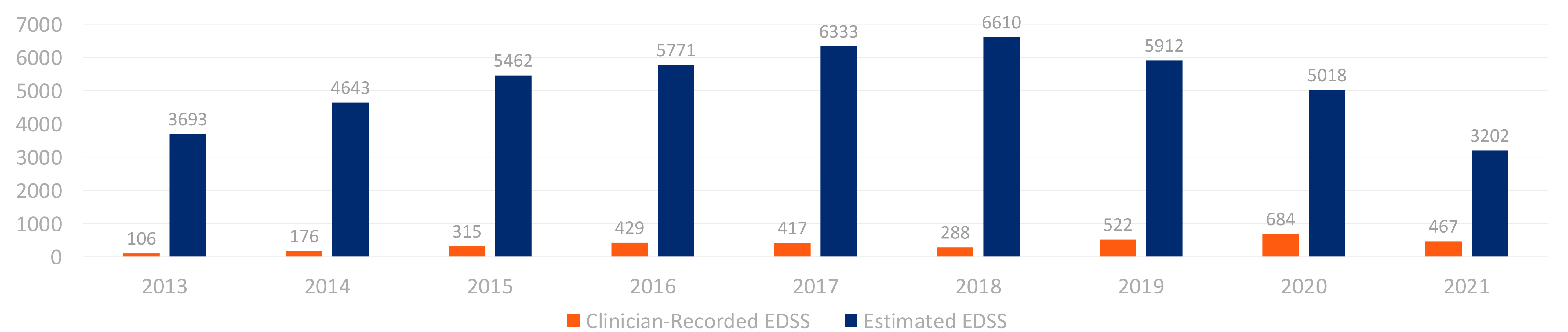
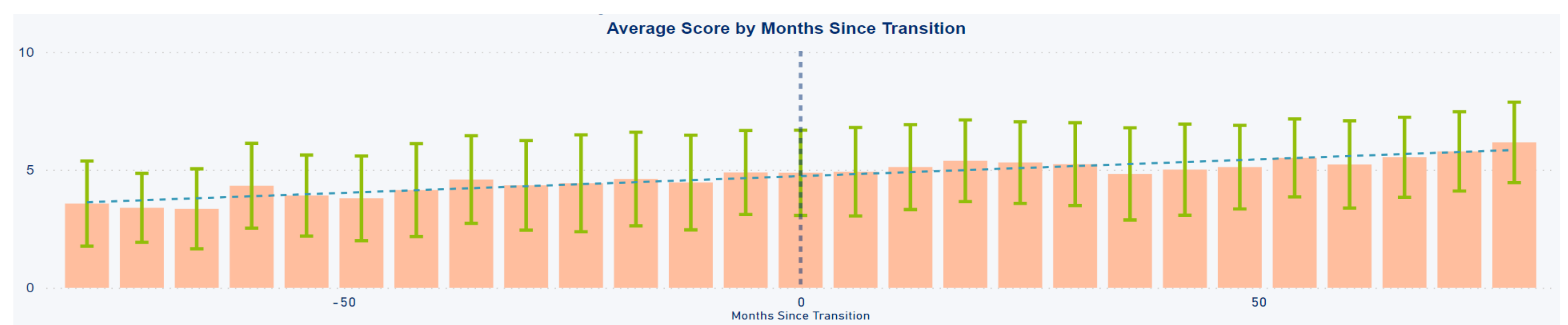


Figure 3. Disease Progression from Relapsing-Remitting MS to Secondary Progressive MS



Conclusions

- Application of a previously-developed machine learning model to estimate EDSS scores in a RWD source increases the number of patients available for real-world studies of disease progression and outcomes.
- Use of the model may improve the utility of RWD sources for MS research and informing the understanding of disability during the transition from RRMS to SPMS.

Conference

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References

¹ Alves P, Green E, Leavy M, et al. Validation of a machine learning approach to estimate expanded disability status scale scores for multiple sclerosis. *Mult Scler J Exp Transl Clin.* 2022;8(2):20552173221108635.