

## Introduction

Neurologists are increasingly being called upon to address and treat mental health issues with multiple sclerosis (MS) patients<sup>1</sup>. Evidence suggests a discrepancy between the high rate of mood symptoms in the MS population and lack of adequate mental health services<sup>2</sup>. The complexity in distinguishing mood and MS symptoms is difficult and time-consuming, as there is significant overlap between depression and neurological symptoms associated with MS<sup>3</sup>. Disease severity and time since diagnosis have also been found to be strongly correlated with mood symptoms in MS, as patients with a shorter duration of the disease have been found to be more likely to experience clinical depression<sup>4</sup>. Thus, the physical and emotional symptoms of MS can be complex for neurologists in deciding whether to refer to a mental health provider for treatment of mood symptoms.

The inclusion of mental health providers in specialty neurology clinics has become increasingly important in the management of mood symptoms in individuals with MS<sup>5</sup>. However, the question remains if demographic and disease-specific variables are controlled for, whether or not patients with MS who attend one Behavioral Medicine (BM) appointment differ from those who do not in terms of emotional functioning.

Therefore, this large-scale retrospective study examined data over four year period at the Mellen Center to determine whether patients receiving a referral to BM had increased emotional distress and decreased quality of life at time of referral when compared to patients who did not despite equivalent demographic and disease-related characteristics.

## Research Aim

To examine the baseline differences in psychological (depression, anxiety, and quality of life measures; PHQ-9, GAD-7, and EQ-5D) and in patients with MS that attend one BM appointment and those that do not after controlling for demographic variables, disease course, and length of time since disease onset.

## Methods

Data was gathered retrospectively through a large database of patient-reported outcomes. Data was limited to only patients diagnosed with MS with appointments at the Mellen Center from 2010-2015.

Exclusion criteria for the study include: patient death prior to 2015; first appointment at the Mellen Center (MC) prior to 2014; patients who are less than 18 years old; patients receiving psychotherapy from Cleveland Clinic mental health providers.

**Table 1: Total Study Population for Propensity Matching**

| Attended Behavioral Medicine Appointment | N of Overall Patients | PHQ-9 | GAD-7 | EQ-5D |
|--|-----------------------|-------|-------|-------|
| Yes                                      | 505                   | 101   | 94    | 101   |
| No                                       | 3413                  | 1629  | 133   | 1629  |
| Matched                                  | ---                   | 101   | 94    | 101   |

Of patients receiving BM services, approximately 74% were female, 79% identified as Caucasian, 52% were married (37% single, 9% other), and 78% were diagnosed with RRMS (10% SPMS with relapses, 5% SPMS without relapses). Average age of patients receiving BM was 44.4.

## Results

Statistical Software using MatchIt program was used to generate propensity score matching based on age, sex, race, marital status, use of assistive device, course of MS, MS Performance Scales (MSPS), timed 25-ft walk, maximum days between MS diagnosis date and first neurology visit at MC or between MS symptom onset date and the first neurology visit at MC. The Nearest Neighbor method was used to perform 1-to-1 matching.

**Table 2: Emotional Functioning Scores After Propensity Score Matching Utilizing Welch Two Sample T-Test**

| Measure | t      | df      | p     | 95% CI         | Mean Score at 1 <sup>st</sup> Neurology Visit |                             |
|---------|--------|---------|-------|----------------|---|-----------------------------|
|         |        |         |       |                | Received BM Services                          | Did Not Receive BM Services |
| PHQ-9   | -2.471 | 191.433 | 0.014 | (-4.3, -0.5)   | 9.4   | 11.8                        |
| GAD-7   | -0.484 | 185.192 | 0.629 | (-2.2, 1.3)    | 8.6   | 9.1                         |
| EQ-5D   | 1.992  | 199.994 | 0.047 | (0.001, 0.126) | 0.708   | 0.645                       |

After accounting for demographic and physical functioning variables (assistive device, course of MS, MSPS, timed 25-ft walk, and time between MS onset and initiating MS care at MC) at the first neurology visit, baseline scores on measures of emotional functioning (specifically, depression and quality of life) indicated significant differences between patients attending one BM appointment and those that do not.

## Conclusions

Results from this study indicate that patients attending one BM appointment following referral from their neurology team report significantly worse depression symptoms and quality of life than patients not receiving BM. The two groups did not significantly differ in self-report anxiety symptoms.

By controlling for demographic and physical functioning variables across both groups of patients, depression and quality of life emerged as two significant and distinguishing variables in determining who attends a BM appointment. That is, patients reporting higher levels of emotional distress and dissatisfaction with the quality of their lives may be more likely to follow through with a referral to BM from their neurology team.

Demographic variables across the study population were largely homogenous and may not generalize to MS patients from diverse backgrounds or with more physical limitations. Also, patients not receiving BM services from MC may have sought mental health from providers outside of the Cleveland Clinic. Lastly, differences in depression scores between the groups, while statistically significant, may not be clinically meaningful.

Future research may seek to understand the type of interpersonal dynamics between neurology provider and patient that may influence whether patients pursue BM referrals. Also, it may be useful to investigate the type of clinical tool (e.g., patient reported symptom measure, clinical interview, or combination) most useful to neurologists to assess clinical depression such that appropriate referrals to BM are maximized for patients.