Social Needs Analysis of a Transcranial Magnetic Stimulation Cohort

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BACKGROUND

- Major depression is one of the most prevalent forms of mental illness. In 2017**, 17.3 million adults** in the United States, **over 7% of the adult population**, experienced at **least one major depressive episode**.
- Mental illness is associated with poor social determinants of health. Those facing social inequalities are at higher risk **of worse outcomes and less engagement with care.**
- A large prospective study estimated that the remission rate for patients with major depressive disorder was close **to one-third after their first antidepressant medication trial**
- Transcranial Magnetic Stimulation (TMS) is a non-invasive procedure to treat depression utilizing magnetic fields to stimulate an electrical current in the left frontal cerebral cortex.
- TMS is approved for those with treatment resistant depression who have **not benefitted from one or more different medications** trials; typically TMS patients have had decades of recurrent or chronic episodes.
- A better definition of this **cohort's social needs and assets** could better inform **holistic mental health care**
- **Identifying barriers** to TMS access could lead to **diminishing mental health disparities**
- Assessing changes in social needs profile after TMS therapy **could identify opportunities for additional patient support**

OBJECTIVES

1. **Characterize the Social Determinant of Health profile of the TMS patients at Butler Hospital.**
2. **Evaluate the effect of TMS treatment on social needs over time.**
3. **Identify possible barriers to TMS care access.**

METHODS

- Implemented a modified version of The Accountable Health Communities Health-Related Social Needs (AHC-HRSN) Screening Tool as a self-report measure, with questions added to explore level of community engagement **(Table 1, below).** Questions in the modified AHC-HRSN Screening tool were compiled into 7 subcategories: Basic Needs, Interpersonal Violence (IPV) Exposure, Isolation and Stress, Disability, Health-Related Behaviors, Psychiatric History, and Substance Use.
- Data was obtained from patients who underwent an acute series of TMS therapy at Butler Hospital between 2019-2020s at intake (Baseline[BL]) and again after the last treatment session (Endpoint [END]).
- Inventory of Depressive Symptomatology-Self Report (IDS-SR) Total Scores were utilized to measure depressive symptom severity, and to define Response and Remission.
- Paired t-test analysis was preformed to examine changes in reporting pre versus post TMS treatment
- Independent t-tests were used to establish baseline differences between responders and non-responders
- Pearson correlation testing was used to examine relationship between percent change in IDS-SR and change in pre-treatment and post-treatment subscale scores.

Question	Subcategory
What is your living situation today?	Basic Needs
Think about the place you live. Do you have problems with any of the following: 1) Pests such as bugs, ants, mice 2) mold 3) lead paint 4) lack of heat 5) oven or stove not working 6) smoke detectors missing or not working 7) water leaks 8) none of the above	Basic Needs
Within the past 12 months, you worried that your food would run out before you got money to buy more:	Basic Needs
Within the past 12 months, the food you bought just didn't last and you didn't have money to get more:	Basic Needs
In the past 12 months, has lack of reliable transportation kept you from medical appointments, meetings, work or from getting things needed for daily living?	Basic Needs
In the past 12 months has the electric, gas, oil, or water company threatened to shut off services in your home?	Basic Needs
How hard is it for you to pay for the very basics like food, housing, medical care, and heating?	Basic Needs
Do you want help finding or keeping work or a job?	Basic Needs
If for any reason you need help with day-to-day activities such as bathing, preparing meals, shopping, managing finances, etc., do you get the help you need?	Basic Needs
Do you want help with school or training? For example, starting or completing job training or getting a high school diploma, GED or equivalent.	Basic Needs
How often does anyone, including family and friends, physically hurt you?	Interpersonal Violence
How often does anyone, including family and friends, insult or talk down to you?	Interpersonal Violence
How often does anyone, including family and friends, threaten you with harm?	Interpersonal Violence
How often does anyone, including family and friends, scream or curse at you?	Interpersonal Violence
How often do you feel lonely or isolated from those around you?	Isolation and Stress
Stress means a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his or her mind is troubled all the time. Do you feel this kind of stress these days?	Isolation and Stress
Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions	Disability
Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?	Disability
In the last 30 days, other than the activities you did for work, how many days during the week on average did you engage in moderate exercise (like walking fast, running, jogging, dancing, swimming, biking, or other similar activities)? On average, how many minutes did you usually spend exercising at this level on one of those days?	Behavior
In the past 3 months, have you engaged in any volunteering?	Behavior
How likely are you to vote in the upcoming election?	Behavior
How connected do you feel to your community?	Behavior
How many times in the past 12 months have you had 5 or more drinks in a day (males) or 4 or more drinks in a day (females)? One drink is 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of 80-proof spirits.	Substance Use
How many times in the past 12 months have you used tobacco products (like cigarettes, cigars, snuff, chew, electronic cigarettes, vaping)?	Substance Use
How many times in the past year have you used prescription drugs for non-medical reasons?	Substance Use
How many times in the past year have you used illegal drugs (e.g., ecstacy, heroin, cocaine, LSD)?	Substance Use
Over the past 12 months, how many times have you been admitted to a hospital for inpatient psychiatric care?	Psychiatric History
Over the past 12 months, have you been treated in a psychiatric day hospital or intensive outpatient program?	Psychiatric History
Over the past 12 months, have you made a suicide attempt or suicide gesture?	Psychiatric History

RESULTS

Table 2. Demographics and clinical characteristics of study population (n=50).

Age, years (mean ± SD)	42.74 ± 16.72
Female (n, %)	62%
Medicare (n,%)	16%
Prior Hospitalization for MDD (n, %)	60%
Prior Electroconvulsive Therapy (n, %)	24%
Baseline IDS-SR score (mean±SD)	47.24 ± 10.30
IDS-SR Endpoint %change (mean±SD)	58.14 ± 29.73
Baseline PHQ9 score (mean±SD)	19.02 ± 5.239
PHQ9 Endpoint %change (mean±SD)	65.98 ± 33.47

Figure 1. Percentage of cohort reporting social assets across question categories.

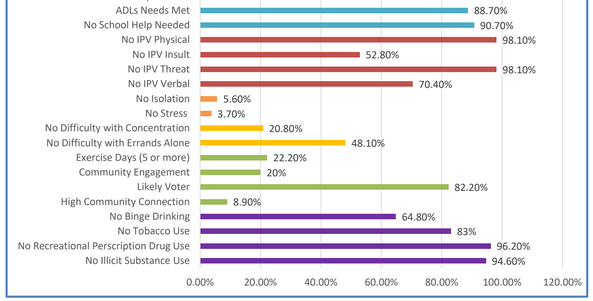
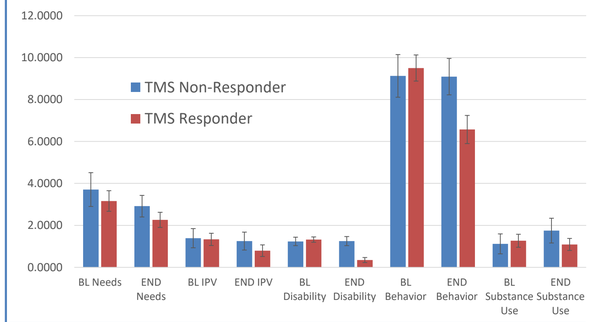


Table 3. Comparison of Subscale and Select Item Scores Before and After TMS Therapy

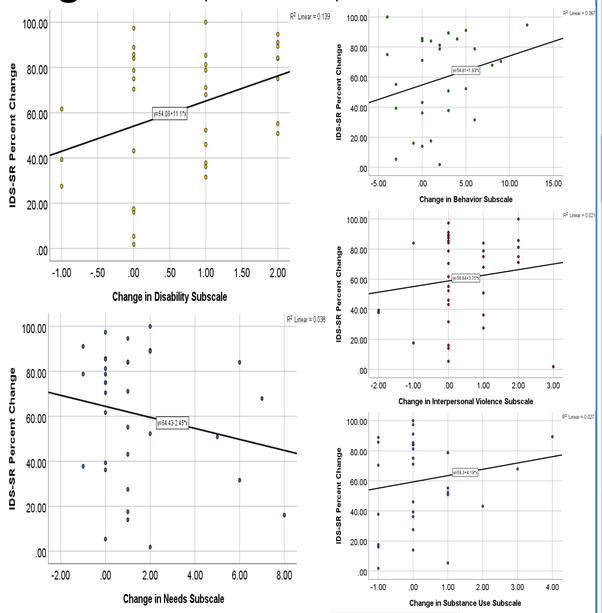
	Mean	N	Mean	Std. Deviation	Std. Error	P-value
Timepoint/Subscale						
BL Basic Needs	3.9118	34	1.41176	2.29779	0.39407	0.001
END Basic Needs	2.5000	34				
BL Interpersonal Violence	1.3714	35	0.40000	1.09006	0.18425	0.037
END Interpersonal Violence	0.9714	35				
BL Disability	1.3235	34	.70588	0.93839	0.16093	0.000
END Disability	0.6176	34				
BL Health Behavior	9.5000	28	1.92857	3.96212	0.74877	0.016
END Health Behavior	7.5714	28				
BL Substance Use	1.6250	32	0.25000	1.13592	0.20080	0.222
END Substances Use	1.3750	32				
Timepoint/Individual Item						
BL Housing Instability	0.2222	36	0.13889	0.42445	0.07074	0.058
END Housing Instability	0.0833	36				
BL Worry about Food Security	0.3056	36	0.19444	0.46718	0.07786	0.017
END Worry about Food Security	0.1111	36				
BL Food Security Experienced	0.1667	36	0.13889	0.35074	0.05846	0.023
END Food Security Experienced	0.0278	36				
BL Need Employment Help	0.6389	36	0.36111	0.79831	0.13305	0.010
END Need Employment Help	0.2778	36				
BL Isolation/Lonely	2.8889	36	1.13889	0.99003	0.16500	0.000
END Isolation/Lonely	1.7500	36				
BL Feel Stress	3.1143	35	1.71429	1.29641	0.21913	0.000
END Feel Stress	1.4000	35				
BL Lack Exercise	5.0000	34	1.23529	2.46255	0.42232	0.006
END Lack Exercise	3.7647	34				

Figure 2. Independent T-tests of baseline and endpoint subscale totals by IDS-SR responder status.



P-value	0.544	0.301	0.915	0.359	0.701	0.000	0.741	0.032	0.786	0.266

Figure 3. Relationship between IDS-SR percent change and change in pre-treatment and post-treatment subscale scores.



Higher Value for % Change on the IDS-SR Scale indicates greater depressive symptom resolution occurred with TMS Therapy

CONCLUSIONS

- Patients receiving a course of TMS therapy are overall characterized by minimal deficits with regard to basic needs and substance use, but symptoms may be disabling and promote isolation and disengagement with others and the community.
- Depressed patients show some areas of significant improvement in self-reported social needs after a series of TMS treatments, independent of clinical response.
- Baseline social needs do not differ between patients with whose illness responds to TMS therapy and those whose illness persists despite TMS.

FUTURE DIRECTIONS

- Qualitative interviewing with participants to further understand the barriers or challenges to TMS care access and how they are/are not managed
- Explore specific factors which lead to diminished social needs after a course of TMS treatment.
- Further explore the relationship between depressive symptom intensity and deficits in Social Determinants of Health

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