Perspectives of Patient Experience of Transcranial Magnetic Stimulation for Parkinson's Disease

Using the DART-RT

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The Gap

- There is a critical need for interventions that effectively target cognitive function for Parkinson's Disease (PD).
- Repetitive transcranial magnetic stimulation (rTMS), a non-invasive neuromodulation technique has shown potential for improving cognitive outcomes in various neurological conditions, such as acquired brain injury. It is currently FDA cleared for depression.
- Clinical and patient readiness and real-world applicability of rTMS for neurological conditions remains unexplored from a patient perspective.

Objectives

- Understand patient perspective of receiving transcranial magnetic stimulation in terms of:
  - Clinical readiness of the technology
  - Patient experience and perceived effectiveness
  - Recommendations for development of rTMS protocols for PD
- Evaluate the Designing for Accelerated Translation of Rehabilitation Technology (DART-RT) survey as a tool to effectively evaluate factors influencing the adoption of rTMS into clinical practice.

Methods

- **Participants:** Six Veterans, with PD diagnoses, completed the same rTMS intervention (ClinicalTrials.gov (NCT03836950)) targeting cognitive enhancement, recruited from single VA medical center.
- **Inclusion criteria**: No more than mild cognitively impaired at the time of the interview.
- Mixed Methods Design:
  - **Quantitative survey:** DART-RT, rating seven clinical readiness constructs: cost, safety, effectiveness, relative advantage, clinical utility, clinical demand, and patient values. Ratings were on a 5-point Likert scale (1=low, 5=high)
  - **Qualitative think-aloud interview:** participants verbalized their reasoning and interpretation behind each rating on the survey.

Analysis

- DARTRT ratings were summarized to characterize perceptions across the seven constructs
- Qualitative content analysis had two aims:
  (1) evaluating whether the DART-RT framework effectively captured patient experiences with TMS
  (2) exploring the nature of those experiences.

Discussion

- Participants felt that TMS for PD was a **safe** option
- Participants **valued** TMS as a treatment for PD and felt it is an option that addresses concerns patients have related to cognitive function
- TMS for PD has **moderate potential to change** patient care and clinical outcomes but relies on the effectiveness
- **Effectiveness** was rated as neutral, as most participants did not feel they experienced change but still had feelings of hope for the future
- **Relative advantage was not considered higher** than current options because TMS had more time, effort, and resources required compared to current treatments (i.e., medications).
- **Clinical demand** and **cost** required clarification, suggesting these domains may benefit from more patient-centered framing in future adaptations.
- TMS was perceived as mostly safe, effective, and likely to complement rather than replace traditional treatments. Consistent with previous literature, effectiveness and safety often dominate patients' considerations when evaluating experimental treatments.
- The results support leveraging user-centered evaluation tools to guide evidence-informed integration of neuromodulation technologies into clinical care.

Limitations

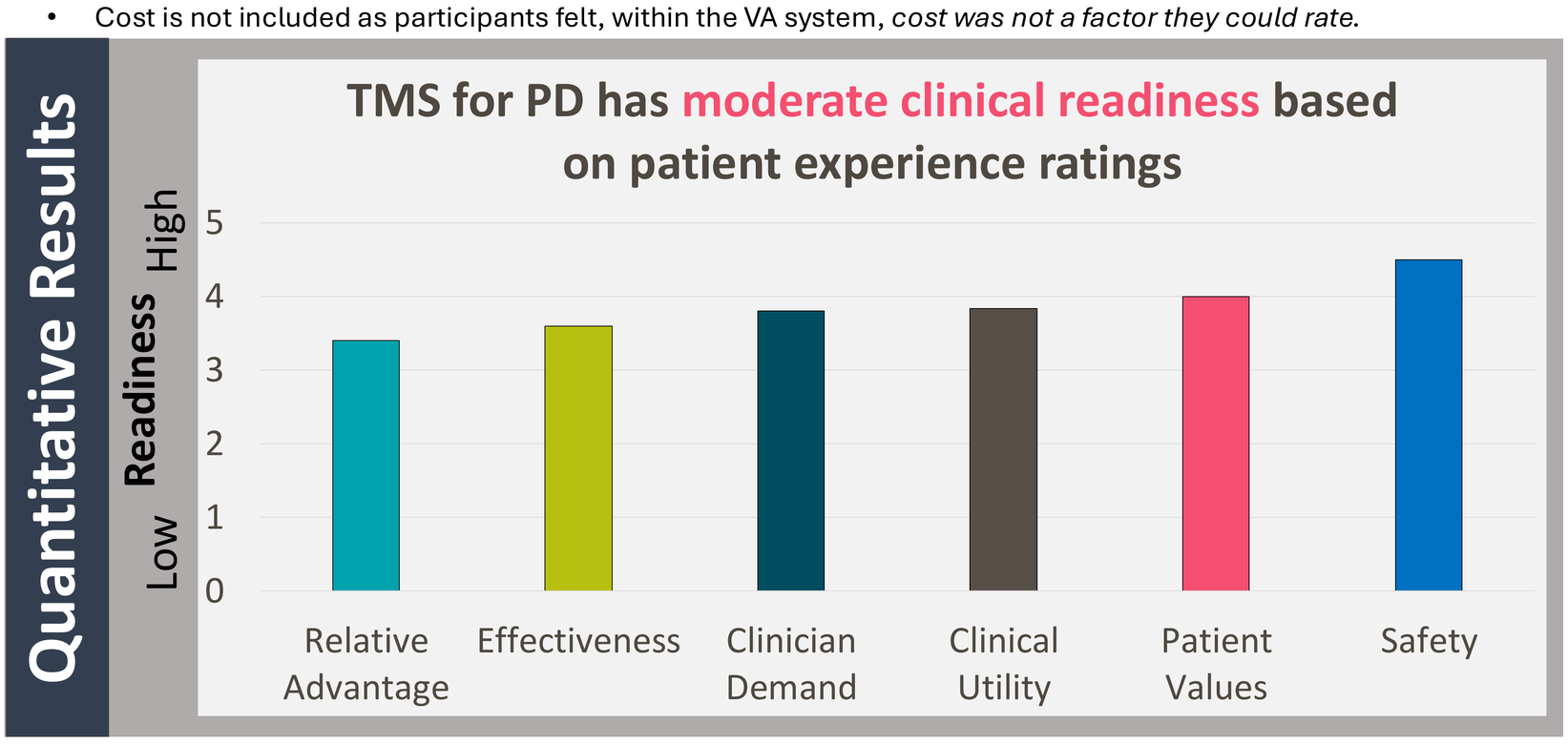
- Small sample size limits generalizability to broader PD populations.
- Participants were recruited from a single VA healthcare setting, potentially introducing site-specific or cultural influences on their perceptions.
- Participants' familiarity with structured reflection may have varied, potentially impacting the depth and consistency of responses.
- Some DART-RT constructs required clarification, suggesting the need for further adaptation of this framework to ensure accessibility and interpretability for individuals with neurodegenerative conditions.

Disclaimer: The view expressed in this poster are the authors' and do not necessarily represent the views of the Department of Veterans Affairs or the United States Government.

Results

- People with PD felt **TMS was safe, aligned with patient values, had good clinical utility and demand** but required **more data on effectiveness** to have **greater relative advantage.**
- Cost is not included as participants felt, within the VA system, *cost was not a factor they could rate.*

Quantitative Results



Qualitative Results

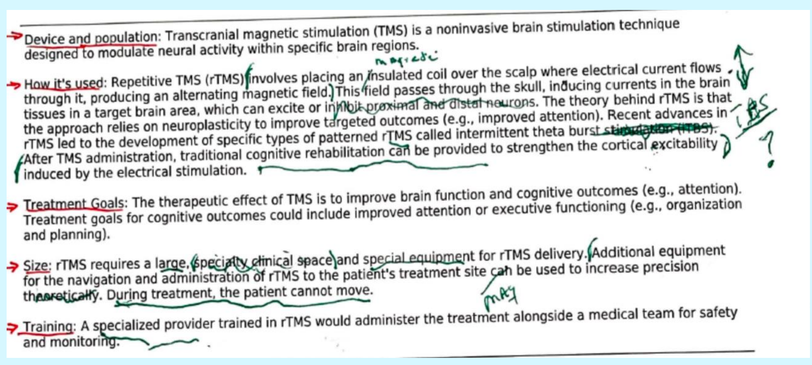
Themes	TMS, if effective, would likely to complement rather than replace traditional treatments for PD			
	Perceived Benefits and Complementarity	**Trust and Safety**	**Concerns About Cost and Access**	**Hope for the Future**
Veteran Quote	*"I don't want to increase (my medications) anymore than I have to…the more medicine I … the less it works. I think the stimulation will help me not need the medication.* -VA #2	*I would make a list of side effects, positive and negative….Then let the person judge it for themselves. There isn't anything that is scary.* -VA #4 *There wasn't a bad experience, it just didn't work for me.* -VA #3	*You have to go more frequent for the TMS and if you see improvements then maybe it's acceptable. But right now, it's easy to do medication because you just take it out of the bottle. But for TMS, you have to come here and get the thing on there. It's not for what's being done, but the inconvenience of driving and going and getting there.* -VA #4	*It didn't work for me I don't think, but I want it to work and I think this is on the right track. I want to be part of the cure and I would come back and do it again if I could.* -VA #6

Think Aloud Results

Use of DART-RT to discuss patient experience was helpful

Additional changes required for patient-centered use of the survey

Veteran Feedback


Device and population: Transcranial magnetic stimulation (TMS) is a noninvasive brain stimulation technique designed to modulate neural activity within specific brain regions.

How it's used: Repetitive TMS (rTMS) involves placing an insulated coil over the scalp where electrical current flows through it, producing an alternating magnetic field. This field passes through the skull, inducing currents in the brain tissues in a target brain area, which can excite or inhibit proximal and distal neurons. The theory behind rTMS is that the approach relies on neuroplasticity to improve targeted outcomes (e.g., improved attention). Recent advances in rTMS led to the development of specific types of patterned rTMS called intermittent theta burst stimulation (iTBS). After TMS administration, traditional cognitive rehabilitation can be provided to strengthen the cortical excitability induced by the electrical stimulation.

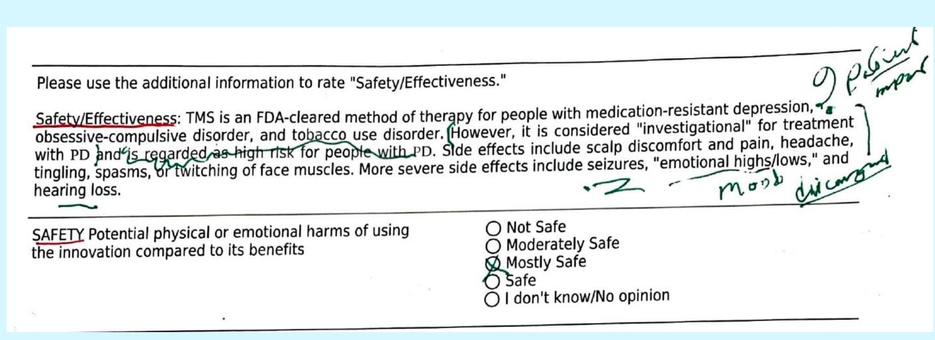
Treatment Goals: The therapeutic effect of TMS is to improve brain function and cognitive outcomes (e.g., attention). Treatment goals for cognitive outcomes could include improved attention or executive functioning (e.g., organization and planning).

Size: rTMS requires a large, specialty clinical space and special equipment for rTMS delivery. Additional equipment for the navigation and administration of rTMS to the patient's treatment site can be used to increase precision theoretically. During treatment, the patient cannot move.

Training: A specialized provider trained in rTMS would administer the treatment alongside a medical team for safety and monitoring.

"You gotta think, ok, more like ask "what would help you make that decision." Then these things can be listed. For me, it's will [TMS] work and what will happen if I do [TMS]."

– VA #7


Please use the additional information to rate "Safety/Effectiveness."

Safety/Effectiveness: TMS is an FDA-cleared method of therapy for people with medication-resistant depression, obsessive-compulsive disorder, and tobacco use disorder. However, it is considered "investigational" for treatment with PD and is regarded as high risk for people with PD. Side effects include scalp discomfort and pain, headache, tingling, spasms, or twitching of face muscles. More severe side effects include seizures, "emotional highs/lows," and hearing loss.

SAFETY Potential physical or emotional harms of using the innovation compared to its benefits

- ○ Not Safe
- ○ Moderately Safe
- ☒ Mostly Safe
- ○ Safe
- ○ I don't know/No opinion



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Contact

Take the DART-RT!

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