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- Dr. Riegler is a certified brain injury specialist with expertise in providing cognitive rehabilitation using telehealth modalities at the Cincinnati Department of Veterans Affairs Medical Center and professor of communication sciences and disorders at the University of Cincinnati.
- As the physical medicine and rehabilitation telehealth coordinator, Dr. Riegler has conducted several grant-funded studies examining the use of web-based interventions to improve access to care within the veteran population.
Cognitive Rehabilitation via Home Telehealth

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Disclosures

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At the conclusion of this presentation, the participant will be able to:

1. Identify the purpose and benefits of using telehealth for the provision of cognitive rehabilitation

2. Explain patient outcomes for participants who have completed Riegler/Wade’s web-based cognitive intervention
Funding Sources

- Office of Rural Health
- Office of Cultural Transformation
- Research Initiative Program Grant
Mild Traumatic Brain Injury (mTBI) is a commonly reported with over 300,707 service members receiving a diagnosis since 2000*

The Department of Defense (DoD) and the Department of Veterans Affairs (VA) define mTBI as a traumatically-induced, structural injury and/or physiological disruption of brain function, as a result of an external force that is indicated by new onset or worsening of at least one of the following clinical signs, immediately following the event:

- Loss of consciousness
- Alteration of consciousness
- Post-traumatic amnesia
- Neurologic deficits that may not be transient
- Intracranial lesion

*DVBIC, through first quarter 2014
For those with probable mTBI the frequency of co-morbid probable PTSD was 33-39%  
  - (Carlson et al., 2010)
• The presence of PTSD may prolong the duration of mTBI symptoms and potentially exacerbate the severity of those symptoms  
  - (Brenner et al., 2010)
• High levels of combat stress are associated with a three to eightfold increase in the rate of reporting of post-concussive symptoms  
  - (Cooper et al., 2011)
• PTSD can exacerbate other conditions often reported post-deployment, including pain and headache because of its effects on sleep and the perception of pain
mTBI: Symptom Overlap

Both the civilian and military literature provide evidence that the greater the burden of co-occurring disorders, the higher the likelihood that symptoms will persist following mTBI.

- There is a high degree of overlap between symptoms of mental health conditions, pain disorders, and sleep disorders and mTBI.

Halbauer et al., 2009
Traumatic brain injury (TBI) can negatively impact cognitive-communication functioning, including:

- Difficulty with concentration
- Memory deficits
- Problems participating in social communication
- Disorganized verbal expression
- Dysfluent speech
- Word-retrieval problems
- Difficulties with executive functioning skills, including planning, problem solving, judgment, and decision making
Cognitive Rehabilitation

“A systematic, functionally-oriented service of therapeutic cognitive activities, based on an assessment and understanding of the person’s brain-behavior deficits. Services are directed to achieve functional changes by:

- [Restorative:] reinforcing, strengthening or establishing previously learned patterns of behavior or,
- [Compensatory:] establishing new patterns of cognitive activity or mechanisms to compensate for impaired neurological systems”

(Bergquist & Malec, 1997).
Telehealth vs. Face-to-Face Treatment

- **Benefits of telehealth**
  - Improves access to care
    - Increases flexibility of scheduling
    - Alleviates travel requirements
    - Reduces anxiety related to attending appointments for some patients

- **Limitations of telehealth**
  - May not be appropriate for patients with severe injuries due to required technology set-up
  - Occasional technical difficulties
On May 7th, 2012 the Department of Veterans Affairs eliminated copayments for veterans receiving in-home care via telehealth technology. This removes a barrier that may have previously discouraged veterans from choosing to use in-home care for video telehealth as a viable medical care option.
A Web-Based Cognitive Intervention for Veterans with Traumatic Brain Injury

- Current research protocol offered to Veterans who have a h/o TBI as an alternative to traditional face-to-face cognitive rehabilitation
- Principal Investigator: Lindsay Riegler
- Providing Speech-Language Pathologists:
  - Lindsey Harrington
  - Lindsay Riegler
Aims of the Research Protocol

- Develop an effective intervention to facilitate long-term adjustment and resilience in Veterans with TBI
- Determine if completion of modules results in an increase in knowledge of TBI
- Determine if completion of the modules results in improvements in attention, memory, and/or executive functioning skills
- Determine if changes in knowledge are associated with reductions in anxiety about cognitive changes
Previous Research

- **Supporting cognitive rehabilitation**
  - A review of the cognitive rehabilitation literature demonstrates substantial evidence to support interventions targeting attention, memory, executive function, and social communication skills (Cornis-Pop et al., 2012)
  - Treatments focused on TBI education with positive expectations for recovery have been effective in reducing long-term complaints of patients with mTBI (Borg et al., 2004)

- **Supporting intervention via telehealth modality**
  - Provides a method for connecting with patients who have limited access to services (Girard, 2007)
  - Use of telehealth in a variety of assessment and treatment contexts has demonstrated generally positive results (Reynolds et al., 2009)
  - Most patients receiving care in this modality have been satisfied with their care (Mashima & Doarn, 2008)
Previous Research

- Supporting web-based cognitive intervention
  - A study on a previous iteration of this protocol resulted in:
    - Improved adherence to treatment in a population that was initially non-adherent to treatment
    - Improvement in standardized test performance that was comparable to face-to-face treatment

(Riegler et al, 2013)
Participants

• Inclusion criteria:
  ○ Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) Veterans
  ○ Patients who have reported cognitive deficits on the Neurobehavioral Screening Index (NSI)
    ○ Scores between 1-4 on items 15m, 15n, 15o, and/or 15p
      • 15m. Poor concentration, can’t pay attention, easily distracted
      • 15n. Forgetfulness, can’t remember things
      • 15o. Difficulty making decisions
      • 15p. Slowed thinking, difficulty getting organized, can’t finish things
  ○ Age 20 to 45

• Exclusion criteria:
  ○ Documented neuropsychological deficits prior to deployment
Research Protocol

- **Pre-intervention evaluation session:**
  - Informed consent and HIPAA
  - Evaluations
    - Test of Everyday Attention, Test of Memory and Learning, Delis-Kaplan Executive Function System, Peabody Picture Vocabulary Test, State-Trait Anxiety Inventory, Behavior Rating of Executive Function Adult Version, Center for Epidemiological Depression Scale, TBI Knowledge Questionnaire
  - Introduction to web-site and videoconferencing equipment
  - Completion of “Transitions” module
    - Used to determine recommended modules based on participant responses to questions
    - Ensure that participants are able to navigate the website independently

- **Intervention**
  - Completion of seven modules and subsequent telehealth sessions

- **Post-intervention evaluation session:**
  - Repeat evaluations completed at pre-testing
  - Complete demographic information and satisfaction survey
Intervention

- Participants complete one module each week prior to meeting with clinician
  - Modules contain content regarding a skill or topic and video clips showing Veterans discussing their experiences with the skill or topic
- Participants meet with clinician via videoconferencing program
  - Review the information discussed in the module
  - Complete structured practice using skills
  - Discuss progress with patient identified goals
  - Discuss any additional concerns/questions
Core TBI Modules

- Session 1: Getting Started
  - Introduction to the program and identification of goals
- Session 2: Staying Positive
  - Cognitive reframing and stress management
- Session 3: Problem Solving
  - Steps of the problem solving process
- Session 4: Getting Organized
  - Strategies to improve organization
- Session 5: Staying in Control
  - Strategies for monitoring behavior
- Session 6: Memory and Attention
  - Strategies to improve memory and attention
- Session 7: Planning for the Future
  - Review of information from previous sessions and focus on planning for the future
TBI Modules

Memory Encoding Strategies

Rehearsal/Repetition
Going over items OVER and OVER again (think about how you learned the alphabet).

Repetition
Think about what the object looks like, where does it belong, where did you last see it? Your brain’s mental camera—the formation of mental pictures.

Association
The ability to form an easy-to-remember association between a new object and a constant.
For example: Suppose you are introduced to a Mr. Hill (new object) who lives on a hill (constant) at the end of town. Mr. Hill on a hill. That’s an association.

Steps of Problem-Solving

Aim—Identify the problem/goal—What do you want to accomplish?

Brainstorm—List possible solutions—How are you going to solve the problem?

Choose—Select a solution—Which is the best choice?

Do It—Try out the solution—How will you make it happen?

Evaluate—Evaluate the results—What worked and what didn’t?

Physical effects may include:
- Headaches
- Difficulty speaking
- Blurry eyesight
- Trouble hearing
- Loss of energy
- Change in sense of taste or smell
- Dizziness or trouble with balance

Cognitive effects may include:
- Difficulty concentrating
- Trouble with attention
- Forgetfulness
- Difficulty making decisions
- Repeating things

Behavioral effects may include:
- Becoming angry easily
- Getting frustrated easily
- Acting without thinking
Results

- Current results include data for 13 participants
  - 12 males and 1 female
  - Between the ages of 24 and 42
- Overall positive results were obtained, including:
  - Improvement in TBI knowledge
  - Statistically significant improvement in verbal and composite memory indexes
  - Improvement was seen on the non-verbal memory index as well, but this was not at a statistically significant level
  - Improvement on the global executive composite score on the Behavior Rating of Executive Function- Adult Version
Note: The TBI Knowledge Questionnaire consists of questions regarding general knowledge of TBI, as well as questions regarding specific compensatory strategies to improve functioning with TBI. The information tested in this questionnaire is reviewed during the treatment protocol.
Memory Results

Note: MFS = Memory for Stories assesses the individual’s auditory processing and consolidation of verbal information presented in paragraph form; Verbal = Verbal Memory Index represents a measure of verbal memory; NV = Nonverbal Memory Index represents a measure of nonverbal aspects of memory; Comp = Composite Memory Index is a summary score that provides a global index of memory function, including both verbal and nonverbal memory.
Behavior Rating Inventory of Executive Function Results

Note: BRI= Behavioral Rating Index represents the adult’s ability to maintain appropriate regulatory control and emotional response; MI= Metacognition Index represents the adult’s ability to systematically solve problems utilizing planning/organization while sustaining task completion efforts in active working memory; GEC= Global Executive Composite is a summary score that incorporates all clinical scales of the BRIEF-A. Decreasing scores indicate improvement in reported functioning.
“Mind blowing, really had good tips. Hurt my brain though.”

“I think it has definitely helped me”

“It was the only thing I have followed through with.”

“My experiences have all been good. Everyone I talk to seem to genuinely want to help. The project is better simply because it’s more convenient for me to use the webcam than coming in.”
How did you Feel about using the Technology?

<table>
<thead>
<tr>
<th>Good</th>
<th>Loved it</th>
<th>Comfortable</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked it</td>
<td>It was different but helpful</td>
<td></td>
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</tbody>
</table>

The convenience of meeting someone via the web is something that should have been utilized in long distance treatment years ago. It was simple and easy to figure out even for a guy having TBI.

The technology was a big help. Being able to reference the material quickly and easily was helpful.

I was ok with it. It was very convenient and easy.

<table>
<thead>
<tr>
<th>Comfortable</th>
<th>Fine</th>
<th>Great</th>
</tr>
</thead>
<tbody>
<tr>
<td>Works fine, easily accessible and easy to use.</td>
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Future Directions

- Continued investigation of the efficacy of the web-based intervention with a greater number of participants
- Investigation of the efficacy of the intervention provided by different clinicians
- Investigation of use of the program with more severely impaired patients
- Investigation of changes in efficacy following changes to the content of some modules
  - Addition of more nonverbal memory strategies
  - Additional of structured practice using memory and/or attention strategies
Questions
References


References


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