Telerehabilitation as a Facilitator in Clinical Programming

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Collaborators, Affiliations and Acknowledgments

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Learning Objectives

• Describe the value of three contextual factors in design and evaluation of telerehabilitation.

• Compare and contrast alternative methodology and outcomes that incorporate naturalistic assessment and intervention using telerehabilitation.

• Describe and evaluate potential methods of incorporating telerehabilitation into their clinical programs.

• Summarize the ethics code revisions on Technology and Distance Counseling.

• Describe at least one ethical consideration that is presented by TR and one ethical consideration that is eliminated by TR.

Telerehabilitation

“Delivery of rehabilitation services via information and communication technologies”

*ATA Blueprint for Telerehabilitation 2010*

"Telerehabilitation is the clinical application of consultative, preventative, diagnostic, and therapeutic services via two-way interactive telecommunication technology."

*AOTA Position Paper*
Evidence for Telerehabilitation Practice

- Limited study of cognitive and vocational rehabilitation
- General emphasis has been on equivalence or non-inferiority with face to face/traditional services
- Efforts to document equivalent or reduced costs such as client travel time, clinician time
- Satisfaction and usability with technology
Extending the Model: Naturalistic Rehabilitation

- Evidence for “in-vivo” home and work-based rehabilitation widespread:
  - Behavioral interventions for anxiety, pain, and phobias
  - Supported Employment
  - Stroke rehabilitation
  - ICF encourages exploration of contextual factors in environment

Rehabilitation Considerations

- In defining process and outcomes, what works for telemedicine may not work for telerehabilitation . . .
Rehabilitation Characteristics

- Encounters with professionals are often repetitive, with established relationships
- Client need for services often escalates as recovery continues
- Needs and problems often most evident out in the community (shopping, at work) rather than in clinical settings
- Rehab prescribes and enables clients to “practice” extensively between sessions in real-life activities

Rehabilitation Characteristics

- Multitude of professional disciplines
- Need for carryover of clinical evaluations and recommendations from one service network/team to another
- Coupled with stubborn and chronic poor employment rates, evidence points to need for new and expanded models of community-based and vocational rehabilitation
Contextual Factors in Rehabilitation

- Limited or difficulty generalizing from clinic to natural environment
- “Place and train” model of supported employment
- Use of strategies in environment to facilitate employment success
  - Assistive technology
  - Cognitive rehabilitation

Contextual Factors in Rehabilitation

- Rehab process requires:
  - Education about injury/disability
  - Detail about the environment
  - Spontaneous compensatory strategies tried out in everyday life
  - Increasing self-awareness and incorporating new info about self
Contextual Factors

- Complex follow-up needs, often escalating over time:
  - Emotional
  - Psychosocial
  - Family/relationship issues
  - Return to work issues
  - Return to home community, making face-to-face follow-up difficult or impossible

Contextual Factors: Conducting TR

- Obtain info about environment (pictures, sounds)
- Implement real-time therapy while individual faces environmental problems (“in vivo”)
- Provide education and feedback at pace tolerable to individual
- Provide system of tracking progress/changes
- Anticipate long-term case management and system carryover needs
TR Challenge for Community Based Rehabilitation

- Community based rehabilitation, including VR, has traditionally been under funded, less rigorously researched, therefore underutilized and untested
- TR already recognized as a tool to address rural accessibility
- TR enables extension and expansion of services beyond clinic, face to face models; consistent with rehabilitation model of intervening in natural environment

- Interventions that promote and result in employment and self-management are examples of the extension and expansion of services
- Public VR offers unique funding opportunities for clinical applications of TR, in hands of the VRC
- Need new models for expanding TR applications to VR – Encourage support for Model demonstrations, University-State collaborations, Industry-community-based rehab collaborations
Overview

I. TR Technologies
II. Facilitator in Clinical Programming
   – Individual Treatment, Group Pyschoeducation, Assessment
   – EHR, Clinical Supervision, Outcome Measures
III. Remote Assessment
    – Autism Assessment (ADOS), Neuropsych Exams
TR Technologies

• Portal
  – Management and Workflow Portal
  – iMHere
• Videoconferencing
  – VISYTER
• Mobile Technologies

Portal for Clinical Programming

• A telerehabilitation portal enables ongoing real time, secure collaboration across program staff in different locations
• The portal includes multiple features to emulate clinical workflow
• Incorporates VISyTER technology for integrated HD video conferencing
Pitt Model

- The Pitt Model is an information management infrastructure designed to support TR applications
- Developed at the University of Pittsburgh’s Rehabilitation Engineering and Research Center on Telerehabilitation (RERC-TR)
- Developed through a design process that focused on accessibility, openness, extensibility, cost-effectiveness, and security

Security

- Encompassing all aspects of the PITT model is the security of the infrastructure
- Portal has been built to comply with common security policies
  - Encryption of data
  - Requiring access information
  - Limiting access to rightful persons
Versatile and Integrated System for Telerehabilitation (VISYTER)

Developing an Infrastructure for TR Applications in the VR Setting

- Cognitive Skills Enhancement Program (CSEP)
  - Specifically designed for individuals with cognitive disabilities
  - Stand-alone, 15-week, Monday through Friday, pre-vocational training program
  - Accepts approximately 15 participants per term
  - Tier I, II, and III

- Center for Assistive Rehabilitation Technology (CART)
Discussion

• Application
  – Introduced – February 2009
  – Implemented - Summer term (May) 2009
  – Usability Study – Fall, 2009

• Given experiences and feedback thus far, Portal has provided functional benefits, including improved communication and increased efficiency, compared to the old system of paper records and a written curriculum

After Scenario Questionnaire (ASQ)

• Scenario-based usability questionnaire
• After completion of a scenario, Portal users responded to the questions both (1) on a Likert scale ranging from 1 (strongly agree) to 7 (strongly disagree), and (2) in written comments:
  1. Overall, I am satisfied with how easy it is to use this system
  2. It was simple to use this system
  3. I could effectively complete the tasks and scenarios using this system
ASQ Scenarios

Calendar
• On the CSEP Calendar, create a 2-hour session on Sunday, October 11, 2009. Attach any document.

Action Item
• Create a high priority action item to remind you to complete these questionnaires by Monday, Oct. 26th

Add Name
• Add your name, the date, and time to the bottom of the HGAC program list

Discussion
• Access the Portal Usability discussion board and follow posted directions

Post-Study System Usability Questionnaire (PSSUQ)

• 19-item questionnaire designed to assess overall user satisfaction with system usability
• Portal users responded to the questions
  – On a Likert scale
  – In written comments
• Scoring results in an overall score and three sub-scale
  – System Usefulness (SYSUSE)
  – Information Quality (INFOQUAL)
  – Interface Quality (INTERQUAL)
Findings – ASQ

- Condense three items into a single scale through averaging
- Lower scores indicate higher usability
- The tasks that were completed successfully were generally rated as more user-friendly

Findings - PSSUQ

- Lower scores indicate higher usability
- Identified the interface to be the most usable
- Quality of information to be least usable
Findings – Written Comments

**Strengths**
- Improved communication
- Easier access to documents and information
- Faster access to documents
- An appealing interface

**Weaknesses**
- Difficulty opening/uploading/editing documents
- Lack of a search function
- Difficulty with action items
- Unhelpful error messages
- Lack of alerts
- Repeated requests for username and password

Discussion and Conclusions

- In general, results of the portal evaluation were overwhelmingly positive
- Based on the characteristics of CSEP staff, the Portal also appears to be accessible for some users with disabilities
- Important to acknowledge negative feedback
- Difficulties with tasks may have been due to
  - Portal functionality
  - Differences between computers
  - Lack of familiarity with the task
REMOTE ASSESSMENT
ADOS Algorithm for DSM-IV/ICD-10 Autism Diagnosis

Participant ID: 12345
Sex: Male
Date of Birth: October 01, 2003
Age: 11

Communication
Conversational Grammatical Use of Words or Phrases (A-B-C)
Description: Conventional, Mechanical, or Incongruous Gestures (A 6-C)
Dyadic or Oncentric Gestures (A 7-C)

Reciprocal Social Interaction
Vocal vs. Non-Vocal (A 11-C)
Facial expressions directed to others (A 16-C)
Eye Contact and Overt Attention (A 19-C)
Responsibility (A 20-C)
Quality of Social Distance (A 22-C)
Amount of Reciprocal Social Communication (A 23-C)

Social Interaction Total: 10

Examiner Name: Jackie
Clinical usability and participatory development
Develop a remote administration procedural manual

**STUDY 1 – CLINICAL USABILITY**

**Usability Study**

- **Cognitive Walkthrough**
  - Participants: 5 clinically reliable ADOS administrators
  - Participants performed a remote ADOS module 4 assessment on a volunteer (mock client)

- **Psychometric standardization:**
  - “Were you forced to break standard face-to-face administration procedure? (Yes or No.)
  - If yes, how? (Narrative response)
  - If yes, to what degree? (Likert scale, 1 to 7)
Results:
Procedural Usability Concerns

• Feedback:
  – Typos on scoring form
  – A glitch in the system that wipes out notes if the administrator forgets to his “save” regularly
  – The problem of visual stimuli not staying on the screen simultaneously with the administrator taking notes

• PSSUQ:

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<thead>
<tr>
<th></th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>System Usefulness</td>
<td>1.29</td>
<td>4.00</td>
<td>2.23</td>
<td>1.11</td>
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<tr>
<td>Information Quality</td>
<td>1.20</td>
<td>3.60</td>
<td>2.00</td>
<td>1.07</td>
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<tr>
<td>Interface Quality</td>
<td>1.00</td>
<td>2.67</td>
<td>1.60</td>
<td>0.64</td>
</tr>
<tr>
<td>Overall</td>
<td>1.22</td>
<td>3.56</td>
<td>1.98</td>
<td>0.98</td>
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</tbody>
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Results:
Maintaining Standard Administration Procedure

• Of the 14 ADOS activities administered, only 6 were noted by at least one subject to force breaking standard, face-to-face administration

• Mean ranking was 2.4, indicating that generally breaks in standardization were minimal
Conclusions

• The usability study identified major system deficits and elicited suggestions for making the system more usable

• A variable affecting the usability of the system was familiarity, proficiency, and comfort with computer technology

Conclusions, cont.

• When examining an alternative administration method for a previously standardized assessment, it is important to evaluate whether or not the new administration has equal reliability and validity to the way the evaluation was originally standardized

• In this study, the method of evaluating potential drift was a semi-structured interview with open- and close-ended question administered after each item

• This method could be considered a starting point for other researchers interested in evaluating whether or not remote administrations of standardized procedures are valid
Reliability and Validity of a Remote Neuropsychological Assessment Protocol

- Neuropsychological assessment is a highly valued rehabilitation tool for individuals with cognitive disabilities
- Project objectives: Development and Research
TR Employment Supports – Mobile and Internet Applications

Cognitive and Vocational Rehabilitation Mobile TR Applications

- Remote Job Coaching (8 week trial of mobile job supports including synchronous and asynchronous interactions with coach)
- Remote Cognitive Rehabilitation (15 week ecologically oriented memory rehabilitation program incorporating everyday demands and applications; structured protocol, homework, synchronous and asynchronous contact with therapist via portal/mobile tablet device)
### Portal Features

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<thead>
<tr>
<th>Feature</th>
<th>TeleNP</th>
<th>TeleCR</th>
<th>TeleJC</th>
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<tbody>
<tr>
<td>Interactive Video</td>
<td>✔</td>
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<tr>
<td>Medical record</td>
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<tr>
<td>Clinical Workflow</td>
<td>✔</td>
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<tr>
<td>Calendar</td>
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<tr>
<td>Imbedded automated test protocols</td>
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<td>Test Stimuli</td>
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<td>White board response capability</td>
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<td>SMS text chat</td>
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<td>Customizable data collection forms</td>
<td>✔</td>
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<tr>
<td>Task guidance videos</td>
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<td>✔</td>
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<tr>
<td>Therapeutic scripts (e.g., problem solving)</td>
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<td>Bibliotherapy resources</td>
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<td>Database/AV capture</td>
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### Mobile Device Applications

- **CBA - Self-evaluation**
- **Work schedule**
- **Problem solving script**
- **Video task guidance library**
- **Worksite daily task list**
- **Camera for recording/forwarding to coach**
- **Live interactive video with coach**
- **SMS text chat with coach**
- **Link to JAN accommodations**

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**Units of Pittsburgh**

**Dept. of Rehabilitation Science and Technology**

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**University of Pittsburgh**

**Dept. of Rehabilitation Science and Technology**
Professional and Ethical Considerations

Professional Organizations and TR

- Professional organizations have different views on TR
  - Professions acknowledge and accept TR at different levels
- Use of social networking for rehabilitation organizations
Some TR Issues with Ethical Implications

- State licensure and reimbursement issues
- Technology selection, training/use, and accessibility
- IT issues in security/archiving, IT networks/staff
- Boundary issues with electronic materials, webcams/screens, social networking, “permanent record” on Internet
- “not providing” when TR could facilitate services
- Imperative to extend assessment and intervention into client context to address geographical, cultural, and most efficacious treatment

Useful Guidelines

- Use accessible disclosure statements to obtain informed consent
- Ensure secure, HIPAA level data storage
- Include disclosure statements on email communications
- Encrypt communications and attachments
Useful Guidelines

- Password protection
- *Need to know basis* for information dissemination
- Don’t ignore simple physical aspects
- Understand ethical pitfalls and safeguards built into new IT systems

TR for RC Challenges and Goals

- Full disclosure leading to informed consent relevant to IT aspects
- Safeguarding Confidentiality
- Best practices in remote assessment, intervention and monitoring
- Effective and ethical use of the Internet
- Awareness of boundary and role issues
- Risk assessment
Assessing Risk

- Self assessment of vulnerabilities
- Security
  - Physical
  - Logical
  - Behavioral
- Agency Security Plan
- Access to and ethical use of information
- Training

Acknowledgments and Resources

CRC Ethics Code:  

• American Telemedicine Association: [www.americantelemed.org](http://www.americantelemed.org)
• ATA Telementalhealth SIG
• ATA Telerehabilitation SIG
• VA and DoD

Relevance to Rehab Practice

- TR is an emerging method of delivering rehabilitation services that uses technology to serve clients, clinicians, and systems by minimizing the barriers of distance, time, and cost.

- Technologies presented have potential to be replicated in various clinical and research settings.

- TR facilitates interdisciplinary work, including rehabilitation engineers, physical and occupational therapists, and rehabilitation counselors.
Contact Information

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