Telehealth and its Use with Clinical Interventions

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“Telepractice is not a different service, but rather a different method of service delivery.”

-J.Brown, 2010
What is Telepractice

“The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health and health administration.” (USDHHS, HRSA, 2012)

But, we need empirical data to support its efficacy.
Telehealth (Telepractice) in SLP

- Telepractice approved by ASHA as an appropriate service delivery in 2005

“Telepractice is an appropriate model of service delivery for the profession of speech-language pathology and audiology (ASHA 2005a, 2005b).”

- SIG 18 Emerged about recently years ago

- Telepractice for SLPs is likely to become an integral part of mainstream practice (Theodoros, 2011)

- ASHA 2015 has many short courses and presentations on Telepractice
Telepractice is a logical solution...

- There is a chronic shortage of SLPs, especially school-based SLPs in many regions nationwide.

- The shortage is most pronounced in rural and geographically isolated areas (AAEE, 2008).
Prevalence of ASD / Public School Demographics

- ADDM Network tracked ASD among 8 year olds in 10 states in 2010

- According to the Community Report on Autism, CDC 2014 the following estimates of ASD were found:
  - 1:68 children
  - 1:42 boys
  - 1:189 girls
  - 1:63 white children
  - 1:81 black children
  - 1:93 Hispanic children
  - 1:81 Asian or Pacific Islander
“80% of children identified with ASD either had eligibility for autism special education services at school or had an ASD diagnosis. The remaining 20% of the children identified with ASD had documented symptoms, but had not received a formal diagnosis.” (CDC, 2014)
Use of Technology to Address the Shortage

- The increased need of direct SLP services and the critical shortage of SLPs has lead researchers and clinicians to turn toward telehealth models.
Telehealth Enables Professionals to...

- Educate
- Communicate
- Collaborate
Benefits of Telehealth

- When appropriately implemented, a telehealth SLP service delivery model promotes:
  - Free and appropriate public education
  - Creates additional, more consistent direct and indirect service opportunities
  - Enables real-time collaboration
  - Complements traditional, on-site service delivery models and energizes student learning (Juenger, 2009)
  - Cost effective
  - Reduces geographical barriers
  - Extends clinical expertise
Benefits of Telehealth

There is empirical evidence that Telehealth models are effective in delivering SLP services, but more well-controlled studies are needed.

Project REMOTE at the Umass Amherst is focused on educating and training the next generation of SLPs to deliver services using a TeleTx model and to demonstrate its Evidence-Based Practice with students on the spectrum.
Limitations to Telehealth

- **Space:** Dedicate or shared room is required;

- **Budget:** Telepractice equipment can be expensive;

- **On-site Support:** Paraprofessional staff and support may be required;

- **Broadband:** Need high-speed Internet;

- **Security Concerns:** Federal standards (HIPAA and FERPA).
Limitations to Telehealth

- **Network Firewall**: On-site firewalls may block videoconferencing site;

- **Licensure Requirements**: SLPs/AuDs are required to be licensed in each state they are practicing in;

- **Community and Institutional Awareness**

- **Research**

- **Standardized Training Model**
THE NEEDS ASSESSMENT
What is a Needs Assessment?

Needs Assessment

Current State of Practice

Needs in the population

Gap in Services

Organizational Resources

Barriers

Needs Assessment
Needs Assessment Steps

- **Step 1: Scope, Purpose and Goal**
  - Caseload size, needs, mission of TeleTx program, etc.
- **Step 2: Assessment Team**
  - Collaborators, e-Helpers, IT support
- **Step 3: Recruitment of essential personnel**
- **Step 4: Assessment Approach**
  - Confidentiality, Security of data
- **Step 5: Gap Analysis**
  - Step 5a: Gap Analysis Elements
- **Step 6: Organizational Readiness**
  - Step 6a: Organizational Readiness Features
- **Step 7: Potential Barriers**
- **Step 8: Summary**
Plan for Data Collection

Project REMOTE Data Collection

Graduate Student Clinician: ___________________________ Date: __________

School: ___________________________ Student Code Name: ___________________________

Goal #: ______ Objective: ___________________________

Performance:

+ Correct
- Incorrect

Notes:

# of Trials/# correct: _______ % Correct: _______ % of Cues: _______
Face to Face
Store and forward
Hybrid Approach

MODELS OF TELEHEALTH SERVICE DELIVERY
Models of Telepractice

- Various platforms have been developed to support service delivery in telepractice, which fall under three broad headings:
  - Synchronous (in real-time)
  - Asynchronous (offline)
  - Hybrid
Synchronous Delivery Model

- Conducted with interactive audio and video connection in real time.
- Live, interactive videoconference session is one in which the specialist and the client are present at the same time, but not in the same location.
- Communication is facilitated by using secure digital videoconferencing.
- Specialist and the patient can conduct conversations in real time (i.e., live, interactive) for services.
Asynchronous Delivery Model

- Store-and-Forward consultation

- Information is captured and “stored” in a digital file at one location and then transmitted or “forwarded” to another location for evaluation (Telehealth Resource Center, 2013)

- Examples include transmission of voice clips, audiologic testing results, outcomes of client/patient practice.
Hybrid Delivery Model

- Use components of both live, interactive and store-and-forward consultations
- Has the advantage of making better use of all technologies available to diagnose, treat and consult client and team and is not limited to a single communications channel.
- Examples of hybrid approaches include:
  - Remote Monitoring
  - Distance Supervision
  - Active Consultation
SECURITY ISSUES

HIPAA
FERPA
IRB Approval
Please note: We are not promoting or endorsing any one of these services or products
Video Companies Reporting HIPAA Compliance

- TeleMental Health Institute lists twenty-seven (27) video companies that claim HIPAA compliance
  - CarePaths & Soltrite

- Citrix GoToMeeting
  - Complies with HIPAA security standards

- Companies that offer Business Associate Agreements*
  (not certain if SLP, Psychiatric Services are approved)
  - Virtual Therapy Connect;
  - thera-LINK;
  - Secure Video;
  - Secure Telehealth

“Video Companies Claiming HIPAA Compliance” – TeleMental Health Institute
The American Telemedicine Association provides general forms that can be used in the delivery of telemedicine services
- Consent to Treatment + Release of Information
- Consent to Participate in a Telemedicine Consultation

**Project REMOTE** at the Umass Amherst has established its own consent and assent forms.
MINIMAL SPECIFICATIONS
Hardware

- Windows 8/XP
  - 2 GB RAM with 2GHZ processor
- Windows Vista
  - 3 GB RAM with 3GHZ processor
- Mac OSX 10.4 or higher
  - 2 GB RAM, 2GHZ processor
- Large monitor
- Web camera with at least 15 FPS
  - Consider remote control of client camera
- Headset
- In-room telephone
- Surge protector
Other Specifications

- **Internet Connection**
  - Reliable, fast internet connection of at least 900 kbps
    (http://speedtest.comcast.net)

- **Additional Peripherals**
  - Additional Monitors

- **Physical Location**
  - Room size + location, ports, outlets, lighting
  - Security + privacy

- **Acoustic Environment**
  - Sound absorption + minimal reverberations
  - Microphones + headsets
“Candidacy for receiving services via telepractice should be assessed prior to the initiation of services.” (ASHA, 2015)
Client/Patient Selection

- The following factors could impact an individual’s ability to benefit from telepractice services:
  - **Physical and sensory characteristics**
    - e.g., hearing and visual abilities
  - **Cognitive, behavioral, and/or motivational characteristics**
    - e.g., ability to maintain attention / sit in front of a camera
  - **Communication characteristics**
    - e.g., speech intelligibility, cultural/linguistic variables
  - **Support resources**
    - e.g., availability of technology, appropriate environment

Telepractice Overview. ASHA 2015
“The use of Telepractice to deliver Speech Language Pathology services has skyrocketed; however, we need to establish its evidence-based practice”

(Andrianopoulos, 2012)
## Telepractice in SLP for Voice and Fluency

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Voice</th>
<th>Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group Design</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Randomized control trials (RCT)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Single subject design</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AB Design</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pilot Study</td>
<td>0</td>
<td>1</td>
</tr>
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</table>

N = 10
Telepractice for Voice + Fluency

- Dysarthria: 60%
- Vocal hyperfunction: 2%
- Vocal nodules: 15%
- Edema: 14%
- Unilateral vocal fold paralysis: 4%
- Severe stuttering: 1%
- Moderate-to-severe stuttering: 4%
### Telepractice for Neurogenic Communication Disorders

#### N = 20

<table>
<thead>
<tr>
<th>Experiment and Control Group</th>
<th>AOS</th>
<th>Dysarthria</th>
<th>Dysphagia</th>
<th>Aphasia</th>
<th>TBI</th>
<th>ALD</th>
<th>Mixed</th>
<th>Brain Injury</th>
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</thead>
<tbody>
<tr>
<td>Experiment with Control</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>RCT</td>
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<td></td>
</tr>
<tr>
<td>Single Group</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Multiple Group</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Case Study</td>
<td>1</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
## Telepractice for Audiology

### Research Design

<table>
<thead>
<tr>
<th>Research Design</th>
<th>Number of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABA design</td>
<td>1 (Hughes)</td>
</tr>
<tr>
<td>Single group</td>
<td>3 (Mantokoudis, Goehring, Hayes)</td>
</tr>
<tr>
<td>Retrospective Study</td>
<td>2 (Constantinescu, McElveen)</td>
</tr>
<tr>
<td>Multiple Groups</td>
<td>1 (Wesarg)</td>
</tr>
</tbody>
</table>

**Research Design**

- ABA: 14% (1 study)
- Single Subject: 43% (3 studies)
- Retrospective: 29% (2 studies)
- Multiple Group: 14% (1 study)

**N = 7**
Levels of EBP for Interventions for ASD

1957-2007
ASD to 22 yrs

1990-2011
ASD to 22 yrs

2007-2012
ASD to Adulthood

2009  2014  2015
<table>
<thead>
<tr>
<th>Study</th>
<th>ASD Participants</th>
<th>Services</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barretto et al. [2006]</td>
<td>1 male, 5 yrs old</td>
<td>Functional Analysis, Teachers training</td>
<td>Functional analyses differed</td>
</tr>
<tr>
<td>Gibson et al. [2010]</td>
<td>1 male, 4 yrs old,</td>
<td>Parent Training</td>
<td>On going teacher feedback</td>
</tr>
<tr>
<td>Machalicek et al. [2009]</td>
<td>2 females, 7+11 yrs old</td>
<td>Functional Analyses</td>
<td>TeleTx reduced bad behavior</td>
</tr>
<tr>
<td>Machalicek et al. [2012]</td>
<td>2 males, 5+7 yrs ASD; plus 1 male, age 34 mos</td>
<td>University Tx for Behavior</td>
<td>Preference fo TeleTx</td>
</tr>
<tr>
<td>Machalicek et al. [NR]</td>
<td>4 males, 2 females,</td>
<td>University based</td>
<td>Skilled maintained</td>
</tr>
<tr>
<td>Rule et al. [2005]</td>
<td>1 preschool age child</td>
<td>University based for IEP</td>
<td>Teacher -Teacher</td>
</tr>
<tr>
<td>Savin et al. [2005]</td>
<td>3 children</td>
<td>Psychiatric</td>
<td>Longer to establish rapport</td>
</tr>
<tr>
<td>Vismara et al. [2009]</td>
<td>N=29; 2-4 yrs</td>
<td>University based ESDM</td>
<td>No Difference</td>
</tr>
</tbody>
</table>
### Telehealth Empirical Studies - ASD

<table>
<thead>
<tr>
<th>Study</th>
<th>ASD Participants</th>
<th>Services</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vernon et al. [2012]</td>
<td>N=3</td>
<td>Behavior Training</td>
<td>Social Reward Enhancement</td>
</tr>
<tr>
<td>Vismara et al. [2012]</td>
<td>N=36</td>
<td>Telehealth P-ESDM</td>
<td>Parent Fidelity</td>
</tr>
<tr>
<td>Vismara et al. [2013]</td>
<td>N=8</td>
<td>Telehealth P-ESDM</td>
<td>Parent Fidelity</td>
</tr>
<tr>
<td></td>
<td>21 months (14–24 mos)</td>
<td>Parent Training</td>
<td>improved</td>
</tr>
</tbody>
</table>
Early Start Denver Model (ESDM)

- Intensive model of early intervention
  - Applied behavior analysis
  - Play-based relationship-focused strategies

- Focuses on interpersonal exchange, joint attention, and positive affect

Webb et al., 2014
Purpose: Sought to find if parent-child learning could be supported by telehealth delivery of Early Start Denver Model (N=9, mean age = 29 mos)

Methods/Procedure:
- Hybrid Telepractice Model
- Sessions took place in families’ home
- Duration = 1 hour / week for 12 weeks
- Internet-based, password protected video-conferencing program was used
Findings/Conclusions:

- *The use of telehealth might be just as effective as in-person services*

- Parent and child behaviors can improve via telepractice, in the absence of receiving in-person therapy
“Studies indicate that computer based instruction typically results in benefits such as increased motivation, decreased inappropriate behavior, and increased attention and sometimes results in increased learning compared to traditional methods.” Goldsmith & Leblanc, 2004

ASD INTEREST IN TECHNOLOGY
SMART Notebook
Use of technology (such as computer-assisted instruction, video modeling) is reinforcing for many children with ASD.

- Increase of appropriate behavior during Tx (Shukla-Mehta, Miller, & Callahan, 2010)

Our research supports that student outcomes using Telepractice are at least equivalent to On-site services (Boisvert, Andrianopoulos, Boscardin, & Kurland, 2012)
The following sections include a pilot study we conducted with six (6) students in an Elementary School. The results of this study supportive of Telepractice as a service delivery method.

In collaboration with the Chicopee Public Schools, we are now conducting a larger experimental study. Thank you for your participation.
REMOTE Study 1 (Boisvert, Andrianopoulos, Boscardin, & Kurland, 2012)

Telepractice vs. Onsite Services for Students with Autism

- **Research question:** Is there a difference in Treatment outcomes when comparing on-site to telepractice services for delivering SLP interventions

- **Hypothesis:** Students with Autism will exhibit equivalent outcome data in both treatment conditions

- **Participants:**
  - Six (6) elementary school children with Autism
  - Age range: 5.6-11.11 yrs; Mean=8.5; SD=2.7; 86% were male.
  - Received other special education services on an IEP (i.e., academic support, OT, PT)
Study 1: Procedures

Treating Clinicians

- Trained 4 first year graduate students to deliver Telepractice: each worked with 1 or 2 children
- Supervised at all times by a certified and licensed SLP with expertise in telepractice

Repeated probe assessments (pre/post treatment session)

- 5 sets of data points per objective collected for each condition.
Study 1: RESULTS

- All 6 students showed improvement in first session (range: 66 – 100%)

- Improvements were maintained or further improved in the 2nd treatment session, regardless of service delivery method (on-site or telepractice)

- Five (5) out of the six (6) students showed no significant differences between the intervention conditions (On-site = Telepractice Tx)

- 1 student responded more favorably to telepractice intervention.
Study 1: Summary of Visual Analysis

- 3 (50%) of students showed a higher level of variability in the on-site session.
- 3 (50%) students showed a higher level of variability in the telepractice session.
Study 1: Telepractice Qualitative Behavioral Outcomes

- Some students exhibited high levels of independence, focused and sustained attention during the telepractice condition.

- We hypothesized that certain variables, high interest in technology computers and screen media or reduced competing stimuli, may have contributed to students’ perceived motivation.
Study 1: Investigate Differences in Behavior in 1 Student

Telepractice vs. On-site

**Purpose:** To study the differences in behavior when services are delivered via Telepractice vs. On-site to 1 student using an ABC behavioral analysis

**Hypothesis:** Student with autism will exhibit similar behavioral patterns during both treatment conditions
Study 1: Overview

**Student 1’s Treatment Focus:**

- Student demonstrated difficulty engaging in conversations while maintaining a topic and partaking in turn-taking exchanges

**IEP Treatment Goals and Objectives:**

- To improve social pragmatic communication skills:
  - Topic Maintenance
  - Event Sequencing
  - Explicitness, Referencing
  - Conjunctive Cohesion Focused Attention
  - Fluency
Study 2: Overview of SLP Outcomes

Student 1 Outcome Data

Percentage Correct

Date of Service

Standard Deviation

Onsite

Telepractice

Baseline

Onsite Probe 1

Telepractice Probe 1

Onsite Probe 2

Telepractice Probe 2

Onsite Mean

Telepractice Mean

School of Public Health and Health Sciences: Department of Communication Disorders
Study 1: Variables  (Please see hand-out)

Variables:

• **Independent variables:**
  • intervention setting (telepractice vs. on-site)

• **Dependent variables:**
  
  • **TSR** = Latency time (seconds)
    • Time it took for the student to respond after question or stimulus was presented
  
  • **TR** = Therapist reinforcement (frequency of occurrence)
    • Number of reinforcements during Tx session
  
  • **SD** = Student distraction (frequency of occurrence)
    • Number of reinforcements during Tx session
ABC Analysis

A
Triggering event
Antecedent
Cause

B
The behavior itself

C
Consequence of the behavior
<table>
<thead>
<tr>
<th>Analysis of Behavior</th>
<th>TELEPRACTICE Tx (Total: 4 Sessions)</th>
<th>ON-SITE Tx (Total: 4 Sessions)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>Average</strong></td>
</tr>
<tr>
<td>1. Total # Verbal Questions/Comments administrated by SLP to student for all 4 sessions combined</td>
<td>153 Questions 38.25 Per session</td>
<td>147 Questions 36.5 Per session</td>
</tr>
<tr>
<td>2. Total # Answers/Comments given by the student to SLP for all 4 sessions combined</td>
<td>153 Answers 38.25 Per session</td>
<td>146 Answers 38 Per session</td>
</tr>
<tr>
<td>3. Total Duration of student’s verbal response</td>
<td>913 Seconds 5.96 Seconds per answer</td>
<td>1605 Seconds 10.99 Seconds per answer</td>
</tr>
<tr>
<td>4. Time needed for SLP to formulate a complete verbal response administered to student</td>
<td>560.5 Seconds 3.66 Seconds per question</td>
<td>897.5 Seconds 6.10 Seconds per question</td>
</tr>
<tr>
<td>5. Time taken by the student to verbalize a complete answer/comment in response to SLP’s question/stimulus</td>
<td>982 Seconds 6.41 Seconds per answer</td>
<td>1506.5 Seconds 10.31 Seconds per answer</td>
</tr>
<tr>
<td>6. Time taken by SLP to verbalize a complete question/response related to the reinforcement administrated to student</td>
<td>72.5 Seconds 1.12 Seconds per question</td>
<td>805.5 Seconds 5.47 Seconds per question</td>
</tr>
<tr>
<td>7. Time taken by student to verbalize a complete answer or response related to reinforcement administrated by SLP</td>
<td>66 Seconds 0.43 Seconds per answer</td>
<td>408.5 Seconds 2.79 Seconds per answer</td>
</tr>
<tr>
<td>8. # of SLP Reinforcements</td>
<td>31 Events 7.75 Per session</td>
<td>171 Events 42.75 Per session</td>
</tr>
<tr>
<td>9. Triggered external event: Student distracted by other external variables during therapy</td>
<td>3 Events 0.75 Per session</td>
<td>8 Events 2 Per session</td>
</tr>
<tr>
<td>10. Triggered internal event: Student distracted by variable related to personal behavior during therapy</td>
<td>2 Events 0.5 Per session</td>
<td>12 Events 3 Per session</td>
</tr>
</tbody>
</table>
What Does this Suggest?

Although using telepractice to deliver SLP has great potential in improving student outcomes, research is significantly lacking regarding the short and long-term benefits of it.

More research is needed to support that delivering SLP services to students with speech/language needs is just as good, and in some cases better, when services are delivered using the telepractice method compared to on-site face-to-face services.
CASE STUDIES
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  • H325K090328 (2009-2013)
  • H325K120327 (2012-2018)

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