USING ASSISTIVE TECHNOLOGY TO IMPROVE MOBILITY OUTCOMES: A COLLABORATIVE REVIEW

KIMBERLY A. EICHHORN, MS, CCC-SLP, ATP
35TH INTERNATIONAL SEATING SYMPOSIUM
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DISCLOSURES

- I receive salary from the Department of Veterans Affairs
- Reference to/mention of particular technologies does not equal endorsement
OBJECTIVES

- Recognize concepts of systematic instruction/error control training in therapeutic application of assistive technologies
- Enhance understanding of various communication impairments and outline ways to modify personal communication to improve patient engagement, participation, and outcomes
- Identify a plan for targeting multiple functional goals with team members as well as a plan for generalization of trained skill(s) to functional activities

DESIGNING EFFECTIVE INSTRUCTION: PIE (SOHLBERG & TURKSTRA, 2011)

Planning Effective Instruction
Implementation of Instruction
Evaluation of Outcome
PERSONAL CHARACTERISTICS THAT INFLUENCE LEARNING

MOTOR SPEECH VS LANGUAGE DISORDERS

**Motor Speech**
- Impairment in speech
- Dysarthria versus apraxia
  - Dysarthria: impairment in muscular control due to CNS or PNS damage
  - Apraxia: impairment in the planning and/or programming of movements

**Language**
- Aphasia
  - Impairment of language affecting:
    - production and/or comprehension of speech
    - ability to read and/or write
      - May affect mainly a single aspect of language use, but more commonly multiple aspects of communication are impaired.
- Cognitive-Communication Impairments
  - Communication difficulty marked by changes to prosody, discourse, semantics, and pragmatics
CONVERSATIONAL DISCOURSE

- Conversational discourse requires competencies of both hemispheres
  - Left: Basic information (e.g., word recognition)
  - Right: Higher level information (e.g., integration of parts of a coherent whole)
- Miss the point of a conversation
- Be unable to stick to the point to convey own message
- Difficulty with topic maintenance
- Focus on irrelevant information or be unable to consider importance of relevant information
- Verbose

SUPPORTED CONVERSATION FOR ADULTS WITH APHASIA (SCA)™ KAGAN, 1998

- Two main goals
  - Acknowledge the competency of the individual with aphasia
  - Help reveal that individual's competency with simple techniques

Competency Principles

- Speak naturally in an adult tone
  - Non-familiar communicators tend to SLOW down and SHOUT
- Validate and normalize the difficulty
- Be honest about difficulties and frustrations. Communication breakdowns will happen.
- Don’t pretend to understand or abandon the conversation without openly acknowledging the breakdown.
COMMUNICATION TECHNIQUES

Getting the message TO
- Use short, simple sentences
- Communicate about one idea at a time; signal topic shift
- Limit distractions
- Use gesture, written key word, draw pictures

Getting the message OUT
- Ask yes/no questions in a logical sequence
- Encourage writing, drawing, gesture
- Write out optional multiple choice answers
- Give time to respond

COGNITIVE PROFILE

- Attention
- Memory
- Executive functions
- Visuospatial skills
Therapy is learning. Clinicians should exploit residual memory abilities and compensate for weakness.

- Long-term and short-term
  - Duration and capacity
- Working memory – short-term store and the active process of manipulating information for storage or retrieval (Baddeley, 2013).
  - Often disrupted in a brain injury
  - Allows for complex activities such as reasoning, learning, and comprehension
  - Mental workspace for executive functions and metacognition

MEMORY REVIEW: CONTENT DEPENDENT

Declarative (explicit) – knowledge base of information of which we have conscious awareness…enhanced by conscious strategies such as elaboration, trial and error, discovery methods. Not tied to context, so easily generalized.

- Episodic
- Semantic
- Metamemory
- Prospective Memory

Nondeclarative (implicit) – learn without conscious awareness; highly context dependent, so not easily generalized unless to situations with highly similar surface features.

- Procedural Memory
- Emotional associations
- Priming
ENVIRONMENTAL CHARACTERISTICS THAT INFLUENCE LEARNING

- Setting: environment, schedule, transportation (Dishman, 1994)
  - Level of Distraction (Sohlberg & Mateer, 2001)
- When appropriate, use environmental cues to facilitate execution of target behavior (Morris & Schultz, 1992)
- Use the team: family, rehab colleagues, staff (Sohlberg & Mateer, 2001; Driver, 2006)
  - In session
  - For generalization

IMPLEMENT

01 Initial Acquisition
02 Mastery and Generalization
03 Maintenance
**PROGRAM CHARACTERISTICS THAT INFLUENCE LEARNING**

- **Intensity**
- **Timing**
- **Task Complexity**
- **Practice**
- **Cueing & Feedback**
- **Maintenance & Generalization**
- **Accountability**
- **Use of Technology**

**TASK COMPLEXITY**

- **Too difficult, may quit** (Campbell, et al., 2001)
- **Clear instructions may augment participation** (Berg, et al., 1993; Sluijs, et al., 1991)
- **Dosage should take into account learner profile** (Henry et al., 1998)
Motor learning and speech rehabilitation literature provides framework for understanding practice conditions, which have relevance across rehab disciplines. (Mass, 2008; Lemoncello, 2008)

- **Errors**
  - Those with moderate-severe declarative memory impairment show enhanced learning when errors are minimized
  - Those with good declarative memory may have better long term retention learning via effortful processing (Lesgold, 2001)
    - Critical Distinction…can one learn from their mistakes?

- **Practice Distribution**
  - Massed Practice: skill is practiced # times in a row in relatively small time frame
  - Distributed Practice: spacing of practice trials over longer period of time, spacing intervals with unrelated events in between
    - Nature of the task often directs regimen

- **Stimulus Variability**
  - Constant: same, specific stimulus used to elicit target behavior
  - Variable: wider range of context to practice the skills/behavior
Clinicians are often focused on learning in the initial stages but may not systematically plan to foster retention of learning or generalization to everyday settings.

- Performance during practice is often not a good predictor of maintenance and generalization (Maas, et al., 2008)
- Maintenance effects can be enhanced by systematically altering:
  - Program intensity, practice regimen, cumulative review/booster sessions, use of cueing and feedback
- Generalization effects can be enhanced by systematically altering:
  - Task complexity, practice tasks, fading cues and feedback

Greatest gains for a particular activity are seen when the training goal most closely resembles the end goal. (Burkhead, et al., 2007)

MAINTENANCE: COMBAT ABANDONMENT

Stimuli
Train natural supports: people and contexts that promote ongoing use of target

Practice
Cumulative review; booster sessions

Level of Engagement
Foster on-going use of metacognitive strategies
BROAD INSTRUCTIONAL CATEGORIES

- **Systematic** (Ehlhardt, Sohlberg, 2008)

- **Discovery, trial and error** (Hammer, 1997; Montessori & George, 1915)

### Systematic Instruction (including errorless learning, spaced retrieval) vs. Conventional Instruction

<table>
<thead>
<tr>
<th>Systematic Instruction</th>
<th>Conventional Instruction</th>
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<tbody>
<tr>
<td>Limited range of instructional targets (e.g., only calendar app at first)</td>
<td>Broad range of instructional targets (train multiple apps)</td>
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<tr>
<td>Multiple training examples</td>
<td>Few training examples</td>
</tr>
<tr>
<td>Mastery emphasized</td>
<td>Mastery not emphasized</td>
</tr>
<tr>
<td>Exploration discouraged</td>
<td>Exploration encouraged</td>
</tr>
<tr>
<td>Step-by-step models, carefully faded support</td>
<td>Whole-task models</td>
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<tr>
<td>High rates of correct, distributed practice and review per target</td>
<td>Few practice opportunities per target</td>
</tr>
<tr>
<td>Immediate corrective feedback</td>
<td>Feedback after task completion</td>
</tr>
<tr>
<td>Training in different environments</td>
<td>Training primarily in clinic setting</td>
</tr>
</tbody>
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*Brush & Camp, 1998; Evans et al., 2000; Sohlberg et al., 2011; Wilson et al., 2001*
EVALUATE

Session Data

Generalization Probes: is the skill used in naturalistic environments?

Maintenance Probes: is the skill durable over time?

Impact Data: how does it improve daily functioning? Baseline vs. Post-treatment

Efficacy Data

SUMMARY OF PIE FRAMEWORK (SOHLBERG & TURKSTRA, 2011 P 83)

PLAN
(assessment & design of instruction)
Who?
What?
Where?
When?
Why?
How?

IMPLEMENT

Acquisition
• Varied stimuli
• Minimize errors
• Provide intensive mass practice
• Facilitate active engagement

Mastery
• Increase stimulus variability
• Fade prompts
• Lengthen distributed practice
• Incorporate metacognitive components

Maintenance
• Incorporate natural supports
• Conduct cumulative review
• Plan for follow-up

Evaluate
• Session
• Generalization
• Maintenance
• Impact
• Efficacy

Reevaluate if no progress

Learning Context Characteristics
Personal
Environmental
Program
SUMMARY

- Know cognitive strengths and weakness – call for back-up if you need it!
- Consistency of training is paramount for persons with cognitive impairments
  - Minimizing errors and fading cues can lead to durable learning in persons with cognitive impairments
  - Limit training targets until mastery is achieved: Chain steps together
- Despite communication impairments, persons with communication disorders should be actively included in assessment, goal setting
  - Take your lead from the person with regards to ease of communication for THEM
  - Simplify the content of your messages while maintaining their dignity

REFERENCES

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