Factors Affecting Technology Use in Upper Extremity Hemiparesis Rehabilitation Following Stroke

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Introduction

Background
- Physical disability following CVA is often a result of hemiparesis, affecting approximately 80% of people acutely and remaining a life-long concern for 40-50%.
- OTs use many methods to rehab impaired upper extremities (UE), with large variations in type of specific treatment modalities across settings.
- AOTA and the U.S. Department of Defense recommend technology-based interventions for stroke: electrical stimulation (e-stim), robotic assisted movement (RAM), virtual reality (VR); other research shows promise for additional technology-based modalities.
- Clinical implementation of tech advances have not kept pace with the evidence on current best practices.
- Little research on individual and practice setting characteristics and how these demographic factors may determine how and when clinicians use technology.

Purpose
To understand what, if any, demographic, education, and work setting factors correlate to different rates of technology use among OTs who treat clients with UE hemiparesis secondary to CVA

Hypothesis
Therapists who are younger, have graduate degrees, work in outpatient settings, and spend more time in CVA rehab will have significantly higher usage rates of all technologies including those recommended by AOTA and the DOD

Research Design & Methods

Design
Descriptive design

Participants
National survey sent to 200 randomized AOTA members who were part of “Physical Rehabilitation” special interest area; See Table 1

Measures
- 78-item survey asking questions about:
  - Demographic info, education, practice setting
  - Modality and technology use UE CVA treatments
  - Barriers to acquisition and use of new technologies in clinical setting
  - Likert scales of importance, checklists, and short-answer sections adapted from previous survey

Analysis
- Descriptive statistics for all respondents analyzed and reported
- Answer frequency for use of devices reported in aggregate, including high and low-tech comparisons
- Chi square, t-test used to analyze practice setting, education
- Logistic regression used to assess years as OT, age, hours per month in stroke rehab setting

Results

Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Age</td>
<td>40.73</td>
<td>12.57</td>
</tr>
<tr>
<td>Years Practicing as OT</td>
<td>14.39</td>
<td>13.10</td>
</tr>
<tr>
<td>Hours/Month in CVA Rehab</td>
<td>42.20</td>
<td>46.67</td>
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Details of High-Tech Use (N = 39)

- 7 (17.9%) reported using none of the seven devices listed in the survey
- 12 (30.8%) reported using three or more of the seven devices listed in the survey
- AOTA guidelines (VR & e-stim):
  - 0 reported using both
  - 28 (71.8%) use e-stim
  - 1 (2.6%) use VR
- U.S. DOD guidelines (RAM & e-stim):
  - 11 (28.2%) reported no use
  - 1 (2.6%) use both

High, Low-Tech Comparisons

- Figure 1 and 2 below show use frequency
- Higher use of all low-tech devices compared to high-tech, with the exception of e-stim (28 users)
- Frequent low-tech users were more likely to be frequent high-tech users, though this relation was not significant, \( \chi^2(1, N = 39) = 1.75, p = .19 \)

Demographic Predictors of High-Tech Use (N = 39)

- Neither age, \( \beta = .021, p = .49 \), nor years in practice as an OT, \( \beta = -.012, p = .69 \), were predictive of high-tech device use
- Graduate level degree group had a higher mean number of high-tech devices used (M = 2.06, SD = ±1.35) compared to those with advanced degrees (M = 1.82, SD = ±1.14), though this difference was not significant, \( t(37) = -.605, p = .55 \)
- AOTA/DOD recommended technologies and level of education also not significantly related, \( \chi^2(2, N = 39) = 1.63, p = .44 \)
- The relation between practice setting (inpatient and outpatient) and high-technology device use (AOTA/DOD recommendations) was not significant, \( \chi^2(1, N = 28) = .598, p = .44 \)
- Increased time per month spent in stroke rehab setting not significantly correlated with increased high-tech device use, \( R^2 = .008, F(1, 32) = .243, p = .63 \)

Conclusions

High-Tech Use and Predictors of Use
- Technology-based guidelines for stroke rehabilitation are not being implemented in practice, with only 5.1% of the sample using two of the three AOTA/DOD recommended devices
  - Despite low usage rates, OTs indicated high levels of interest in acquiring such devices or obtaining more information regarding use; suggests that OTs possess an interest in learning more about devices and consider using them in practice
  - None of the factors that were explored (education, age, practice setting, years as OT, use of low-tech devices, or time spent in CVA rehabilitation setting per month) were significantly correlated to high-tech device usage

Future Research
- Existing data from this survey may be used to identify the most significant barriers to implementation of new devices
- Exploration should continue into the factors that are most predictive of modalities and techniques used in OT practice

Implications for Practice

- Government and professional organizations must seek to inform about updated guidelines and utility of novel devices in rehab across all demographic areas
- OTs must take initiative to become informed about new practice guidelines, utilize new technologies when appropriate
- Designers of new technology should seek to increase OT use
- Universities and other training centers should emphasize the need for preparation to critically assess and use new technology in OT treatment

References


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