Technology in Practice: Promoting Participation in Patients with High Level of Spinal Cord Injury

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Technology in Practice: Promoting Participation in Patients with High Level Spinal Cord Injury
Morgan Gill, Kate Nuschke, Kaithlin O’Sullivan, Casey Puvogel, Alex Sagnor
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Faculty Mentor: Teal Benevides, MS, OTR/L
Presented in Partial Fulfillment of the Master of Science in Occupational Therapy degree at Thomas Jefferson University

Objectives: At the conclusion of this presentation, the learner will be able to:
• Evaluate different modes of technology used to improve participation in daily occupations with individuals with high-level spinal cord injury (SCI)
• Integrate current evidence into clinical practice
• Discuss implications for future practice, research, and education

PICO: Does the use of technology in individuals with cervical and thoracic level spinal cord injuries improve participation in daily occupations?

Methods:

<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervical SCI, thoracic SCI, tetraplegia, quadriplegia</td>
<td>FES, robotic, OT, eye gaze, hand, grasp, neuroprostheses, technology</td>
<td>Function, participation, social, leisure, work, ADL, occupation, driving, QOL, self-care, activity, upper limb, upper extremity</td>
</tr>
</tbody>
</table>

Search Limitations: English language, human subjects, adolescents and adults, published 2000-2013

Databases Used: PubMed and CINAHL

Total Articles Found: 1,530

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Cervical and thoracic level injuries</td>
<td>- Paraplegia</td>
</tr>
<tr>
<td>- Upper extremity interventions</td>
<td>- Co-morbid physical disabilities</td>
</tr>
<tr>
<td>- Functional electrical stimulation (FES)</td>
<td>- Only incomplete injuries</td>
</tr>
<tr>
<td>- Neuroprostheses</td>
<td>- Interventions related to mobility</td>
</tr>
<tr>
<td>- Electronic aids to daily living (EADL)</td>
<td>- Pediatric populations</td>
</tr>
<tr>
<td>- Functional activity</td>
<td></td>
</tr>
</tbody>
</table>

Final Article Count Based on Inclusion & Exclusion Criteria: 14

Qualitative article critical review form: Letts et al., 2007
Quantitative article critical review form: Law et al., 1998

Results & Clinical Significance:

Surface FES
- Improved performance in communication management, home management, grooming, and feeding\textsuperscript{1,10,11}
- Improved performance in leisure participation\textsuperscript{3,10}
- Research conflicts on ease of home use\textsuperscript{1,10}

Implanted FES
- Improved participation in feeding and grooming\textsuperscript{7,12,13,14}
- Improved participation in communication and home management\textsuperscript{7,12,13,15}
- Improved performance satisfaction in meaningful activities\textsuperscript{7,12,13,14,15}

EADL
- Increased independence in ADLs, leisure participation and comfort in the home\textsuperscript{4,6,16}
- Improved perception of self-efficacy, competency, adaptability, and self-esteem\textsuperscript{4,16}
- Reduced caregiver utilization and/or paid assistance\textsuperscript{4,6,16}

ASIBOT
- Improved participation in drinking and brushing teeth\textsuperscript{17}

Tooth-click technology
- TC provided faster and more reliable clicks than speech recognition
- Persons with tetraplegia performed better with TC/OHM than TC/GHM- explanation is unknown\textsuperscript{18}
### Implications:

<table>
<thead>
<tr>
<th>Practice</th>
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<tbody>
<tr>
<td>- Implementation of implanted and surface FES in individuals with spinal cord injuries increase participation in ADLs</td>
</tr>
<tr>
<td>- Use of surface FES, implanted FES, and EADLs increases participation in IADLs</td>
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</table>

<table>
<thead>
<tr>
<th>Research</th>
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<tbody>
<tr>
<td>- Higher level of research to support use of technology in rehabilitation</td>
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<tr>
<td>- Exploration of additional types of technology</td>
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<tr>
<td>- Larger sample sizes for improved generalizability</td>
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<tr>
<td>- More research focused on technology for SCI populations</td>
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<td>- Need for standardized assessments and protocols</td>
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<tr>
<th>Education</th>
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<tr>
<td>- Explore training options to use various types of technology in practice</td>
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<tr>
<td>- Provide patient and caregiver education on available technology</td>
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<tr>
<td>- Advocate for systematic training protocols for clients using technology</td>
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### References