A staged approach evaluation of Remotely Supervised Myofeedback Treatment

Roessingh Research and Development

R. Huis in ’t Veld
M. Vollenbroek-Hutten
H. Hermens
Content

**Introduction and background**
- What is remotely supervised myofeedback treatment (RSMT)
- A staged approach for RSMT effect evaluation

**Methods**

**Results**

**Discussion**
Introduction

• Remotely supervised myofeedback treatment (RSMT)
  – Remotely = treatment in the own environment of the subjects / at distance from the provider, by means of information and communication technologies
  – Supervised = consultation and coaching by professional
  – Myofeedback = feedback about muscle tension (‘myo’)

• Target population: subjects with non-specific neck-shoulder pain related to computerwork
• Treatment = > aimed at reducing pain in the neck-shoulder region related to computerwork
Background

- **Literature suggests (Hägg, 1991)**
  - Patients with pain have insufficient muscle relaxation
  - Insufficient muscle relaxation contributes to muscle damage and pain

- **Solution**
  - Warn subjects when muscle relaxation is insufficient
  - By measuring and processing sEMG
RSMT components

- **Body Area Network**
- **Wireless communication infrastructure**
- **Back-end server**
Body Area Network (BAN): patient

- Garment incorporated with dry surface electromyographical (sEMG) electrodes
- Processing and vibrating unit
- PDA for wireless transmission of sEMG data to secured server
Back-end server: therapist

- Secured server to view biodata
- Secured patient database
Advantages of RSMT compared to non-remote MT

**Increased quality of care**
- High- treatment intensity in patient’s own (work) environment (by personal feedback unit) and continuous supervision (by remote therapist)

**Increased access of care**
- Increased flexibility for consultation by therapist
- Data available on server to prepare the consultation
- High- efficiency because multiple patients can be treated simultaneously (1:N)
- Travel times are reduced

Multidimensional spectrum of effects
Staged approach to telemedicine evaluation

- **The Staged Approach (DeChant, 1999):** from narrowly focused application specific endpoints (stage 1-2) to comprehensive effect evaluation on global impact on care (stage 3-4)
  - **Stage 1:** Technical efficacy
  - **Stage 2:** Specific system objectives
  - **Stage 3:** Global system analysis (access, quality, costs)
  - **Stage 4:** External validity of global analysis: generalizability
Study objective

- **Study objectives:**
  - **What is the technical feasibility of RSMT?**
    - Minimal 8 hours of sEMG data per week (blocks >15 min)
    - User Satisfaction: strength and weakness
  - **What is the clinical effectiveness of RSMT?**
    - Changes in pain intensity and pain disability
  - **What is the willingness to pay for RSMT?**
    - Voluntary financial contribution (euros)
Study population

- Study population: n=10
  - Women with non-specific neck-shoulder pain related to computer work (according to one’s own opinion)
  - Neck-shoulder pain >30 days during past 12 months
  - Still working at least 20 hours per week
  - Performing computer work predominantly
Study design

*N=10 subjects received four weeks of RSMT treatment: in vivo counseling was alternated with remote counseling (i.e. by telephone)*
Results: Technical efficacy for clinical use

- Technical efficacy in 97.6% sufficient for clinical use
  - >= min. 8 hours of sEMG data per patient per week consisting of datablocks >15 minutes

<table>
<thead>
<tr>
<th>RSMT</th>
<th>Hours sEMG per wk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Week 1</td>
<td>14.6</td>
</tr>
<tr>
<td>Week 2</td>
<td>15.4</td>
</tr>
<tr>
<td>Week 3</td>
<td>14.0</td>
</tr>
<tr>
<td>Week 4</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Huis in’t Veld et al., in press
Results: User satisfaction

- **Strength**
  - Effectiveness of remote counseling sessions
  - Self-efficacy of patients to follow instructions and advices remotely (as good as they would have been able to follow by means of in vivo)

- **Weakness**
  - The stability of the bluetooth connection myofeedback system & PDA
Results: pain intensity neck

- Sign. reductions in pain intensity scores in the neck and shoulder

- 80% of subjects reported clinically relevant decrease in pain intensity after RSMT (T1); in 63% of the subjects the positive effect remained at one month follow up (T2)

Huis in ’t Veld et al., in press
Results: neck pain disability

- Disability levels significantly reduced after RSMT (T1)

- 50% of subjects reported clinically relevant reduction in disability level after RSMT (T1); in 38% of the subjects the positive effect remained at one month follow up (T2)

Huis in 't Veld et al., in press
Results: Willingness to pay (WTP)

- *Payment card: minimal, maximal, voluntary WTP*

- *Subjects were willing to pay between 20 euro – 200 euro for receiving RSMT*

Huis in 't Veld *et al.*, in press
Conclusion RSMT

• **RSMT is technically feasible and seems clinically effective in a considerable part of the study population.**

• **In vivo myofeedback: 30-50% effectiveness (Hermens and Hutten 2002; Voerman 2006)**

• **Technical functioning of RSMT prototype needs be revised before further evaluation (stage 3-4)**

• **The Staged Approach seems a useful theoretical framework for telemedicine effect evaluation (DeChant, 1999)**
Questions? Thank you for your attention!

Telemedicine: technology push or pull?
Background

- **Etiology of non-specific neck-shoulder pain: Cinderella hypothesis:**
- **Fixed recruitment of motor units + continuous “low level” muscle activation -> leads to damage of Cinderella motor units**

![Cinderella motor units](image)
Staged approach to telemedicine evaluation

- The Staged Approach (DeChant, 1999): from narrowly focused application specific endpoints (stage 1-2) to comprehensive effect evaluation on global impact on care (stage 3-4)