Effects from robot-assisted group activity in nursing homes

– a cluster-randomized controlled trial

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Background

- Resident challenges due to poor quality of life and symptoms of depression and agitation
  - Medication has little effect.
- Shift towards stimulating social, personal and physical resources in people with dementia.
- Development of social robots in recent years – developed to assist people socially and emotionally.

- Aiming to provide
  - **social**
  - **psychological**
  - **physiological**

  benefits through interactions.

Effects from Paro-groups in nursing homes
Previous research on Paro

- Effect on reduced loneliness (Robinson et al. 2013)
- Effect on reduced apathy (Valenti-Solér et al. 2015)
- Effect on increased utterances and positive expressions (Takayanaki et al. 2014)
- Improved clinical QoL (Moyle et al. 2013)
- Reduced levels of stress hormones
  - in urine samples, long term (Wada/Shibata 2008)
  - reduced blood pressure (Robinson et al. 2015a)
- Increased social interaction and interactions among participants (Wada et al. 2004, Klein & Cook, 2012, Robinson et al. 2015b)
Methods
Study design

• Cluster-RCT: 5 control group
• 10 nursing homes units 5 Paro group activity
• 3 intervention periods (during 2013 and 2014)
• 6 participants in each Paro-group.
• n = 60 (30 participants in each group).

• Inclusion criteria:
  – Age > 65 years
  – Dementia diagnosis/cognitive impairment (MMSE <25/30)
  – To intervention group: Show interest in Paro during recruitment.

Registered at www.ClinicalTrials.gov and approved by the Norwegian Committees for Medical and Health Research Ethics.
Paro activity group

- 5-6 participants, 30 min twice a week through 12 weeks.
- Activity performed in a separate room in NH.
- Staff leading the sessions, trained in advance and supervised.
- Semi-structured activity, naturally occurring activities with Paro during the sessions.
- Paro distributed for 2 rounds.
Assessments

• The Brief Agitation Rating Scale (BARS) – symptoms on agitation (range 9-63).

• The Cornell Scale for Symptoms of Depression in Dementia (CSDD) – symptoms on depression (0-38)

• The Quality of Life in Late-Stage Dementia (QUALID) – assessment on quality of life (11–55)

• Assessments conducted at baseline, post intervention and at follow-up (3 months after).

• Occurring and change in behaviors from video recordings in weeks 2 and 10 - analyzed by an ethogram.
Effects from Paro-groups in nursing homes
Analysis of behaviors

• 18 predefined behaviors, both positive and negative.
• Time recorded in seconds, converted to % of time.

, 9 of these included in analysis, mainly positive, such as:

  • Observe Paro / other participants/nurse / other things
  • Conversation with/ without having Paro on the lap.
  • Smiles/laughter towards Paro / other participants.
  • Physical contact with Paro
  • Active physical contact with Paro
Results
### Characteristics at baseline

<table>
<thead>
<tr>
<th></th>
<th>Paro-group</th>
<th>Control group</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample of participants</td>
<td>( n = 30 )</td>
<td>( n = 30 )</td>
<td></td>
</tr>
<tr>
<td>Mean age (±SD)</td>
<td>83.9 (±7.2)</td>
<td>84.1 (±6.7)</td>
<td>.922</td>
</tr>
<tr>
<td>Women</td>
<td>70 %</td>
<td>63.3 %</td>
<td>.584</td>
</tr>
<tr>
<td>CDR-rating 1 (mild)</td>
<td>7.4 %</td>
<td>7.6 %</td>
<td>.449</td>
</tr>
<tr>
<td>2 (moderate)</td>
<td>48.1 %</td>
<td>46.2 %</td>
<td></td>
</tr>
<tr>
<td>3 (severe)</td>
<td>44.4 %</td>
<td>46.2 %</td>
<td></td>
</tr>
<tr>
<td>Mean agitation (BARS)</td>
<td>22.4 (±7.7)</td>
<td>23.2 (±11.4)</td>
<td>.759</td>
</tr>
<tr>
<td>Mean depression (CSDD/Cornell)</td>
<td>9.0 (±4.9)</td>
<td>6.9 (±4.7)</td>
<td>.116</td>
</tr>
<tr>
<td>Mean quality of life (QUALID)</td>
<td>23.5 (±5.9)</td>
<td>22.9 (±8.5)</td>
<td>.754</td>
</tr>
<tr>
<td>Included in analysis</td>
<td>( n = 27 )</td>
<td>( n = 26 )</td>
<td></td>
</tr>
</tbody>
</table>
Occurring behaviors in week 2 and stratified on CDR-groups

- Observing Paro
  - CDR 1/2: 58.3% (10.8)
  - CDR 3: 39.2% (24.3)
  \[ p = .019^* \]

- Observing other things
  - CDR 1/2: 8.0% (5.8)
  - CDR 3: 22.5% (23.5)
  \[ p = .042^* \]

* Statistical significant at 0.05-level
Change in behaviors on group level - week 2 to week 10

- Conversation with Paro
  mean % (SD)
  From 9,0% (5,5) to 6,7% (5,5)
  \( p = .014^* \)

- Smiling/laughter - others
  From 0,8% (0,8) to 1,5% (1,4)
  \( p = .011^* \)
Results – symptoms of agitation

Mean values - BARS:

Mixed-model analysis:
Estimate (95% CI) change from baseline to follow-up:

- 5.5 (0.1 – 11.0)

Adjusted:
- 5.4 (0.1 – 10.7), \( p = .044^* \)

*statistical significant at 0.05 level

Effects from Paro-groups in nursing homes

Norwegian University of Life Sciences
Results – symptoms of depression

Mean values - Cornell:

Mixed-model analysis:
Estimate (95% CI) change from baseline to follow-up:
- 3.90 (0.4 – 7.3)

Adjusted:
- 3.99 (0.7 – 7.3), \( p = .019^* \)

\( p = .028^* \)

*statistical significant at 0.05 level
Results – quality of life according to dementia severity

**Mean QUALID:**

<table>
<thead>
<tr>
<th>CDR 3</th>
<th>Baseline</th>
<th>After Intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26.8</td>
<td>27.9</td>
<td>30.9</td>
</tr>
<tr>
<td>Paro</td>
<td>25.9</td>
<td>26.4</td>
<td>24.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CDR 1/2</th>
<th>Baseline</th>
<th>After Intervention</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>21.1</td>
<td>21.1</td>
<td>22.2</td>
</tr>
<tr>
<td>Paro</td>
<td>20.4</td>
<td>21.1</td>
<td>22.2</td>
</tr>
</tbody>
</table>

**Mixed model analysis:**

- **CDR 3 (severe):**
  Estimate (95% CI) change from baseline to follow-up:
  7.92 (2.16-13.69), \( p = .008^* \)

- **CDR 1/2 (mild/moderate):**
  Estimate (95% CI) change from baseline to follow-up:
  0.06 (-5.56 - 5.68), \( p = .983 \)

\* statistical significant at 0.05 level
Conclusions
Main findings and conclusions

• Social and psychological benefits
  – Increased social interactions and increased mood.

• Physiological benefits
  – Paro seems to have a calming effect
    • A stress-reducing effect (increased oxytocin).
    • Engaging activity affect behaviors positively.

• All benefits seem to affect quality of life in older people with severe dementia.

• Paro-intervention might have influenced staff towards increased attention during the course of the intervention, resulting in effects at follow-up.
Practical implications

• Paro seems to promote health in those who enjoy Paro.

• Paro seems to be a feasible and effective activity in nursing homes.

• Activity with Paro require little verbal instructions and has low level of complexity = successful interventions.

• Increased social interactions as added value.

• A possible non-pharmacological tool towards nursing home residents with dementia.
Thank you for your attention!