ESTEEM After Stroke

Exercising, Socialising and Thinking: an Environmental Enrichment Model in the community After Stroke

Dr Heidi Janssen (Physiotherapist and Stroke Researcher)

In partnership with our Community
Background: Evidence in animal models

Background: Environmental Enrichment (EE)

provides novelty
voluntary engagement
control environment
Background: Evidence in animal model of stroke

↑sensorimotor function 0.9 SDs **greater** than non-EE animals
(95% CI: 0.5-1.3, p<0.001, n=320)

**TREND TOWARDS** ↑learning 25% **better**
(95% CI: 4-47, p=0.002, n=130)

EE in the hospital setting: Patient driven model

- Individual enrichment
- Communal enrichment
- Encourage & assist set-up
- Ensure accessible
- X Forced
EE in the hospital setting: Pilot study results

Phase II Trial: Research questions

1. Does an enrichment intervention result in stroke patients being more active at 10 days (± 3) after admission to rehabilitation?

2. Is an enrichment intervention feasible?
   - Can it be adhered to by staff?
   - Is it safe? (adverse events including falls)

3. Does it result in better outcomes at 3 months?
Design

• before-after controlled trial (N=4)

• n=208

<table>
<thead>
<tr>
<th>Before (Control)</th>
<th>After (Intervention)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usual care (rehabilitation therapies)</td>
<td>EE + rehabilitation therapies</td>
</tr>
</tbody>
</table>

• n=26/site/experimental arm

• blinded assessment of outcome

• intention-to-treat analysis
  
  • multi-level (hierarchical) random-effect linear regression model
    
    • adjusted for stroke severity and age
Outcomes

- patient inactivity levels 10 (+/-3) days post rehab admission

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>physical activity</td>
<td>purposeful physical movement</td>
</tr>
<tr>
<td>cognitive activity</td>
<td>non-physical leisure activity which involves the participant actively engaging in a mental task</td>
</tr>
<tr>
<td>social activity</td>
<td>interaction ...verbal communication...people present/via telecommunication devices, &amp; non-verbal interactions ...touching, kissing or holding</td>
</tr>
</tbody>
</table>
Outcomes

• adverse events (including falls)
  i. discharge from hospital
  ii. 90 days post-stroke
## Results: Patients screened

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n=1365, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, <strong>female</strong></td>
<td>56</td>
</tr>
<tr>
<td>Recent stroke (≤ 4 weeks)</td>
<td>87</td>
</tr>
<tr>
<td>Pre-morbid modifiedRankin Scale ≤ 2</td>
<td>78</td>
</tr>
<tr>
<td>Follow <strong>1 stage</strong> command</td>
<td>88</td>
</tr>
<tr>
<td><strong>Stand</strong> with Assist x 2 people or less</td>
<td>82</td>
</tr>
<tr>
<td>Estimated length of stay ≥ 10 days</td>
<td>70</td>
</tr>
<tr>
<td><strong>Met ELIGIBILITY CRITERIA</strong></td>
<td>30</td>
</tr>
</tbody>
</table>
## Results: Participants

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention n = 90</th>
<th>Control n = 100</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (%), males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Age (yr), median (IQR)</td>
<td>66 (55, 79)</td>
<td>74.5 (61, 82)</td>
<td>0.019</td>
</tr>
<tr>
<td>Stroke severity, median (IQR)</td>
<td>6 (3, 9)</td>
<td>4 (2, 7)</td>
<td>0.007</td>
</tr>
<tr>
<td>National Institute of Health Stroke Scale (NIHSS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aphasia (%), NIHSS Item 10 &gt; 0</td>
<td>38</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Emotional state (%),</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital Anxiety and Depression Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety &gt;7</td>
<td>35</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Depression &gt;7</td>
<td>30</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Cognitive Impairment (%)</td>
<td>49</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Montreal Cognitive Assessment &lt; 23/30</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results: Level of inactivity

<table>
<thead>
<tr>
<th></th>
<th>Intervention</th>
<th>Control</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days post-stroke, median (IQR)</td>
<td>13 (10, 19)</td>
<td>11 (9, 13)</td>
<td></td>
</tr>
<tr>
<td>% in INACTIVITY</td>
<td>22.4 (14.71, 38.78)</td>
<td>31.58 (19.85, 42.85)</td>
<td>-5.09 (95% CI -2 to 13) p=0.184</td>
</tr>
</tbody>
</table>

*adjusted for age and stroke severity*
Results: Level of inactivity

25 percentile (patients with low levels of inactivity)

-8.9 (95%CI -12.91 to -4.89), p < 0.000

75 percentile (patients with high levels of inactivity)

- 4.68 (95%CI -20.24 to 10.86), p = 0.553

adjusted for age and stroke severity
Limitations

- Imbalanced groups
- Change in service delivery
- Recruitment challenges in rehab
- Change in hyper acute/acute stroke management
EE in the community setting: Evidence

**Intervention arms**

1. Horse riding therapy (H-RT)

2. Rhythm & music based therapy (R-MT)

3. Usual care

2 hours x2/week, 12 weeks

Cognitive stimulating cultural activities: Evidence


Singing – reduction of psychological distress (trend)
Increase confidence, enhanced mood motivation AND communication

Tai Chi – systematic review

Theatre – confidence commn/mood
Physical activity: Evidence

ESTEEM After Stroke

Exercising, Socialising and Thinking: an Environmental Enrichment Model in the community After Stroke
1. Develop and test the effectiveness of a model of enrichment (exercise + socialisation + cultural cognitive activity) in:
   • maximising functional recovery,
   • reducing emotional distress and
   • improving quality of life after stroke

2. Ensure model of enrichment continues after project end (self-sustaining), and

3. Model of enrichment for use in health service outpatient rehab
PROPOSED SOLUTION: MODEL OF ENRICHMENT

PHYSICAL

FAME

Fitness And Mobility Exercise Program:
A community-based Group Exercise Program
for People Living with Stroke

Evidence based intervention

COGNITIVE

SOCIAL
## Model of Enrichment: ‘Informed’ Dose

<table>
<thead>
<tr>
<th>DOSE</th>
<th>1 hr Physical</th>
<th>0.5 hr Social</th>
<th>1 hr Cognitive (choice of 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FAME exercise program</td>
<td>Social interaction</td>
<td>Art</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Singing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Book club</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Dance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tai Chi</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Theatre (acting)</td>
</tr>
</tbody>
</table>

### 2 Times/Week

### 12 Weeks
## ESTEEM: PROJECT PLAN

<table>
<thead>
<tr>
<th>PHASE 1</th>
<th>ACTIVITIES &amp; METHODS</th>
<th>TIMELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development</td>
<td>Co-production (stroke survivors, carers, community groups, health service)</td>
<td>Apr 2020</td>
</tr>
</tbody>
</table>
### PHASE 2: Feasibility

**Determine:**
- if stroke survivors *engage, attend, enjoy*
- *safety* of model
- *stakeholder experience & needs*
- *wait-list* randomised controlled trial (n=40)
- run the model of enrichment **2 times**
- measure *recruitment, attendance, satisfaction, tolerability, satisfaction*
- monitor contamination across groups
- measure *outcomes* planned for collection in Phase 3
- *interview* stroke survivors & other stakeholders (semi-structured interviews)

**TIMELINE:** Mar 2021
## ESTEEM: PROJECT PLAN

<table>
<thead>
<tr>
<th>PHASE 3</th>
<th>ACTIVITIES &amp; METHODS</th>
<th>TIMELINE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Efficacy</strong></td>
<td>Determine the <strong>efficacy</strong> of enrichment model on:</td>
<td><strong>Sep 2021</strong></td>
</tr>
<tr>
<td></td>
<td>• <strong>functional recovery</strong> (Primary outcome)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>emotional distress</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• <strong>quality of life</strong> (community participation &amp; cognitive function/memory)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multi-site (N=3) <strong>3-arm randomised controlled trial</strong> (n=80/site)</td>
<td></td>
</tr>
</tbody>
</table>

Multi-site 3-arm randomised controlled trial (n=80/site) | **Apr 2023**

**PHASE 3**

**Efficacy**

Determine the **efficacy** of enrichment model on:

- **functional recovery** (Primary outcome)
- **emotional distress**
- **quality of life** (community participation & cognitive function/memory)

Multi-site (N=3) **3-arm randomised controlled trial** (n=80/site)
**ESTEEM: Beneficiaries & Impact**

**Need**
Stroke survivors get ~ 12 weeks of rehabilitation in the health system. They need much more to recover from this significant life changing event but there is currently no low cost evidence based options in the community.

**Aims**
- Co-develop the first ever community based model of enrichment
- Improve stroke survivor function, emotional health and quality of life

**Activities**
- Consult with consumers, health services, local council, volunteer groups to design model of enrichment
- Confirm location and components
- Conduct feasibility & then multi-site RCT
- Determine effectiveness and potential health cost savings
- Modify model in consultation with health services to apply early after stroke

**Outputs**
- Publications
- Presentations to research, health and communities
- Higher degree research
- Environmental enrichment resources (manuals & frameworks)
- Effectiveness and cost effectiveness outcomes
- Business case outcomes

**End Users**
- Stroke survivors
- Family & carers
- Health services
- Researchers
- Clinicians
- Community members
- Stroke Foundation

**Impacts**
- Evidence-based knowledge/service models/Stroke guidelines
- Health service redesign/more access to rehabilitation for stroke survivors
- Increase in independence, reduced emotional distress & better quality of life of stroke survivors
Contact details

Keen to do a PhD?
Keen to collaborate?
Heidi.Janssen@health.nsw.gov.au

slootal
T: +612 40420417