The influence of multimorbidity on rehabilitation outcomes in stroke and amputation

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Dublin, Ireland, 31th July
Nijmegen GRAMPS study

Geriatric Rehabilitation in AMPutation and Stroke

dr. Bianca Buijck en dr. Monica van Eijk
GRAMPS research design

Longitudinal

Observational

Multidisciplinary

Multicenter
GRAMPS research design

Patients

• All newly admitted patients in the skilled nursing facility

• Rehabilitation after stroke or amputation

• Skilled nursing facilities from the university knowledge network elderly care Nijmegen

• Informed consent

- Stroke n=186
- Amputation n=48
Amputation

Lower limb amputation yearly in the Netherlands:

\( n = 3200 \)

Caused by:

- Vascular disease (68 %)
- Diabetes (27 %)
- Trauma (4 %)
- Tumor (1 %)
Stroke

Stroke yearly in the Netherlands:

n = 41,000

80% ischemic stroke
## Frail patients on admission

<table>
<thead>
<tr>
<th>Age</th>
<th>Amputation</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>75 years</td>
<td></td>
<td>78.6 years</td>
</tr>
</tbody>
</table>

### Multimorbidity Comorbidity

<table>
<thead>
<tr>
<th>Condition</th>
<th>Amputation</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial infarction</td>
<td>53%</td>
<td>34%</td>
</tr>
<tr>
<td>Heart failure</td>
<td>30%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Peripheral vasc dis.</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>77%</td>
<td>13%</td>
</tr>
<tr>
<td>Stroke</td>
<td>33%</td>
<td>18%</td>
</tr>
<tr>
<td>Maligne</td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>Incontinence (Item BIpm)</td>
<td>9%</td>
<td>6%</td>
</tr>
</tbody>
</table>

### Incontinence (Item BIpm)

<table>
<thead>
<tr>
<th>Type</th>
<th>Amputation</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feces</td>
<td>3%</td>
<td>3%</td>
</tr>
<tr>
<td>Urine</td>
<td>17%</td>
<td>5%</td>
</tr>
</tbody>
</table>
Comorbidity or multimorbidity

• Charlson Index
• 19 items
• Score for presence and severity
• Myocardial Infarction in the past, and no role of significance at this moment: no score
• Heart failure after Myocardial infarction = score
• Corrected for vascular disease and diabetes

Some limitations for this instrument
Model: univariate and multivariate

- All factors in relation with the outcome
- Factors with significant relation on the outcome
- Factors independently associated with the outcome
Associated

- Question: which factors have a predictive value for outcome at discharge
- Calculated the influence of potential factors
- Only the most relevant factors in the model
- Which factors have independently a predictive value for the rehabilitation outcomes
Stroke multimorbidity

Patients with multimorbidity differed from the patients without multimorbidity with respect to:

• Age
• Proprioception
• Vibration sense

But not for:

• Any of the cognitive tests
• Muscle strength
• Sitting balance

Patients with multimorbidity had, on average, lower scores on outcome measures.
Stroke model 1

Balance:

Multimorbidity
Muscle strength
Interaction between muscle strength & static sitting balance

66%
Stroke model 2

Walking abilities:

- Multimorbidity
- Muscle strength

Interaction between muscle strength & static sitting balance 67%
Amputation model 1

Independent living situation

Diabetes Mellitus
Pre operative functioning

47%
Amputation model 2

Functional status after rehabilitation

Functional status on admission
Pre operative functioning 78%
One leg standing balance
Amputation model 3

Use of prosthesis

Independent walking
Phantom pain

Amputation level

56%
Amputation model 4

Timed Up & Go test

Cognitive abilities
Low amputation level
Pre-operative functional abilities

82%
Table 2. Associations for prosthetic use and univariate linear analyses for timed up-and-go test (TUG-test) after rehabilitation for lower limb amputation in skilled nursing facilities (SNFs).

<table>
<thead>
<tr>
<th></th>
<th>Prosthetic use</th>
<th></th>
<th>TUG-test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( n = 19 )</td>
<td>( n = 19 )</td>
<td>( n = 15 )</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>( p \text{ value} )</td>
</tr>
<tr>
<td>Age (years)(^{1})</td>
<td>73.6</td>
<td>77.4</td>
<td>0.153</td>
</tr>
<tr>
<td>Gender (M/F)(^{2})</td>
<td>6/13</td>
<td>5/14</td>
<td>0.721</td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
<td>35</td>
<td>32</td>
<td>0.079</td>
</tr>
<tr>
<td>Amputation level ( n )^{3}</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>- High amputation</td>
<td>5</td>
<td>13</td>
<td>0.009</td>
</tr>
<tr>
<td>- Low amputation</td>
<td>14</td>
<td>6</td>
<td>( )</td>
</tr>
<tr>
<td>Impaired wound healing (%)</td>
<td>16</td>
<td>37</td>
<td>0.141</td>
</tr>
<tr>
<td>Stump pain (%)</td>
<td>37</td>
<td>42</td>
<td>0.740</td>
</tr>
<tr>
<td>Phantom pain (%)</td>
<td>47</td>
<td>74</td>
<td>0.067</td>
</tr>
<tr>
<td>Multimorbidity(^{4}) (%)</td>
<td>53</td>
<td>37</td>
<td>0.328</td>
</tr>
<tr>
<td>CI score (%)</td>
<td>2</td>
<td>1</td>
<td>0.819</td>
</tr>
<tr>
<td>Diabetes mellitus (%)</td>
<td>58</td>
<td>37</td>
<td>0.194</td>
</tr>
<tr>
<td>MMSE (0–30)</td>
<td>27</td>
<td>25</td>
<td>0.302</td>
</tr>
<tr>
<td>Clock drawing (0–14)</td>
<td>13</td>
<td>10</td>
<td>0.293</td>
</tr>
<tr>
<td>Barthel Index po (0–30)</td>
<td>20</td>
<td>25</td>
<td>0.004</td>
</tr>
<tr>
<td>Barthel Index adm (0–30)</td>
<td>12</td>
<td>9</td>
<td>0.306</td>
</tr>
<tr>
<td>FAI (0–35)</td>
<td>25</td>
<td>16</td>
<td>0.386</td>
</tr>
<tr>
<td>FAC (0–5)</td>
<td>2</td>
<td>0</td>
<td>0.002</td>
</tr>
<tr>
<td>One-leg balance (%)</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>- Not possible</td>
<td>11</td>
<td>26</td>
<td>( )</td>
</tr>
<tr>
<td>- With support</td>
<td>16</td>
<td>53</td>
<td>( )</td>
</tr>
<tr>
<td>- Without support &lt; 10s</td>
<td>37</td>
<td>5</td>
<td>( )</td>
</tr>
<tr>
<td>- Without support &gt; 10s</td>
<td>37</td>
<td>16</td>
<td>( )</td>
</tr>
</tbody>
</table>

\(^{1}\) Charlson Index score; 2 Charlson Index score; FAC, Functional Ambulation Categories; MMSE, Mini Mental State Examination; 3 preoperative. \(^{4}\) Multimorbidity was defined as CI score (with peripheral arterial disease and diabetes mellitus excluded) > 1; \(^{2}\) Chi square test; \(^{3}\) Students t-test; all others Mann Whitney U test.
Multimorbidity

- In this study multimorbidity has no influence on outcomes for amputation
- Other studies found influence on outcomes but used different and unstandardized instruments
- In this study Charlson Index >1
- Two or more diagnoses next to peripheral vascular diseases
- Distribution of multimorbidity equal for patients with prosthesis or without prosthesis
- Its hard to show a relation with prosthesis use
Conclusion

• Amputation small group in the Netherlands

• Possible overfitting of the models: small sample size

• It is important that nurses have insight in rehabilitation outcome, because the presence of multiple chronic diseases influences the performance of stroke and LLA patients during rehabilitation in het SNF.
References


