Information Processing Speed Impairment after Stroke

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NIH StrokeNet Trainee Presentation

No Disclosures
**Background: Information Processing Speed (IPS)**

- **IPS**: elemental cognitive function w/ complex dimensions beyond simple reaction time.
  - Essential governor of cognitive performances
  - Close but separate relationships w/ memory, attention, executive function, & academic skills

- **One year post-stroke:**
  - 50-70% of stroke survivors have IPS impairment
  - IPS impairment more profound than memory impairment
Background: Information Processing Speed (IPS)

Two components: **Limited Time and Simultaneity**

- **Consequence of slow speeds:**
  - **Limited time** is available to complete the later steps of mental operations
  - Information from the earlier mental processing is too impoverished by the time other simultaneous information needs to be processed
Aims/Hypothesis: Information Processing Speed (IPS)

- **Aim:**
  - Determine frequency & severity of IPS impairment in patients with mild stroke compared to moderate stroke over time (evidenced by abnormal SDMT scores)

- **Hypothesis:**
  - IPS impairment is not significantly different in patients with mild stroke compared to moderate stroke
Methods: Information Processing Speed (IPS)

- Longitudinal observational study, 70 adults w/ acute mild (NIHSS <5) v. mod. stroke (NIHSS 5-12)
- Assessments at < 72 hrs, Wk 3, & Wk 12 post-stroke
- Controls: diagnostic standard SDMT norm values tables & age matched control group (N=30)
- IPS impairment measurements: Symbol Digit Modalities Test (SDMT)
Results: Information Processing Speed (IPS)

- **Interim analysis** of 30 subjects (mild stroke n=18)

- Linear mixed model regression: No significant difference in frequency & severity of IPS impairment between subjects w/ mild & moderate stroke (p=0.2)

SDMT test results were lower than matched normative table values by the following percent:

<table>
<thead>
<tr>
<th>Severity of stroke</th>
<th>baseline</th>
<th>Wk 12</th>
<th># of patients defined as unimpaired at Wk 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>53% lower</td>
<td>32% lower</td>
<td>6 (33%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>60% lower</td>
<td>39% lower</td>
<td>4 (33%)</td>
</tr>
</tbody>
</table>
Figure 1. In each Box, Mean is indicated by x= and Median is indicated by a bar; each Box equals 50% of scores (each whisker = 25%). Most scores fall well below normal value range (Strauss et al., 2006) yet indicate IPS improvement over time. There were three outlier scores: mild stroke scores of zero points (baseline) and 54 points (Week 3) and for moderate stroke a score of 9 (Week 12). When these outliers were removed all whiskers were similar in length per plot.
Conclusion: Information Processing Speed (IPS)

Key findings:
- Regardless of stroke severity:
  - 67% of subjects in both groups have severe, persistent IPS impairment for 3 months
  - 94% of all screened patients (n=45) have IPS impairment
- Mod. strokes improved most between baseline & Wk. 3
- Mild strokes between Wk. 3 & Wk12

Limitation:
- Small sample (n=30/70 subjects),
- Tiny effect size (Cohn’s d = 0.05)
Information Processing Speed (IPS)

Questions?