From Screening to Diagnosis: The Oxford Cognitive Neuropsychology Centre

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Neuropsychological screening

Large scale trials of cognitive screening
  - BCoS
  - OCS
  - OCS-social

Lesion-symptom analyses

Lesion and behaviour-based group analyses of cognitive functions

Lesion-symptom prognosis

Neuropsychological rehabilitation trials

Individual behaviour-based analyses of cognitive functions

TRANSLATIONAL  BASIC
- Tests not set-up for stroke patients and thus often contaminated by problems common in stroke (neglect, apraxia)

- Not always designed to detect problems common after stroke (neglect, apraxia)

- Not always designed to reflect cognitive domains (verbal fluency? executive or language?)

- Need tests that are ‘aphasia and neglect friendly’ (uncontaminated)
- That detect common problems after stroke
- That are designed to reflect particular cognitive domains
- That are clinically applicable
Need for a screen that is ‘broad but shallow’

BCoS - ~ 1 hour   OCS - ~ 15 mins
use short high frequency words
use vertical layouts and multi-modal presentations
time efficient design
Auditory attention test

Words presented at uneven times on MP3 player, respond to no, hello, please but not to yes, goodbye, thanks, across 3 trial blocks

measures:

- selective attention/response inhibition
- sustained attention (across blocks)
- working memory (learning & recall of words)
BCoS trial – 1000 patients across 14 Trusts in the West Midlands

Patients tested within 3 months and post 9 months

HADS, Barthel, NEADL, Apathy
Domain specificity along with some domain general tests
# Functional correlates

80% inclusion rate

## Outcome measure at 9 months

<table>
<thead>
<tr>
<th>N=362</th>
<th>NEADL²</th>
<th>B</th>
<th>SE</th>
<th>β</th>
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<tbody>
<tr>
<td>Initial Barthel</td>
<td>0.45</td>
<td>0.06</td>
<td>0.40**</td>
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<tr>
<td>% BCoS tasks impaired</td>
<td>-2.82</td>
<td>1.30</td>
<td>-0.11*</td>
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<tr>
<td>Apathy at follow up</td>
<td>-0.16</td>
<td>0.03</td>
<td>-0.27**</td>
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<tr>
<td>HADS at follow up</td>
<td>-0.16</td>
<td>0.05</td>
<td>-0.19**</td>
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<tr>
<td>Hemiplegia at follow up</td>
<td>2.34</td>
<td>0.98</td>
<td>0.13*</td>
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BCoS inclusive and predictive
BUT – useful for acute settings?
BCoS-lite: 15 min version, with tests built around the same philosophy

Executive test
Differences between baseline and switch conditions provides a measure of executive cost and subtracts out problems due to neglect, slow responding per se.
Comparison of BCoS-lite with the Montreal Cognitive Assessment (MOCA) {currently recommended screening tool}

150 acute stroke patients in the John Radcliffe

12% of acute patients score 0 on MOCA due to aphasia
2% only on the lite

Contamination by neglect: example from the trails test
74% failure

61% failure

Lite – less contaminated & more sensitive
Conclusion:

New neuropsychological screens provide sensitive, clinically applicable tools, with tests revealing of underlying cognitive processes & helpful for rehabilitation

New directions:

International

Automated
Neuropsychological rehabilitation trials

Carmel Mevorach

- Computer game playing (vs. Tetris) shown to improve attentional functions in healthy young participants (Green & Bavelier, 2003)

- But do the effects of brain training generalise (Owens et al., 2010)?

- Chung et al. (2013) – need for well-designed clinical trial (with appropriate control conditions) to evaluate effects of cognitive training after brain injury
Theories of cognition separate cognitive processes

- **DOMAIN SPECIFIC**
  - perception
  - long-term memory
  - language

- **DOMAIN GENERAL**
  - executive functions
  - sustained attention
  - working memory

In principle, training on domain general processes should produce generalization

In the BCoS trial, 60% of patients had DOMAIN SPECIFIC + DOMAIN GENERAL problems

The presence of aDOMAIN GENERAL problem helped account for 18% more of the variance on ADL outcome at 9 months
We examined whether training of domain general cognitive processes does improve cognitive outcome after stroke.

Patients trained (i) on tests ‘weighting’ sustained attention, working memory and executive functions (dealing with response competition) or (ii) on Tetris.

Tests increase in difficulty as patients succeed, there is graphical feedback per session and accumulating feedback over sessions.
Sustained attention task

RTs (ms)

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<th>Exp</th>
<th>Con</th>
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<td>Post</td>
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Variance (ms)

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Effects on untrained aspects of BCoS

Data hold promise on the effectiveness of domain-general cognitive training
Lesions predictive of different recovery profiles of neglect

3 months

9 months
INDIREA

1. Extend ‘stroke-specific approach’ to aspects of attention - which aspects to include?

2. Extend rehabilitation to contrast different aspects of attention
Thanks for your attention