Crosswalk study

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NIA ADC Clinical Task Force
UDS Neuropsychology Work Group

Members:
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Agenda — Part 1

1. Background
2. New measures
Goals and time line

• IRB modifications/applications for each Center
• Provide feedback following feasibility pilot by November 29
• Final revisions to worksheets and instructions, if needed
• WEBINAR: December 12, 2013 12pm – 3pm CDT
• Total estimated additional time for administration of Crosswalk tests: 20-30 minutes (includes delay for Craft Story 21)
• Projected completion date: March 30, 2014
## Montreal Cognitive Assessment (MoCA)

### Visuospatial / Executive
- **Copy a cube**
- **Draw a clock** (Ten past eleven) (3 points)

### Naming
- [Rhino](image)
- [Camel](image)

### Memory
- Read a list of words, subject must repeat them. Do 2 trials, even if 1st trials successful. Do a recall after 5 minutes.
- **1st trial**
- **2nd trial**

### Attention
- Read a list of digits (1 digit/sec.)
  - Subject has to repeat them in the forward order
  - Subject has to repeat them in the backward order
- Read a list of letters. The subject must tap with his hand at each letter A.

### Language
- Repeat: I only know that John is the one to help today.
- The cat always hid under the couch when dogs were in the room.

### Abstraction
- Similarity between e.g. banana - orange = fruit
- **Face**
- **Velvet**
- **Church**
- **Daisy**
- **Red**

### Delayed Recall
- Hot to recall words with no cue
- Points for UNCUED recall only

### Optional
- Date
- Month
- Year
- Day
- Place
- City

### Total
- Normal ≥ 26 / 30
- Add 1 point if ≤ 52 yr. old

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[www.mocatest.org](http://www.mocatest.org)
| 3a. | Visuospatial/executive (0–5) | ... |
| 3b. | Naming (0–3) | ... |
| 3c. | Attention: List of digits (0–2) | ... |
| 3d. | Attention: List of letters (0–1) | ... |
| 3e. | Attention: Serial 7 subtraction (0–3) | ... |
| 3f. | Language: Repeat (0–2) | ... |
| 3g. | Language: Fluency (0–1) | ... |
| 3h. | Abstraction (0–2) | ... |
| 3i. | Delayed recall (0–5) | ... |
| 3j. | Orientation (0–6) | ... |
**Number Span Test: Forward**

[Say]: “I am going to ask you to repeat some numbers for me. Wait until I finish saying the numbers and then repeat them in the same order. “For example, if I say 1-8-7, you would say 1-8-7. If I say 2-9-8, what would you say?” If the subject gives the wrong answer, say, “Actually, you would say 2-9-8.”

[Say]: Repeat only the numbers I say each time. You don’t have to remember all the numbers you just repeated before this set.” Then start with test items.

<table>
<thead>
<tr>
<th>Series length</th>
<th>Response</th>
<th>Response code</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>1-8-4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2-7-9</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4-1-6-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8-1-9-5</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>6-4-9-2-8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7-3-8-6-1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>3-9-2-4-7-5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6-2-8-3-1-9</td>
<td></td>
</tr>
</tbody>
</table>
Craft Story 21

Maria’s child Ricky played soccer every Monday at 3:30. He liked going to the field behind their house and joining the game. One day, he kicked the ball so hard that it went over the neighbor’s fence where three large dogs lived. The dogs’ owner heard loud barking, came out, and helped them retrieve the ball.

Total story units recalled (VERBATIM SCORING): / 44
Total story units recalled (PARAPHRASE SCORING): / 25

CRAFT STORY 21 RECALL (IMMEDIATE): VERBATIM SCORING

PERFECT VERBATIM RESPONSE (1.0 POINT): Give the subject 1 point for every bit for which content words are recalled exactly and completely. The content words do not need to be recalled by the subject in the same order they were read to receive credit. The words can appear anywhere in the recall.

<table>
<thead>
<tr>
<th>Maria’s</th>
<th>hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>child</td>
<td>it</td>
</tr>
<tr>
<td>Ricky</td>
<td>went</td>
</tr>
<tr>
<td>played</td>
<td>over</td>
</tr>
<tr>
<td>soccer</td>
<td>neighbor’s</td>
</tr>
<tr>
<td>every</td>
<td>fence</td>
</tr>
<tr>
<td>Monday</td>
<td>three</td>
</tr>
<tr>
<td>three thirty</td>
<td>large</td>
</tr>
<tr>
<td>he</td>
<td>dogs</td>
</tr>
<tr>
<td>liked</td>
<td>lived</td>
</tr>
<tr>
<td>going</td>
<td>dogs’</td>
</tr>
<tr>
<td>field</td>
<td>owner</td>
</tr>
</tbody>
</table>
CRAFT STORY 21 RECALL (IMMEDIATE): PARAPHRASE SCORING

PARAPHRASE RESPONSE (1.0 POINT): Give a point for a response that captures the elements of the story although not necessarily with the exact words (see table below).

<table>
<thead>
<tr>
<th>Text</th>
<th>General rule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria's</td>
<td>“Maria” or variant of the name</td>
</tr>
<tr>
<td>child</td>
<td>“child” or a phrase denoting that it was a young person</td>
</tr>
<tr>
<td>Ricky</td>
<td>“Ricky” or variant of the name</td>
</tr>
<tr>
<td>played</td>
<td>“played” is required</td>
</tr>
<tr>
<td>soccer</td>
<td>“soccer” is required</td>
</tr>
<tr>
<td>every Monday</td>
<td>“Monday” or an indication that the activity occurred on a weekday</td>
</tr>
<tr>
<td>at 3:30.</td>
<td>An indication that the activity took place in the afternoon</td>
</tr>
<tr>
<td>He liked going to the field</td>
<td>An indication that he went to an outdoor area</td>
</tr>
<tr>
<td>behind their house</td>
<td>“House” or a word denoting a house</td>
</tr>
<tr>
<td>and joining</td>
<td>An indication that he participated</td>
</tr>
<tr>
<td>the game.</td>
<td>“Game” in any context</td>
</tr>
<tr>
<td>One day</td>
<td>“One day” is required</td>
</tr>
<tr>
<td>he kicked</td>
<td>An indication that he performed the activity with his foot</td>
</tr>
<tr>
<td>the ball</td>
<td>“ball” is required</td>
</tr>
</tbody>
</table>
Selected MINT items

“candle”

“parachute”

“wig”

“axle”


Multilingual Naming Test (MINT)

**INSTRUCTIONS AND CUING**

[Say]: “I am going to show you some pictures of objects, one at a time. Please tell me the name of each object, that is, tell me what it is called. If you cannot think of the name try to make your best guess. If you don’t know what the object is, I will try to help you. Do you have any questions?”

<table>
<thead>
<tr>
<th>Item #</th>
<th>English</th>
<th>Semantic cue</th>
<th>Spontaneous Response(s)</th>
<th>Uncued correct</th>
<th>Semantic cue correct</th>
<th>Incorrect</th>
<th>Phonemic cue correct</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Butterfly</td>
<td>an Insect</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Glove</td>
<td>an article of clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Lightbulb</td>
<td>used to see better and is turned on electrically</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Watch</td>
<td>used to tell the time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Candle</td>
<td>is used in the dark to make light</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clown</td>
<td>found in a circus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Kite</td>
<td>a toy that uses the wind to make it fly</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rainbow</td>
<td>It’s colorful and is found in the sky after it rains</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Witch</td>
<td>a woman with magical powers</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Agenda — Part 2

1. Detailed time line for the crosswalk study
2. Feasibility phase
3. Web training
4. Crosswalk study
   • Study design
   • Data collection & submission
   • Analysis method
5. Questions and discussion
Timeline for crosswalk study proposed by CTF

• September 2013
  Officially announce crosswalk: documents posted, obtain IRB approval, begin feasibility phase

• October - November 29, 2013
  Feasibility findings and questions due to NACC’s Clinical Core Bulletin Board

• December 12, 2013
  Web training

• December 13, – March 31, 2014 (projected)
  Collect data, perform interim analysis

• April 2014 (projected)
  Final data analysis

• April 26, 2014
  Present at ADC meeting
Feasibility phase

• Administer crosswalk tests to up to five UDS subjects (control, MCI, early AD)
• Identify any questions or potential problems related to:
  – Test materials
  – Administration instructions
  – Scoring
• Submit all UDS2 data per usual protocol
• Do NOT submit new test scores to NACC
• Do NOT email Sandy directly

Now – Nov 29, 2013
Feasibility phase

- Communicate feedback via NACC Clinical Core Bulletin Board
- Select Topic 1—UDS 3.0 Crosswalk Feedback

https://www.alz.washington.edu/NONMEMBER/clinictalk.html
Web training

• **Who should attend?**
  – All Center staff responsible for administration and scoring of UDS neuropsychological battery

• **How long will it last?**
  – Allow three hours: 12pm – 3pm CDT

• **What will we cover?**
  – Test-by-test instructions, stimuli, scoring
  – Sequence of administration of old and new tests
  – Data form completion and submission
  – Questions and answers
Crosswalk study design

- Centers volunteer to participate
- Subjects receive both current UDS battery and tests proposed for UDS 3.0
- Order of current vs. new battery randomized by Center
- Include subjects with a wide range of cognitive abilities at both initial and follow-up visits
- Interim analysis

Dec 13, 2013 – March 2014?
## Data collection

**Forms:**
- C1W
- A1
- C1

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### Form C1W: Neuropsychological Battery Summary Scores

**Center:** ___________________________  **Subject ID:** ___________________________  **Form Date:** ____ / ____ / ______

**NOTE:** This form is to be completed by ADC or clinic staff. For test administration and scoring, see Instructions for Neuropsychological Battery Form C1W Crosswalk Study.

**Visit #:** ________  **Examiner’s initials:** ________

**KEY:** If the subject cannot complete any of the following exams, please give the reason by entering one of the following codes in the first data element and skip the rest of the data elements for that test:

- 95 = Physical problem
- 96 = Cognitive/behavior problem
- 97 = Other problem
- 98 = Verbal refusal

1. **Date of testing (MM/DD/YYYY)**  
   __________ / ______ / ______

2. **Craft Story 21 Recall (Immediate)**
   - 2a. Total story units recalled, VERBATIM SCORING (0–44)  
     __________
   - 2b. Total story units recalled, PARAPHRASE SCORING (0–25)  
     __________

3. **MoCA — Total score (0–30)**  
   __________
   - 3a. Visuospatial/executive (0–5)  
     __________
   - 3b. Language naming (0–3)  
     __________
Crosswalk data collection and submission

- Forms to submit via usual Center protocol:
  - Form A1 (UDS2 subject demographics form)
  - Form C1 (UDS2 summary scores form)

- Forms to submit via web data entry or e-form:
  - Form C1W (crosswalk study summary scores form)

- Submit all three forms within 1 week of subject’s visit
  - To allow proper data monitoring
  - To allow prompt study completion

- Submit remainder of UDS forms as usual for QA, finalization, etc.
Sample size

- Desired sample = 1500 (Kolen and Brennan)
- Penn study had >500 subjects
- Need to observe every value in range
- Subject recruitment depends on Center participation

<table>
<thead>
<tr>
<th>Number of Centers participating</th>
<th>Number of subjects needed per Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>150</td>
</tr>
<tr>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>75</td>
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<tr>
<td>25</td>
<td>60</td>
</tr>
</tbody>
</table>
Method: Equipercentile equating

- Standardized testing/education literature
- Penn study (Roalf et al.):
  - Compared MMSE and MoCA
  - 321 AD, 126 MCI, and 140 CN
Table 4
Conversion table for MMSE and MoCA screening measures based on equipercentile equating in 321 AD, 126 MCI, and 140 HC*

<table>
<thead>
<tr>
<th>Raw MoCA score</th>
<th>Equivalent MMSE score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
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<tr>
<td>3</td>
<td>9</td>
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<td>4</td>
<td>10</td>
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<td>5</td>
<td>11</td>
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<td>12</td>
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<td>15</td>
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<td>16</td>
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<td>28</td>
<td>30</td>
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<tr>
<td>29</td>
<td>30</td>
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<tr>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

*Equivalent scores were derived from equipercentile equating with log-linear smoothing.

- Provide table and/or derived data element to investigators
- Publish findings
Additional analyses

Data available to ADC researchers post-analysis by CTF subgroup and NACC for:

- Validation study
- Assessment of test properties
- Analysis using other equating methods, such as multiple imputation, IRT, etc.
Statistical Work Group

Hiroko Dodge (OHSU & UDS Neuropsychology Work Group)
Steve Edland (UCSD)
Richard Kryscio (Kentucky)
Sarah Monsell (NACC)
Dan Mungas (UC-Davis & UDS Neuropsychology Work Group)
Shane Pankratz (Mayo Clinic)
Leslie Phillips (NACC)
Andrew Zhou (NACC)
Questions? Comments?