MicroCog: Assessment of Cognitive Functioning (Powell et. al., 1993)

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Introduction

• Not affiliated with Pearson Assessment
• Consultant for CPEP
  ▫ Interpret MicroCog screens for CPEP, as one aspect of assessment of physicians referred for competency evaluations
  ▫ Complete full neuropsychological evaluations for CPEP, when one is requested as a part of a referral
  ▫ Conducted research using MicroCog
Overview

• Essentials
  ▫ Neuropsychological screens – What are they used for?
  ▫ Norms – What is important to know.
    • Age
    • Education
  ▫ Neuropsychological screen versus full neuropsychological evaluation
Overview

• Introduction to the MicroCog
  ▫ Original design
  ▫ Structure of assessment
  ▫ Norms
  ▫ Interpretation
  ▫ Limitations
  ▫ Future
How are neuropsychological screens used?

- Neuropsychological Screens
  - More efficient than full neuropsychological evaluation
    - Less expensive
    - Less time to administer and interpret
  - Used as a measure to determine if further assessment is recommended
Norms - Age

- Neuropsychological abilities decline with age
- For example, with age comes decline in
  - processing speed
  - the ability to sustain concentration over long periods of time
  - visual spatial abilities
  - the ability to learn novel material in a short amount of time
  - the ability to multi-task

(Goldstein, 2000; Powell & Whitla, 1994)
Norms - Age

- In general, a 60 year old physician would be much slower than a 30 year old physician on many novel cognitive tasks

- When assessing for cognitive deficits age-corrections are used to account for this decline
What this Means for Physicians

• Age normed assessment means an examinee’s scores are compared to a (normative) group of people in their same age group.

• So if there is a difficulty question, it is highly likely to have been difficult for the group of people in their age group.
Norms - Education

• Individuals with a high level of education generally perform better than individuals with lower level of education (Leckliter & Matarazzo, 1989)

• Education corrected norms are used to account for difference in performance
How are neuropsychological screens used?

• Neuro-cognitive screens are only designed to determine if further assessment is recommended

• Not used to determine fit for practice

• Very similar to how physicians use medical screens
  • Mammogram – Ultrasound – Biopsy – then Cancer diagnosis
Common Physician Concern

- This screen cannot tell you about how I am as a clinician
- There are no medical questions
- Overall, physicians have learned to be academically sophisticated due to so much education
- On neuropsychological tests, specifically the MicroCog, there is nothing to study
Full Neuropsychological Evaluation

- Expensive and time consuming
- Extensive testing and data collection
- Ecological validity increased with collateral information
  - Work performance issues?
  - Specific clinical performance issues?
  - Historical functioning?
MicroCog: Assessment of Cognitive Functioning

Powell et. al., 1993
Original Purpose

• Risk Management Foundation of Harvard Medical Institutions funded development

• Computer administered neuropsychological screen

• Designed to screen physicians for subtle changes in cognitive functioning
Original MicroCog

• Extremely high ceilings

• Sensitivity and specificity rates above 80% for mild cognitive impairment (Green et al., 1994)

• Physician Norms Available
MicroCog History

• Pearson Assessment
  ▫ Bought the instrument and made minor changes
  ▫ Normed on general population
Structure of MicroCog
Structure

- Computer administered, 45 – 60 minutes
- It is recommended that a proctor be available to answer questions and record observations
- Instructions are integrated into the computer program
- Examinees use a keyboard with a number pad
- 18 subtests
Five Domains Assessed

• Attention and Mental Control
  ▫ Assesses various aspects of attention, such as immediate attention span, vigilance, concentration, and perseverance

• Memory
  ▫ Measures immediate and delayed recognition memory

• Reasoning and Calculation
  ▫ Assesses abstraction and reasoning
Five Domains

• Spatial Processing
  ▫ Assesses both novel and familiar visual spatial processing and memory

• Reaction Time
  ▫ Measures simple reaction time in both auditory and visual modalities
Global Scores

- Overall Processing Speed score
- Overall Accuracy score

- Two Global Cognitive Functioning scores
  - General Cognitive Functioning
    - equal weight to speed and accuracy of processing
  - General Cognitive Proficiency
    - combines both speed and accuracy, but gives greater weight to the accuracy
Norms

• **Age Norms**
  - 18 to 89 placed in nine age groups
  - 18-24, 25-34, 35-44, 45-54, 55-64, 65-69, 70-74, 75-79, and 80-89

• **Education Norms**
  - Less than high school, high school, and greater than high school

• **Physician Norms**
  - Not available through Pearson Assessment
  - Accessible through research
What to do about norms??

• Should physicians be compared to the greater than high school education group?
  ▫ 22+ years of education
  ▫ Increases likelihood of false negatives?
  ▫ Decreases likelihood of false positives?
  ▫ Many neuropsychological tests have educational corrections up to 20 years
## Summary and Domain Scores

### Summary Index Table

<table>
<thead>
<tr>
<th>Age and Education Corrected Norms (Age: 45 - 54, Education: &gt; High School)</th>
<th>Sum</th>
<th>Scaled Score</th>
<th>%ile</th>
<th>95% Conf. Interval</th>
<th>Qualitative Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 3 - Indexes</strong></td>
<td></td>
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<tr>
<td>General Cognitive Functioning (GCF)</td>
<td>229</td>
<td>119</td>
<td>90</td>
<td>112-126</td>
<td>Above Average</td>
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<tr>
<td>General Cognitive Proficiency (GCP)</td>
<td>107</td>
<td>105</td>
<td>63</td>
<td>99-111</td>
<td>Average</td>
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<td><strong>Level 2 - Indexes</strong></td>
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<tr>
<td>Information Processing Speed (IPS)</td>
<td>102</td>
<td>102</td>
<td>55</td>
<td>95-109</td>
<td>Average</td>
</tr>
<tr>
<td>Information Processing Accuracy (IPA)</td>
<td>127</td>
<td>104</td>
<td>61</td>
<td>97-111</td>
<td>Average</td>
</tr>
</tbody>
</table>
## Five Domains

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</tr>
</thead>
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<tr>
<td>Attention/Mental Control (Attn)</td>
<td>69</td>
<td>98</td>
<td>45</td>
<td>87-109</td>
<td>Average</td>
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<tr>
<td>Reasoning/Calculation (Reas)</td>
<td>56</td>
<td>94</td>
<td>34</td>
<td>83-105</td>
<td>Average</td>
</tr>
<tr>
<td>Memory (Mem)</td>
<td>74</td>
<td>118</td>
<td>88</td>
<td>108-128</td>
<td>Above Average</td>
</tr>
<tr>
<td>Spatial Processing (Spat)</td>
<td>44</td>
<td>107</td>
<td>68</td>
<td>97-117</td>
<td>Average</td>
</tr>
<tr>
<td>Reaction Time (RT)</td>
<td>67</td>
<td>107</td>
<td>68</td>
<td>101-113</td>
<td>Average</td>
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Subtests
Interpretation of MicroCog

• Neuropsychologists interpret the MicroCog

• Usually three level of recommendations
  ▫ No referral for neuropsychological evaluation
  ▫ Gray area
  ▫ Referral for neuropsychological evaluation
Interpretation

- No cutoff score used
  - Instead neuropsychologists evaluate patterns of impairment and level of impairment
  - One low subtest score with mild impairment very different from a very low domain score

- Also consider specialization
  - Slow processing speed for emergency physician?
  - Poor attention for anesthesiologist?
  - Poor visual spatial processing for surgeons?
Interpretation

• Change perception that taking the MicroCog directly leads to determination of fitness to work as a physician
  ▫ If there are concerns, further assessment is recommended, with an increased ecological validity through clinical assessment and gathering of collateral information
Limitations of MicroCog

- Extensive physician norms not available
- Very limited auditory processing
- No alternate forms
- Pearson no longer provides updates for new operating systems
Future of MicroCog

- Currently, very good neurocognitive screen for physicians
- In future address issues
  - Improve physician norms
    - Partner with military?
    - Multi-site data collection?
  - Develop alternate forms
  - Update software for newer operating systems
  - Education to help improve current perceptions
Question?
Thank you...

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