Reliability and validity of a Short Form Upper Extremity Functional Capacity Evaluation in patients with complaints of the arm or hand

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4th International FCE Research Conference 2018
21-09-2018
Let’s save
Background

- Upper Extremity Functional Capacity Evaluation (UE-FCE) is a performance-based measurement composed of several tests \(^1\)
- Typical UE-FCE tests consist of multiple repeated trials
- A Short Form (SF) UE-FCE is more efficient and beneficial for both patient and observer
- SF UE-FCE has been found reliable compared to the regular protocol in healthy subjects \(^2\)
- SF UE-FCE has not been assessed in patients yet

Objectives

- Compare SF UE-FCE protocols (1 or 2 trials) with a regular UE-FCE protocol (3 or 4 trials)
- Assess measurement properties of the most concise UE-FCE
  - Test-retest reliability
  - Construct validity
Subjects

• Adult outpatients (university hospital)
  – Complaints of hand, wrist and/or forearm
    • Specific complaints of the arm, neck and shoulder (CANS)
    • Nonspecific CANS
  – No other medical conditions causing considerate disability
    • Meeting Physical Activity Readiness Questionnaire (PAR-Q) criteria
Measurements

- Hand grip strength
- Pinch strength (key, tip and palmar)
- **3 trials**

- Fingertip dexterity
- **3 trials**

- Hand and forearm dexterity
- **4 trials**
Measurements

- Overhead lift
  - 5 attempts to reach maximum weight

- Overhead work

- Both single trial tests
- No adaptation for shortened protocol
Measurements

- Shortened protocols were not tested separately, but were derived from the data of the regular protocol
- Several questionnaires
  - Demographics
  - Validity testing
- UE-FCE was conducted twice
  - 1 to 3-week interval
Statistics

- **Comparison between SF and regular protocols**
  - Intraclass Correlation Coefficient (ICC) (≥0.90)

- **Test-retest reliability of the most concise protocol**
  - ICC (≥0.70)

- **Construct validity**
  - Pre-defined hypotheses
  - 54 on the strength of the association of FCE tests with other construct variables (questionnaires)
    - pain and/or upper extremity function
    - overall functioning and quality of life
  - 10 on known-group differences
# Results (preliminary research data)

- Measurements have been completed in 39 patients

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<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>43.2 ± 15.2</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>n=13 (33%)</td>
</tr>
<tr>
<td>Female</td>
<td>n=26 (67%)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Specific CANS</td>
<td>n=17 (44%)*</td>
</tr>
<tr>
<td>Nonspecific CANS</td>
<td>n=22 (56%)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>n=28 (76%)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>n=6 (16%)</td>
</tr>
<tr>
<td>Retired</td>
<td>n=3 (8%)</td>
</tr>
</tbody>
</table>

* Lateral epicondylitis (n=6), De Quervain’s disease (n=4), Dupuytren disease (n=4), trigger finger (n=3)
Results (preliminary research data)

- Hand grip strength tests
  - ICCs ranged from 0.96 to 0.99 (1 versus 3 trials)
- Pinch strength tests
  - ICCs ranged from 0.95 to 0.98 (1 versus 3 trials)
- Purdue Pegboard Test (PPT)
  - ICCs ranged from 0.96 to 0.98 (2 versus 3 trials)
- Complete Minnesota Dexterity Test (CMDT)
  - ICCs ranged from 0.93 to 0.94 (2 versus 4 trials)
## Results (preliminary research data)

<table>
<thead>
<tr>
<th>Test-retest reliability</th>
<th>ICC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand grip strength (1 trial)</td>
<td>.88 - .95</td>
</tr>
<tr>
<td>Pinch strength (1 trial)</td>
<td>.78 - .90</td>
</tr>
<tr>
<td>Purdue Pegboard Test (2 trial)</td>
<td>.62 (dominant)*</td>
</tr>
<tr>
<td>Complete Minnesota Dexterity Test (2 trial)</td>
<td>.64 (dominant)†</td>
</tr>
<tr>
<td>Overhead lift</td>
<td>.87</td>
</tr>
<tr>
<td>Overhead work</td>
<td>.76</td>
</tr>
<tr>
<td>Purdue Pegboard Test (3 trial): ICC .69 (dominant)</td>
<td></td>
</tr>
<tr>
<td>Complete Minnesota Dexterity Test (3 trial): ICC .70 (dominant)</td>
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</tbody>
</table>
## Results (preliminary research data)

<table>
<thead>
<tr>
<th>Construct validity</th>
<th>Pearson correlations</th>
<th>Known-groups</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QuickDASH</td>
<td>-.34</td>
<td>-.19</td>
</tr>
<tr>
<td>PRWHE</td>
<td>-.31</td>
<td>-.26</td>
</tr>
<tr>
<td>PDI</td>
<td>-.31</td>
<td>-.19</td>
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<tr>
<td>RAND-36 mental health</td>
<td>.17</td>
<td>.04</td>
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<tr>
<td>Difference male/female</td>
<td>M&gt;F</td>
<td>M=F</td>
</tr>
</tbody>
</table>
Conclusions

- For all UE-FCE tests an SF protocol is reliable in patients with CANS
  - Hand and pinch grip strength: 1 trial protocol
  - PPT and CMDT: 2 trial protocol
- Test-retest reliability is good for the majority of SF UE-FCE tests.
- Construct validity seems sufficient
  - Especially for overhead work
  - Extensive hypothesis testing will follow (ongoing analysis)
- SF UE-FCE instead of a longer regular protocol can be applied in clinical practice.
Take-home message

SF UE-FCE is reliable and seems valid and saves

TIME

MONEY

EFFORT