Evaluating the psychometric properties of the Clinical Case Assessment Tool (CCAT)

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Date: Friday, September 27, 2019
I do not have an affiliation (financial or otherwise) with a pharmaceutical, medical device or communications organization.

Je n’ai aucune affiliation (financière ou autre) avec une entreprise pharmaceutique, un fabricant d’appareils médicaux ou un cabinet de communication.
Background

- CBME – Competency Based Medical Education
  - Shift from time-based training to one based on competencies
- Work-Based Assessment (WBA) – direct observation and assessment of trainees’ performance
- Entrustment Scale for WBA
  - OSCORE – scale validated in Surgery (Rekman et al, 2016)
- Currently, no validated entrustment scale within Anesthesiology
Clinical Case Assessment Tool (CCAT)

- uOttawa Anesthesia CBD launched in 2015, prior to Royal College-established Entrustable Professional Activity (EPA)
- Narrative comments
  > Resident self-reflection + faculty feedback (face-to-face)
- Entrustment Scale
  > Scoring by faculty in 3 phases: preoperative assessment, intraoperative, postoperative plan
  > Different ratings in different contexts
Clinical Case Assessment Tool (CCAT)

CCAT Entrustment Scale

1 – “Staff had to do” (e.g., resident required complete hands-on guidance by staff, resident did not do case, resident was not given the opportunity to do case)

2 – “Staff had to talk resident through” (e.g., resident able to perform tasks but needed constant direction)

3 – “Staff had to prompt resident from time to time” (e.g., resident demonstrated some independence but required intermittent direction)

4 – “Staff needed to be in the room just in case” (e.g., resident was independent but unaware of risks and required supervision for safe practice)

5 – “Staff did not need to be there” (e.g., resident completely independent, understood risks and performed safely, ready for practice)

Domains
- Case Complexity: Low, Medium, High
- Setting: In Operating Room, In Clinic, On Call
- Stage of Training
Purpose of Study

- **Reliability** (internal consistency)
  - Factors contributing to the variability in entrustment scores in each category of the CCAT, including means, standard deviations, frequency of ratings, and proportion of missing data.

- **Validity**
  - To evaluate **construct validity** of the entrustment scales, we examined whether scores increased as residents progressed through levels of CBD training.
  - To evaluate **concurrent validity**, we compared mean entrustment scores to performance on other known metrics.
Study Context

• 3 cohorts (2015, 2016 & 2017) = 35 residents
• Data collected over initial 7 months of residency
  > Transition to Discipline & Foundations BootCamp + Clinical
• 2,309 entrustment scores analyzed: 66 avg. per resident
• Percentile scores on the AKT1 and AKT6, mean OSCE score, and median rank score allocated by the CCC at the end of the Foundations block
Methods

- **Construct Validity**
  > Did entrustment scores improve over time?
    » Mean scores across pre, intra, post phases

- **Concurrent Validity**
  > Did entrustment scores correlate with other high-stakes assessments of competence?
    » Anesthesia Knowledge Test (AKT) 1 & AKT 6
    » OSCE
    » Clinical Competence Committee (CCC)

- **Reliability**
  > Generalizability analysis for internal consistency
Results – Construct Validity

Bar chart showing mean entrustment scores for Transitions to Discipline, Bootcamp Foundations, and Clinical Foundations across preoperative, intraoperative, and postoperative phases.
Results – Concurrent Validity

- Higher intraoperative scores associated with:
  - Positive correlation AKT6 percentile scores
  - Positive correlation mean OSCE scores
  - Both intra & post significant, pre-op mean not correlated to other metrics

- Positive correlation of higher scoring (entrustment) residents were ranked higher by CCC members (correlates with pre, intra & post)

<table>
<thead>
<tr>
<th>CCAT Item</th>
<th>Preoperative</th>
<th>Intraoperative</th>
<th>Postoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATK 1 percentile</td>
<td>0.18</td>
<td>0.24</td>
<td>0.1</td>
</tr>
<tr>
<td>ATK 6 percentile</td>
<td>0.29</td>
<td>0.51**</td>
<td>0.39*</td>
</tr>
<tr>
<td>Mean OSCE Score</td>
<td>0.29</td>
<td>0.45**</td>
<td>0.35*</td>
</tr>
<tr>
<td>Median CCC rank</td>
<td>0.48**</td>
<td>0.55**</td>
<td>0.47**</td>
</tr>
</tbody>
</table>
## Results - Reliability

<table>
<thead>
<tr>
<th>Facet</th>
<th>Variance Component (VC)</th>
<th>VC%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident (r)</td>
<td>0.032</td>
<td>33.7%</td>
<td>The variance due to differences between residents</td>
</tr>
<tr>
<td>Month (m)</td>
<td>0.009</td>
<td>9.5%</td>
<td>The variance due to different months in the CBD curriculum</td>
</tr>
<tr>
<td>Item (i)</td>
<td>0.041</td>
<td>43.2%</td>
<td>The variance attributable to the items on the tool.</td>
</tr>
<tr>
<td>r*m</td>
<td>0.009</td>
<td>9.5%</td>
<td>The variance attributable to the individual residents across the first seven months of training (i.e. did residents differ in how they were scored based on the month in which they were assessed?)</td>
</tr>
<tr>
<td>r*i</td>
<td>0.001</td>
<td>1.1%</td>
<td>The variance attributable to the interaction between residents and items (i.e. did residents differ in how they were scored on particular items?)</td>
</tr>
<tr>
<td>m*i</td>
<td>0</td>
<td>0%</td>
<td>The variance attributable to the interaction between months of training and items (i.e. did item means vary based on at what point in the curriculum the assessment took place?)</td>
</tr>
<tr>
<td>r<em>m</em>i</td>
<td>0.003</td>
<td>3.2%</td>
<td>The variance attributable to the residents, time, items, plus random error</td>
</tr>
</tbody>
</table>

G-coefficient: 0.73
Discussion

• Limitations
  > Localized to one site
  > Time period of the first 7 months of residency
  > CCAT specific

• Future Directions
THANK YOU!

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