Evaluating A Cognitive Support System For Psychiatric Clinical Comprehension

Venkata V.K. Dalai, MBBS, MPH1,2, Dinesh Gottipatti, MS1, Thomas Kannampallil, MS3, Vineeth John, MD, MBA4, Trevor Cohen, MBChB, PhD1,2

1The National Center for Cognitive Decision Making in Healthcare | 2The School of Biomedical Informatics at The University of Texas Health Science Center Houston | 3New York Academy of Medicine | 4University of Texas Medical School at Houston

Introduction

- Clinical comprehension differs between experts and novice clinicians with respect to selective filtering, pattern recognition and accuracy of inference generation [1].
- The ability to generate "intermediate constructs" (meaningful clusters of observations that point toward specific diagnoses) is a distinguishing characteristic of expert clinical comprehension [2].
- So a cognitive support system that organizes the information in a manner that mediates efficient problem solving may improve clinical comprehension, and hence the quality and efficiency of patient care.
- This poster documents the evaluation of a cognitive support system that organizes psychiatric narrative in accordance with key intermediate constructs [3].

Methodology

Participants and Study Design

- Sixteen (n=16) PGY3 psychiatry residents.
- Within-subjects, repeated measures 2x2 experiment with Case Complexity and Interface Type (IC, No-IC) (Figure 1) as factors.
- Order of cases counterbalanced to avoid learning effects.

Procedure

- Participants instructed to read case while thinking aloud, and then summarize key features.
- Verbal protocols audio-recorded and transcribed for text analysis.
- The interaction with the system was captured using Techsmith Morae.
- Text analysis of case summaries are used in this research report.

Qualitative Analysis:

- Descriptive analysis of the usage of the interface by the IC group participants, used to determine if there was any correlation with the expert’s approach and betterment in clinical comprehension, when compared to No-IC group.

Identification of Facets:

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>Units of clinically relevant Information</td>
<td>“voices of god telling her to kill her husband”</td>
</tr>
<tr>
<td>Findings</td>
<td>Subset that is relevant to patient care</td>
<td>“Command auditory hallucinations”</td>
</tr>
<tr>
<td>Facets</td>
<td>Clusters of findings related by pathophysiology</td>
<td>“Psychosis”</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>Subsumes all previous levels</td>
<td>“Schizophrenia”</td>
</tr>
</tbody>
</table>

Quantitative Analysis:

- Latent Semantic Analysis (LSA) [4] was used as a means to measure representation of aspects of case deemed relevant by experts.

Results and Discussion

- Individual performances were strongly correlated across cases (Pearson’s r=0.8894).
- This effect was far more prominent in the IC group (Pearson’s r=0.9479) than the No-IC group (Pearson’s r=0.8810).
- Statistically significant difference is between CASE1_NOIC and CASE2_NOIC (t(7)= 3.1108, p= 0.0171)
- Significant drop in the similarity between participants and the reference standard in the No-IC group when moving from the simple case to the complex case.

Summary of Conclusions

- Quantitative results suggest supportive effects in complex case.
- Descriptive findings demonstrate the interplay between information organization by the system and diagnostic reasoning.
- Limitation: variable system use by IC participants
- A follow up study is currently underway with altered experimental design to further encourage system use in IC case.

References


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Please contact: Venkata.V.Dalai@uth.tmc.edu