Comparison Between Flat and Enhanced Electronic Clinical Outcome Assessments of Mini-Mental State Attention and Calculation in Clinical Trials of Alzheimer's Disease

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The Methodological Question being Addressed
When compared to "flat" eCOA, does an "enhanced" version of the Mini-Mental State Exam (MMSE) reduce scoring errors on Serial 7s (Attention and Calculation)?

Introduction (Aim)

Electronic clinical outcome assessments (eCOA) in conjunction with audio monitoring of scale administrations by trained and calibrated central reviewers significantly improves data quality. While eCOA provides utility over paper versions, scales without built-in quality checks (i.e. "flat") may not reduce errors to the same degree as versions with built-in quality checks (i.e. "enhanced").

The MMSE is commonly used as an inclusion criterion for clinical trials of AD. Historically, the working memory domain, often referred to as "Serial 7s," has proved problematic for raters to properly administer and score. Given the various eCOA versions of the MMSE currently in use, it is important to compare their respective ability to reduce rater error and enhance data quality. In this analysis we compared two different eCOA versions of the MMSE which were utilized in similar multinational AD clinical trials in order to determine if an "enhanced" version with built-in quality checks significantly reduced error rates, when compared to a "flat" version, both overall in the scale and specifically, within the working memory (Serial 7s) domain.

Methods

All screening visit MMSEs from two multinational AD clinical trials were reviewed by trained, local language, expert central reviewers for both scoring and administration errors. Reviewers evaluated scoring accuracy and listened to audio recordings of the assessment in order to identify additional scoring and/or administration errors. One study used a traditional "flat" eCOA version of the MMSE (n = 2,612), while the other utilized an "enhanced" eCOA version (n = 1,999). The "enhanced" version contained automated scoring for many of the MMSE scale items including Serial 7s whereas the "flat" version required raters to score the entire scale manually.

Results

Pearson's chi-square test revealed significantly fewer overall scoring errors ($p < .01$) in the "enhanced" version (14.86%) when compared to the "flat" version (18.38%). In particular, using the "enhanced" version resulted in significantly fewer ($p < .05$) scoring errors (1.75%) on Serial 7s compared to the "flat" version (2.79%). The remaining scoring errors in the "enhanced" version were transcription errors. Across the entire MMSE, significantly fewer administration errors were observed ($p < .01$) in the "enhanced" version (13.61%) when compared to the "flat" version (20.21%). However, there was no difference in administration errors on Serial 7s between the two eCOA versions ($p > .05$).

Conclusions

The use of an "enhanced" eCOA version of the MMSE resulted in a significant reduction in the number of scoring errors, both in the overall scale as well as on Serial 7s. This finding suggests that employing intelligent design with automated scoring within an eCOA version of the MMSE is important for reducing measurement error. These findings also highlight the added benefit of using an "enhanced" version of the MMSE along with audio surveillance in order to improve data quality.