Remote telephone-based assessment and the additional clinical use of speech features in the Semantic Verbal Fluency task

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Background. The COVID-19 pandemic had accelerated the transition to remote neuropsychological assessment (NPA), which results in reducing the burden on patients, saving time and reducing costs. However, the accuracy of remote telephone-based administration remains unclear. We investigated the clinical additional value of the Semantic Verbal Fluency (SVF) task and its related speech and linguistic features in early diagnostics of dementia in a semi-automated NPA. Furthermore, we examined the user-experiences of the telephone assessment and compared this to the care-as-usual face-to-face assessment.

Method. In the DeepSpA project, 134 participants did a telephone-based neuropsychological assessment. All participants underwent a face-to-face (NPA) at baseline and after 6-months a semi-automated telephone-based NPA in the memory clinic of the MUMC+ (Maastricht, the Netherlands). Both assessments included the SVF task (animals and groceries, 60 seconds) which was administered and recorded via the Apollo application (ki:elements). The additional clinical value of the speech and linguistic features, such as mean word frequency, temporal and semantic clusters etc., and clinical diagnosis, were investigated by using machine learning models (random forest) corrected for age. Questionnaires on user-experience were administered after each assessment. The answers were analysed with a dependent samples t-test comparing the face-to-face with the semi-automated telephone assessment.

Results. Compared to the commonly used SVF total score (AUC=0.69), automatically derived speech and linguistic features had an additional value in the differentiation between people with and without cognitive disorders in the telephone-based assessment (AUC=0.71). The user-experience ratings for simplicity, conceivability, comfortability of the assessment and to repeat the assessment were comparable for both assessment modalities.

Conclusion. Automatically derived speech and linguistic features of the SVF task have a clinical additional value in early diagnostics of dementia. A telephone-based assessment could be considered as an easy tool to follow patients remotely over time.

Keywords: remote testing, cognitive assessment, dementia