

Feature development of a digital measure of the finger tapping task

Topic Biomarkers

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What is the Methodological Question Being Addressed Algorithm development to support the feature identification and scoring of a digital endpoint

Introduction The development of novel digital endpoints frequently requires the development of new scoring algorithms to work with new types of data. In this poster, we describe utilizing a retrospective dataset in the development of a new scoring algorithm for Finger Tap. Finger Tap is an assessment of finger dexterity used in CNS conditions.

The mPower smartphone app, developed by non-profit research organization Sage Bionetworks, is a research app used in a series of clinical trials for Parkinson's disease. Data from these trials is made available to researchers for analysis. The mPower app includes a digital Finger Tapping assessment. The Finger Tap digital task requires patients to alternately tap two buttons on the touchscreen. The coordinates of the patient touch and timestamp are recorded. A scoring algorithm that incorporated additional features could increase the sensitivity of the measure. We analyzed a retrospective data-set of mPower Finger Tap data to determine which features were most relevant and differentiating.

Methods The Sage mPower dataset was used for this analysis. A subset of the data on Tap Analysis was identified for both healthy subjects and Parkinson's Disease patients during an off state. Six features were analyzed for differences between the groups; Speed, Correct tap sequence, speed regularity, positional accuracy, Speed left-right vs right-left, Change in speed over assessment. The Kolmogorov-Smirnov test is used to determine if the features are significantly different between the two groups.

Results Tapping speed, correct tap sequence, and speed regularity were identified as useful features. The results are summarized in Table 7. Self stated healthy subjects had higher tapping speed. Healthy subjects generally produce more accurate sequence of taps, although there is considerable overlap between the two populations. Healthy subjects had higher speed regularity. The remaining features were determined to not be useful.

Conclusion Digital endpoints utilizing a smartphone app to replace a traditionally administered clinician-reported or performance-reported outcome frequently may allow for more fine-grained scoring and measurement than questionnaires provide. Developing and validating scoring algorithms for digital measures can be supported by use of retrospective datasets.

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