Automatized assessment of motor function in patients with NMD: MFM-Digital Study

D. Vincent-Genod, J. Coton, Adriana Gomes Lisboa de Souza, A Daron, L Servais, P. Rippert, Guillaume Thomann, C. Vuillerot

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The Motor Function Measure (MFM), a validated and sensitive tool applicable to ambulant and non ambulant patients with neuromuscular disorders (NMD), is currently used as outcome measure in clinical studies. By using digital technologies, we want to create an automated assessment based on MFM. The objectives are to improve the MFM reliability and its acceptability by turning the assessment into a serious game. Feasibility studies assessing the relevance of digital systems to capture postures and motions during a MFM test have shown that on 32 items of the MFM, 14 could be recognized by the Kinect and 3 by a digital tablet. Here we present preliminary studies to the conception of automated scoring systems.

**RESULTS MFM-KINETIC**

119/140 records were interpretable. Some digital data were not analyzed because of capture problems with distortion skeleton, for example for patient with small amplitude movements or sitting on a wheelchair. On interpretable records, a great agreement between items scoring by a therapist and items blind scoring on captured digital data were found (75.6%). Differences between both studies concern as well concordance than interpretative capture.

**RESULTS MFM-DIGITAL TABLET**

37 patients were included in the MFM-tablet (with inclusion still on-going), with 11 DMD, 7 neuropathies, 6 SMA and 13 others. Median age of patients were 15.8 years (IQR: 9.4 - 43.8) and median of %MFM total score were 81.2 % (IQR: 59.4 - 87.5). The agreement between scoring on paper vs tablet is excellent (κ = 0.81) for items 18 and 22, good (κ = 0.61-0.8) for item 19.

**DISCUSSION and CONCLUSION**

Results are encouraging to support the development of an automatized MFM. Additional work is needed to improve Kinect capture for weaker patient and to resolve interference problems. In study 2, MFM-Kinect protocol was included in a long list of tests during Nathlis-SMA, which could explain result differences between studies. The MFM-tablet results place the tablet in the assessment tools of the upper limb. The children showed a greater interest for the tablet application. The data supplied by the system MFM-digital bring additional data, in particular the timing of items’ exercises and kinematic parameters which could refine the sensitivity of MFM. We explore avenues of improvement of the system, in particular concerning the capture for weaker patients. The next step will be to use algorithms providing automatic scorings based on digital data and we are still looking for new digital technologies able to capture additional items.