A MOTOR FUNCTION MEASURE SCALE FOR NEUROMUSCULAR DISEASES. VALIDATION AND SENSITIVITY STUDY

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Background
In order to improve the knowledge of natural history of each aetiology of neuromuscular diseases, to select patients for therapeutic trials and to quantify outcomes of therapeutic measures, we needed precise tools to objective the motor disabilities of patients. The Motor Function Measure (MFM) scale has been developed and evaluated for neuromuscular diseases.

After an international consultation with a temporary scale, a French version of the MFM scale including 51 items was written and tested with 376 children and adults with NMD between May 2000 and April 2001. In light of the results, a last version was written, tested between May 2002 and July 2004 and validated.

The scale comprises 32 items.

Three dimensions are evaluated including :
D1: the standing position and transfers
D2: the sitting position and limbs proximal motor function
D3: the distal motor function.

The scorings use a 4-point Likert scale based on the abilities of the subject without any help :
0: does not initiate the movement or cannot maintain the starting position,
1: initiates or partially completes the task
2: completes the task fully, but with compensation strategies or very slowly with obvious clumsiness,
3: fully completes the task in a normal way or with a standard pattern

Scoring was detailed in a manual with precise guidelines for each item …

Ex: supine (sits up on mat, arms free)
0: Position the patient on the mat or a wide table, arms and legs comfortably positioned. The legs off the edge of the table are not allowed.
1: Instruct the patient to sit up, arms free if possible. Once the sitting position is achieved, the arms can be used to gain stability.
2: does not initiate movement
3: initiates movement or sits up on mat by rolling to prone
2: sits up on mat by arm propping – rolling onto one side is permissible, as well as propping with one or both arms but not rolling to prone
3: sits up on mat, arms free

Patients
302 patients (6 to 62 years) with NMD were recruited for the validation study between May 2002 and March 2003 in 19 units in France and in Switzerland. The sensitivity to change was assessed with 152 patients between October 2003 and July 2004.

Biologically confirmed diagnosis included were :
- Duchenne muscular dystrophy (DMD)
- Becker muscular dystrophy (BMD)
- Facio-scapulo-humeral dystrophy (FSHD)
- Limb girdle muscular dystrophy (LGMD)
- Congenital muscular dystrophy (CMD)
- Myotonic dystrophy
- Congenital myopathy.
- Spinal muscular atrophy.
- Hereditary neuropathy.

Methods of validation
Inter and intra observer reliabilities were tested with 54 and 41 patients, respectively.

The construct validity was established through correlations with convergent criteria such as, Brooke and Vignos scales, the FIM, and several visual analogic scales of severity, and by factorial analysis for evaluation of internal structure and underlying dimensions.

Sensitivity to change was assessed one year later with a subsample of 152 patients.

The study was approved by the Ethical Committee of Lyon A and the Ethics Committee of Lausanne (Switzerland).

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Characteristics of the patients

Age: 24.5 ± 15.4 years.
- 31% were female and 69% male.
- 49% were children and 51% adults.
- 45% could not walk and 57% used a wheelchair.
- 6% had a tracheotomy.

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The MFM scale is well accepted by the patients. Some of them discovered new motor abilities during this half an hour evaluation. The results objective a good correlation with clinical evaluations and good reliability. The sensitivity to change has been confirmed by the second test one year later. This tool seems to be discriminant and adapted to assess according three different dimensions the clinical expression or evolution of neuromuscular diseases.