Use of the Quality Function Measure (QFM) to evaluate changes in quality of movement in ambulant children with cerebral palsy following lower limb Botulinum Toxin A injections

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Background

Quality of movement (QOM) is an essential component of effective motor skills in children with Cerebral Palsy (CP), influencing not only a child's functional activity level but also their participation opportunities. Botulinum Toxin A (BoNT-A) is an established treatment modality in the management of increased tone in CP and is frequently used in an attempt to optimize a child’s functional skills and improve QOM. However, evidence associating reduction in dynamic spasticity and improvement in QOM is lacking and there is a demand for more sensitive outcome measures to evaluate the efficacy of BoNT-A in CP. Quality Function Measure (QFM) is a standardised outcome measure evaluating QOM of standing, walking, jumping and running skills in ambulant children with CP. It is based on Dimensions D and E of the ‘gold standard’ Gross Motor Function Measure (GMFM) and is reported to be sensitive to change when evaluating therapeutic interventions and assesses movement quality in 5 dimensions: Alignment, Stability, Coordination, Dissociation & Weight-shift.

Objectives

To evaluate the feasibility of introducing the Quality Function Measure (QFM) into an established clinical setting to assess short-term change in QOM following lower limb BoNT-A use in ambulant CP.

Methods

- This feasibility study forms part of a prospective longitudinal study evaluating the use of lower limb BoNT-A over a 12 month period
- 55 children with CP (29 Female, 26 Male) attending the BoNT-A clinic of a tertiary Motor Disorders Service were recruited.
- All children were ambulant classified as Gross Motor Function Classification System (GMFCS)1 levels I-III
- GMFCS levels: I n= 20 II n= 21 III n= 14
- Age at recruitment: Mean (SD) 7.4 years (2.8)
- Specialist Physiotherapists (≥15 years paediatric experience) administered the Gross Motor Function Measure (GMFM) pre injection and 6 weeks post injection following a standardized protocol (up to 3 trials) to digitally capture performance from frontal and coronal planes of movement as per QFM protocol2
- Time to administer QFM
- Mean time to administer the test was 39 mins (range 25-60 mins).
- Administration time differed between GMFCS levels;
  - I = 28 mins (SD 2.4 mins)
  - II = 37 mins (SD 6.8 mins)
  - III = 52 mins (SD 8 mins)
- Level III children completed fewer test items but took longer to complete the tests and exhibited increasing fatigue.

Conclusions

- Introduction of QFM has proved acceptable in an established clinical setting provided clinic times are extended to incorporate the test
- QFM administration in the clinical setting (39 mins) compares to other standardised tests requiring post clinic evaluation
- Preliminary results suggest that improvement in QOM is associated with short term reduction in dynamic spasticity following BoNT-A
- However with a mean QFM scoring time of 60 minutes3 an important consideration is whether the lengthy scoring time for post clinic analysis prohibits its use in a clinical setting

References