Functional Gross Motor Assessments for children with Cerebral Palsy

Measuring motor function in children with cerebral palsy is vital to give children and parents feedback on their progress over time, set goals and plan treatment, and evaluate change within research. The 'gold standard' measure of motor function for children with cerebral palsy is widely acknowledged to be the Gross Motor Function Measure (GMFM)[1-3]. However, this can take from 20 – 90 minutes to administer and score depending whether the GMFM-88, GMFM-66 or one of the abbreviated versions are used[4]. Although therapists can learn to administer and score it from the manual and a training video is also available, these have a cost. Training courses are also known to improve reliability[5], but these are not always available in every country.

Some brief reliable measures of motor function exist which can also be useful in assessing skills and monitoring change in children with cerebral palsy. They are simple to use and free of charge. They can easily be administered in the home, clinic or school environment.

Measures include:

- 10 meter timed walk
- 1 minute walk
- Timed up and go TUG
- Timed up and down stairs TUDS
- Lateral step up test LSU
- Sit to stand test SST

These have shown moderate to high correlations with GMFM standing and walking dimension scores. In addition, the 1-minute walk, LSU, and 10-meter walk measures are positive predictors of the GMFM-88 (dimensions D and E) and can differentiate between children in Gross Motor Function Classification System (GMFCS) levels I-III to differing extents[6,7].

Instructions follow for the administration and scoring of the different tests with references to articles describing the different assessments. For more information on reliability and validity please see references.

10 Metre Walk Test[6]

This uses a 14 meter walkway with marked points 2 meters after the starting point and 2 meters after the finishing point.

The child is instructed to walk at their typical speed with or without aids.

A stopwatch is used to measure the time needed for the child to cover a 10-meter walking distance starting from 2 meters after the starting point and 2 meters before the finishing point.

Chrysagis N, Skordilis EK, Koutsouki D2014 Validity and clinical utility of functional assessments in children with cerebral palsy. Arch Phys Med Rehabil. Feb;95(2):369-74.

1 minute walk test[8]

The 1-minute walk test is used to evaluate the child's ability to walk around a 20 or 35 metre oval track as fast as possible without running.

The distance covered by the child (with or without splints and walking aids), during 1 minute is measured.

Chong J, Mackey AH, Broadbent E, Stott NS. 2011 Relationship between walk tests and parental reports of walking abilities in children with cerebral palsy. Arch Phys Med Rehabil. Feb;92(2):265-70.

Timed ‘Up and Go’ test in children[9]

Test administration:

Child sits on a seat with backrest, no armrest, knees at 90°, feet flat on floor.

Child rises from a seat without arms (knees at 90°), stands momentarily, walks 3 meters forwards and touches a target on the wall, turns, return to same seat and sit down.

Examples of instructions

This test is to see how you can stand up, walk, touch the green spot (or other marker on wall), then come back and sit down.

Give a demonstration.

The stopwatch is to time you.

After I say ‘Go’, walk and touch the spot and come back and sit down.

When you are ready ….Go! Don’t forget to touch the spot, come back, and sit down *(repeat instructions while child does task).*

Timing starts as soon as the child leaves the seat (rather than on instruction ‘go’) and stops as the child’s bottom touches seat, so only movement time is measured *(not reaction time as well).*

Repeat test if child interrupts performance by normal behavioural variation, e.g. hopping, running.

Record results: Total time in seconds from child leaving seat to bottom touching seat

Williams E. et al (2005) Investigation of the timed ‘Up & Go’ test in children. *Dev Med Child Neurology,* 47:518-524

Timed up and down stairs test[10]

This is recorded as being done

Up/down flight of 14 stairs

Or

Up/down 4 stairs

Test administration

- Stand at bottom of staircase (4 steps of height 12cm and with lateral handrails)

- Participant instructions: “Go up to the top of the stairs, turn around and come back down. Use the handrails if you need to. Do not run”.

- Timing: record from the command “go” and stop when both feet were returned to the bottom of the staircase.

- Recording results: Total time to go up/down 4 stairs

The same procedure can be followed for the Up/down 14 stairs

Chrysagis, N; Skordilis, Emmanouil K.; Tsiganos, G; Koutsouki, D; Validity evidence of the Lateral Step Up (LSU) test for adolescents with spastic cerebral palsy. Disability & Rehabilitation, July2013; 35(11): 875-880

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Lateral Step up Test[10]

Test each leg separately.
One foot remains on the step (tested leg).
The other foot is placed on and off the step (non-tested leg).

- Test administration – stand in front of a step
  - 21-cm (GMFCS E&R levels I and II) or
  - 12-cm (GMFCS E&R level III)

- Participant instructions:
  - instruct the child to place the tested leg on the step and keep it there throughout the test, then when I say 'go'
  - When I say 'GO' lift your other leg *(non-tested leg)* and put it on the step making sure you fully straighten your leg *(extend hip and knee)* then
  - place your foot back on the floor *(non-tested leg)*
  - Keep repeating this until I say 'stop'

- Record for 30 seconds: One repetition is recorded each time the non-tested leg is placed back onto the floor.

- Recording results: Number of repetitions achieved in 30 seconds.

Chrysagis, Nikolaos; Skordilis, Emmanouil K.; Tsiganos, Georgios; Koutsouki, Dimitra; Validity evidence of the Lateral Step Up (LSU) test for adolescents with spastic cerebral palsy. Disability & Rehabilitation, July2013; 35(11): 875-880

Sit to stand test - 5 repetitions[7]

Test Administration:
You can just test once.
Some authors suggest mean of 3 trials with 2 minute rests in-between.
Some authors record number of repetitions in 30 seconds.

1. SET UP
   - Patient sits with arms folded across chest and with their back against the chair.
   - Use a chair without arms which allows hips and knees to be flexed to 90 degrees (keep testing chair consistent for each retest)

2. Patient Instructions: "I want you to stand up and sit down 5 times as quickly as you can when I say 'Go'."
   - "Try not to touch the back of the chair when you sit down"
   - "Make sure you stand all the way up" or "touch my hand with your head each time you stand up" - *(Can also hold or set up something above child for them to touch each time with their with head)*
   - Try NOT to talk to the patient during the test (may decrease patient's speed)

3. Practice trial Provide one trail before measurements are recorded. If you are concerned that the patient may fatigue with a practice trial, it is OK to demonstrate to the patient and have the patient do three repetitions to ensure they understand the instructions

4. Timing begins at "Go" (as trunk comes forwards) and ends when the buttocks touches the chair after the 5th repetition.

5. Recording results:
   - Record total time for 5 repetitions e.g. 15 seconds
   - Record repetitions per second e.g. 15/5 = 0.33
   - Inability to complete five repetitions without assistance or use of arms indicates failure of test and zero score.
   - *If you have instead recorded maximum number of repetitions in 30 seconds – state this is what you have done*

Tze-Hsuan Wang, Hua-Fang Liao, Yi-Chun Peng (2011[7]. Clinical Rehabilitation 26(7) 664–671

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