

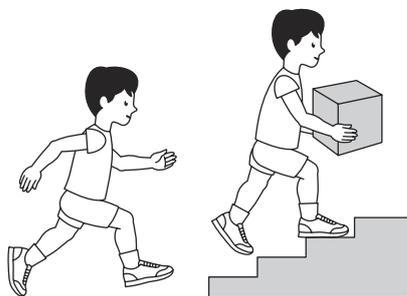
Fig. E-1

The Gross Motor Function Classification System. The Gross Motor Function Classification System was described by Palisano and colleagues in 1997 and is a five-level ordinal grading system. The Gross Motor Function Classification System can be used to describe gross motor function in children with cerebral palsy in four age bands: under two years, two to four years, four to six years, and six to twelve years. Descriptors for children over the age of twelve years are currently under development.

Children in level I have mild involvement and can perform most of the activities of their age-matched, normally developing peers, with only modest qualitative impairment. Children in level V have severe involvement, lacking head control and sitting balance. The descriptors reported by Palisano et al., with illustrations from The Royal Children's Hospital in Melbourne, Australia, are shown in Figure E-1 for each Gross Motor Function Classification System level in the six to twelve-year age band. These are the descriptors that were applied to our study cohort, although some of the patients were considerably older than twelve years of age at the time of follow-up. We decided to use these descriptors in the absence of descriptors for an older age-group.

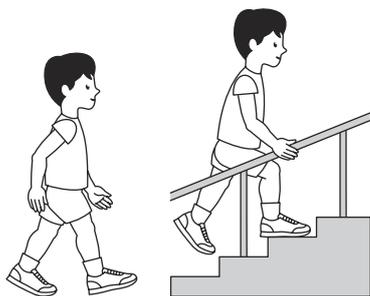
The Gross Motor Function Classification System has been demonstrated to be valid, reliable, and relatively stable over time. Children are not expected to have a change in their Gross Motor Function Classification System level, and the Gross Motor Function Classification System can be considered to be a prognostic tool for predicting motor development in children with cerebral palsy. It is therefore of some importance that two of the children in our study improved by one Gross Motor Function Classification System level following surgery and rehabilitation for severe crouch gait. (Reprinted, with permission, from: Graham HK. Classifying cerebral palsy. *J Pediatr Orthop*. 2005;25:128. Also reprinted with permission from: H. Kerr Graham and Bill Reid.)

GMFCS for children aged 6–12 years: Descriptors and illustrations



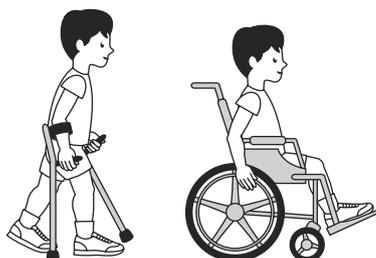
GMFCS Level I

Children walk indoors and outdoors and climb stairs without limitation. Children perform gross motor skills including running and jumping, but speed, balance and co-ordination are impaired.



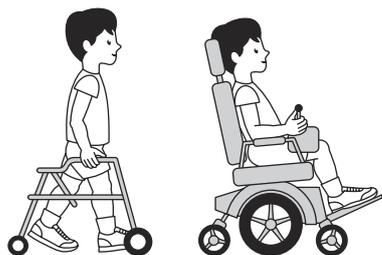
GMFCS Level II

Children walk indoors and outdoors and climb stairs holding onto a railing but experience limitations walking on uneven surfaces and inclines and walking in crowds or confined spaces.



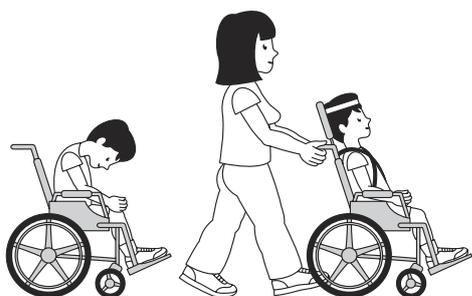
GMFCS Level III

Children walk indoors or outdoors on a level surface with an assistive mobility device. Children may climb stairs holding onto a railing. Children may propel a wheelchair manually or are transported when traveling for long distances or outdoors on uneven terrain.



GMFCS Level IV

Children may continue to walk for short distances on a walker or rely more on wheeled mobility at home and school and in the community.



GMFCS Level V

Physical impairment restricts voluntary control of movement and the ability to maintain antigravity head and trunk postures. All areas of motor function are limited. Children have no means of independent mobility and are transported.

Footnote GMFCS by Palisano et al.

Palisano RJ, Rosenbaum P, Walter S, Russell D, Wood E, Galuppi B. Development and reliability of a system to classify gross motor function in children with cerebral palsy. *Dev Med Child Neurol.* 1997;45:113–120. Illustrated by Kerr Graham and Bill Reid, The Royal Children's Hospital, Melbourne.

Fig. E-2

Functional Mobility Scale. The Functional Mobility Scale (FMS) was devised by Graham and colleagues from the Hugh Williamson Gait Laboratory and the Royal Children's Hospital in Melbourne, Australia. The functional mobility scale is a six-level ordinal grading system in which the level of support required by a child to achieve mobility is graded over three specific distances, representing mobility at home, at school, and in the community. The scale was developed in response to the observation that children with cerebral palsy frequently use different levels of assistance to achieve mobility. For example, a child with moderately severe spastic diplegia may take a few steps unaided at home but may require Canadian crutches at school and a wheelchair to access a shopping mall. A child who functions in this manner would be described as FMS 5, 3, 1. The FMS has been shown to be valid, reliable, and responsive to change following intervention such as multilevel orthopaedic surgery. (Reprinted, with permission, from: Graham HK, Harvey A, Rodda J, Nattrass GR, Pirpiris M. The Functional Mobility Scale (FMS). *J Pediatr Orthop.* 2004;24:514-20.)

Examples

- a) A child who walks independently at home on all surfaces but uses crutches in the school playground and a wheelchair for long family walks or school outings would be scored as:

6 3 1

- b) A child who uses crutches indoors at home, a walker in the playground at school and a wheelchair to go to the shopping centre would be scored as:

3 2 1

- c) A child who walks independently on all surfaces at home including steps without a rail but at school and for longer distances tend to lose balance on uneven ground or in crowds would be scored as:

6 5 5

- d) A child who uses a walker at home and in physiotherapy but in all other settings uses a wheelchair would be scored as:

2 1 1

- e) A child who walks independently without assistive devices at home on level ground only and uses two single point sticks at school in the classroom and the playground and a walker for longer distances would be scored as:

5 4 2

References

- 1) Graham H.K., Harvey A., Rodda J., Nattrass G.R., Pirpiris M. (2004). The Functional Mobility Scale (FMS). *JPO* 24(5): 514–520.
- 2) Palisano R.J., Tieman B.L., Walter S.D., Bartlett D.J., Rosenbaum P.L., Russell D., Hanna S.E. (2003). Effect of environmental setting on mobility methods of children with cerebral palsy. *Dev. Med. Child Neurol.* 45: 113–120.

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ERC: 061076

FMS

The Functional Mobility Scale (version 2)

For children with cerebral palsy
aged 4–18 years



Developed by the
Hugh Williamson Gait Laboratory
The Royal Children's Hospital
Melbourne, Australia
Part of the Gait CCRE
www.rch.org.au/gait



Introduction

The Functional Mobility Scale (FMS) has been constructed to classify functional mobility in children, taking into account the range of assistive devices a child might use.

The scale can be used to classify children's functional mobility, document change over time in the same child and to document change seen following interventions, for example orthopaedic surgery or selective dorsal rhizotomy.

The FMS rates walking ability at three specific distances, 5, 50 and 500 metres, (or 5, 50, 500 yards). This represents the child's mobility in the home, at school and in the community setting. It therefore accounts for different assistive devices used by the same child in different environments.

Assessment is by the clinician on the basis of questions asked of the child/parent (not direct observation). The walking ability of the child is rated at each of the three distances according to the need for assistive devices such as crutches, walkers or wheelchair. Orthotics which are regularly used should be included for the rating.

The FMS is a **performance** measure. It is important to rate what the child **actually does** at this point in time, not what they **can do** or **used to be able to do**.



Developed by the Hugh Williamson Gait Laboratory, The Royal Children's Hospital, Melbourne, Australia. Part of the Gait CCRE.

www.rch.org.au/gait

Rating **6**

Independent on all surfaces:

Does not use any walking aids or need any help from another person when walking over all surfaces including uneven ground, curbs etc. and in a crowded environment.

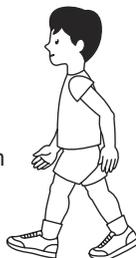


Rating **5**

Independent on level surfaces:

Does not use walking aids or need help from another person.* Requires a rail for stairs.

*If uses furniture, walls, fences, shop fronts for support, please use 4 as the appropriate description.



Rating **4**

Uses sticks (one or two):

Without help from another person.



Rating **3**

Uses crutches:

Without help from another person.



Rating **2**

Uses a walker or frame:

Without help from another person.



Rating **1**

Uses wheelchair:

May stand for transfers, may do some stepping supported by another person or using a walker/frame.



Rating **C**

Crawling:

Child crawls for mobility at home (5m).

Rating **N**

N = does not apply:

For example child does not complete the distance (500 m).

Walking distance	Rating: select the number (from 1–6) which best describes current function
5 metres (yards)	
50 metres (yards)	
500 metres (yards)	

Questions

To obtain answers that reflect performance, the manner in which the questions are asked of the child/parent is important. The questions we use to obtain the appropriate responses are:

1. How does your child move around for short distances in the house? (5m)
2. How does your child move around in and between classes at school? (50m)
3. How does your child move around for long distances such as at the shopping centre? (500m)

The distances are a guide. It is the environment that is most relevant.

Qualifiers

The difference between 1–4 is self-explanatory, however the difference between 5 and 6 is less clear.

5 metres: children who require a rail for stairs would be rated as 5 and children who do not require a rail or help would be rated as 6.

50 metres: children who can walk on all surfaces including uneven surfaces and steps, particularly at school are rated as 6 and children that require help on these surfaces but can walk on level surfaces without help are rated as 5.

500 metres: children who can walk on all surfaces including rough ground, curbs, steps and in crowded environments in the community without help are rated as 6 and children who walk long distances only on level surfaces and have difficulty walking in crowds are rated as 5.