Functional classification of cerebral palsy

Welcome to the second newsletter from the Northern Ireland Cerebral Palsy Register (NICPR). This short newsletter will focus on use of classification systems in children with cerebral palsy (CP).
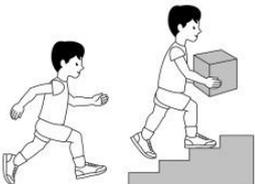
Assessment in children with CP is challenging due to the heterogeneous nature of the condition. Classification systems are a quick and simple form of assessment that enable grouping of similar children for registries and research. They are also useful tools in the clinical environment, providing a common language that facilitates clear communication between healthcare professionals.

Several valid and reliable classification tools are available to categorise the abilities of children with CP according to their typical performance in daily life. The tools outlined below are analogous and complement each other, and thus can be used to provide an entire clinical picture of a child with CP.

GMFCS - E&R

The Gross Motor Function Classification System Expanded and Revised (GMFCS) is a universally accepted means of classifying gross motor function in children aged under two to 18 years with CP. It is stable over time meaning it can also be used to predict future gross motor function in children with the condition (Wood and Rosenbaum 2000).

The image below shows descriptors and illustrators for a child between their 6th and 12th birthday (Palisano et al 2007, Palisano et al 1997).

GMFCS Level I

Children walk at home, school, outdoors and in the community. They can climb stairs without the use of a railing. Children perform gross motor skills such as running and jumping, but speed, balance and coordination are limited
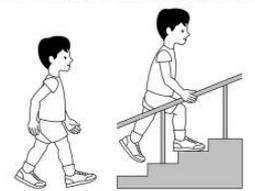
GMFCS Level II

Children walk in most settings and climb stairs holding onto a railing. They may experience difficulty walking long distances and balancing on uneven terrain, inclines, in crowded areas or confined spaces. Children may walk with physical assistance, a hand-held mobility device or used wheeled mobility over long distances. Children have only minimal ability to perform gross motor skills such as running and jumping.
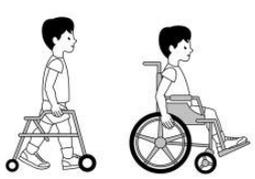
GMFCS Level III

Children walk using a hand-held mobility device in most indoor settings. They may climb stairs holding onto a railing with supervision or assistance. Children use wheeled mobility when traveling long distances and may self-propel for shorter distances.
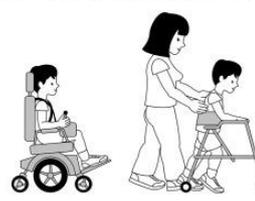
GMFCS Level IV

Children use methods of mobility that require physical assistance or powered mobility in most settings. They may walk for short distances at home with physical assistance or use powered mobility or a body support walker when positioned. At school, outdoors and in the community children are transported in a manual wheelchair or use powered mobility.
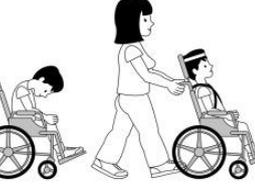
GMFCS Level V

Children are transported in a manual wheelchair in all settings. Children are limited in their ability to maintain antigravity head and trunk postures and control leg and arm movements.

GMFCS descriptors: Palisano et al. (1997) Dev Med Child Neurol 39:214-23
CanChild: www.canchild.ca

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The Royal Children's Hospital, Melbourne

MACS

The Manual Ability Classification System (MACS) is a fine motor counterpart to the GMFCS, classifying upper limb function based on how a child uses their hands to handle objects in daily activities (Eliasson et al 2006). The MACS can be used in children aged four to 18 years and the mini-MACS is available for children aged one to four years. Similar to the GMFCS, the MACS can predict future manual abilities in children with CP (Ohrvall et al 2013).

What do you need to know to use MACS?

The child's ability to handle objects in important daily activities, for example during play and leisure, eating and dressing.

In which situation is the child independent and to what extent do they need support and adaptation?

I. **Handles objects easily and successfully.** At most, limitations in the ease of performing manual tasks requiring speed and accuracy. However, any limitations in manual abilities do not restrict independence in daily activities.

II. **Handles most objects but with somewhat reduced quality and/or speed of achievement.** Certain activities may be avoided or be achieved with some difficulty; alternative ways of performance might be used but manual abilities do not usually restrict independence in daily activities.

III. **Handles objects with difficulty; needs help to prepare and/or modify activities.** The performance is slow and achieved with limited success regarding quality and quantity. Activities are performed independently if they have been set up or adapted.

IV. **Handles a limited selection of easily managed objects in adapted situations.** Performs parts of activities with effort and with limited success. Requires continuous support and assistance and/or adapted equipment, for even partial achievement of the activity.

V. **Does not handle objects and has severely limited ability to perform even simple actions.** Requires total assistance.

Distinctions between Levels I and II
Children in Level I may have limitations in handling very small, heavy or fragile objects which demand detailed fine motor control, or efficient coordination between hands. Limitations may also involve performance in new and unfamiliar situations. Children in Level II perform almost the same activities as children in Level I but the quality of performance is decreased, or the performance is slower. Functional differences between hands can limit effectiveness of performance. Children in Level II commonly try to simplify handling of objects, for example by using a surface for support instead of handling objects with both hands.

Distinctions between Levels II and III
Children in Level II handle most objects, although slowly or with reduced quality of performance. Children in Level III commonly need help to prepare the activity and/or require adjustments to be made to the environment since their ability to reach or handle objects is limited. They cannot perform certain activities and their degree of independence is related to the supportiveness of the environmental context.

**Distinctions between Levels III and IV**
Children in Level III can perform selected activities if the situation is prearranged and if they get supervision and plenty of time. Children in Level IV need continuous help during the activity and can at best participate meaningfully in only parts of an activity.

Distinctions between Levels IV and V
Children in Level IV perform part of an activity, however, they need help continuously. Children in Level V might at best participate with a simple movement in special situations, e.g. by pushing a button or occasionally hold undemanding objects.

CFCS

The Communication Function Classification System (CFCS) is used to describe everyday communication performance in children with CP aged two to 18 years (Hidecker et al 2011). As the CFCS is a more recent development than the GMFCS and MACS, further research is required to ascertain predictive value.
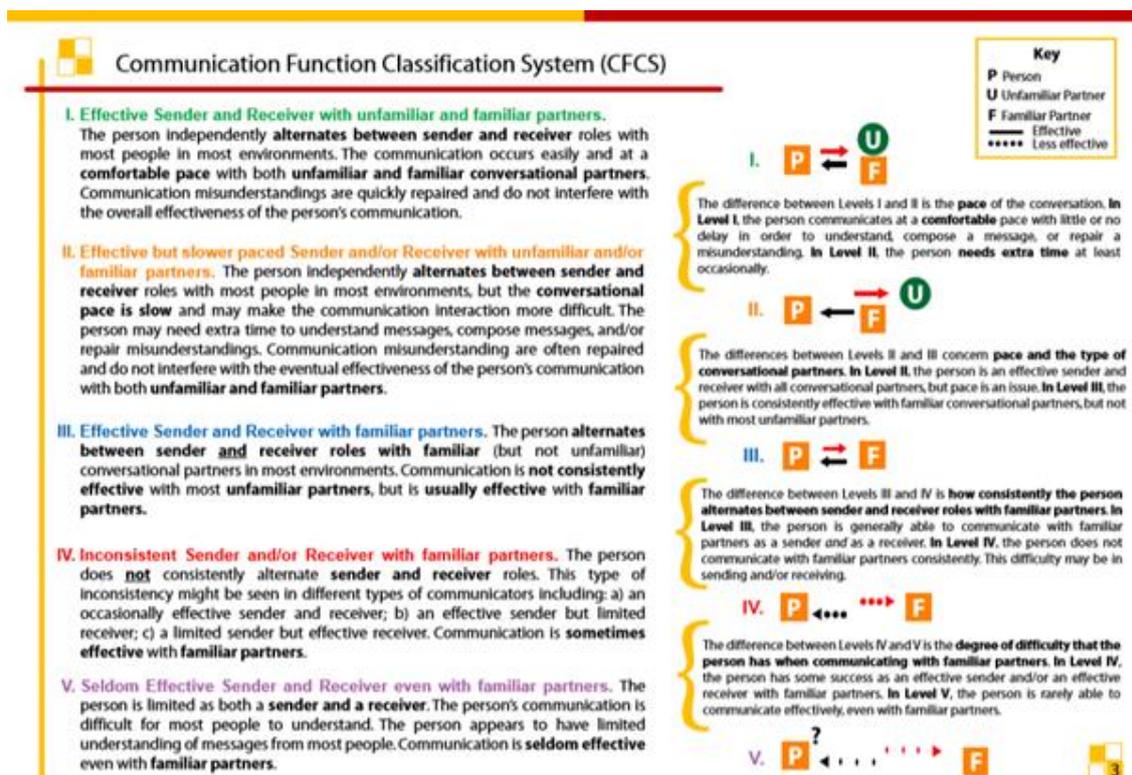
EDACS

The Eating and Drinking Ability Classification System (EDACS) can be used to categorise ability to eat and drink safely and efficiently in children aged three years and over with CP (Sellers et al 2013). The research team that produced EDACS is currently working on developing a mini-EDACS for children aged 18

to 36 months.

GENERAL HEADINGS

Level I Eats and drinks safely and efficiently.

Level II Eats and drinks safely but with some limitations to efficiency.

Level III Eats and drinks with some limitations to safety; there may be limitations to efficiency.

Level IV Eats and drinks with significant limitations to safety.

Level V Unable to eat or drink safely – tube feeding may be considered to provide nutrition.

Practice implications

The above tools are reliable, valid and freely available to classify functional abilities of children with CP. They are also very quick to administer and so can be easily embedded into routine clinical care.

Classification tools can complement more complex means of assessment in children with CP.

When such tools are used collectively they provide a simple summary of the severity of a child's condition, thus facilitating communication between professionals, families and service providers.

We welcome your comments

Feedback and suggestions for further content are welcome at nicpr@qub.ac.uk at any time - we look forward to hearing from you!