**Developing the Communication Function Classification System**

Mary Jo Cooley Hidecker, PhD, CCC-A/SLP

Nigel Paneth, MD, MPH

Peter Rosenbaum, MD, FRCP(C)

Ray D. Kent, PhD

Janet Lillie, PhD

Brenda Johnson, MA, CCC-CFY

Kenneth Chester, Jr, BA

John B. Eulenberg, PhD

*Rosanbaum, et al. (2007)*

---

**Cerebral Palsy Definition**

“describes a group of permanent disorders of the development of movement and posture, causing activity limitations, that are attributed to non-progressive disturbances that occurred in the developing fetal or infant brain. The motor disturbances of cerebral palsy are often accompanied by disturbances of sensation, perception, cognition, communication, and behaviour, by epilepsy, and by secondary musculoskeletal problems”

Rosenbaum, et al. (2007)

---

**Cerebral Palsy**

- Affects 1 in 500 children born each year

  - Stanley et al. (2003), Odding et al. (2006), Paneth et al. (2006)

- Lifetime cost estimated at $1 million per individual with CP


- Clinical diagnosis by physician (often a neurologist)

  - Gross & fine motor problems

  - No specific biomedical test for CP

---

**Cerebral Palsy Classifications**

- Different Ways to Classify
  - By type of motor disorder
  - By type of tone
  - By limb involvement/topography
  - By function

---

**Cerebral Palsy Classifications**

- By type of motor disorder
  - Spastic CP
    - Stiff, contracted muscles
    - 70 to 80%
  - Athetoid or dyskinetic CP
    - Uncontrolled, slow, writhing movements
    - 10 to 20%
  - Ataxic CP
    - Walk unsteadily
    - Poor coordination and balance
    - 5 to 10%
  - Mixed forms
Cerebral Palsy Classifications

By type of tone

- Hypertonicity
  - Stiff, rigid
- Hypotonicity
  - Floppy, loose
- Changing

Cerebral Palsy Classifications

By limb involvement/topography

- Hemiplegia
  - Arm & Leg on same side of body (R or L)
- Diplegia
  - Arms and Legs but legs more involved
- Quadriplegia or Tetraplegia
  - Arms and Legs equally involved OR Arms more involved than legs
- Remaining terms describe rare limb patterns
  - Monoplegia
  - One limb
  - Triplegia
  - Three limbs
  - Paraplegia
  - Only legs involved

WHO ICF Model

The World Health Organization’s (WHO) International Classification of Functioning, Disability and Health (ICF)

Health Condition (Disorder or Disease)

Body Functions & Structures

Activity

Participation

Environmental Factors

Personal Factors

WHO ICF Model: 3 perspectives on assessment and intervention

1. body structure and function - anatomy & physiology includes language subsystems
2. daily activities - carrying out tasks such as communication
3. participation in home, school, work and/or community

Also consider interactions with

- personal factors (e.g., age, motivation, desires) and
- environmental factors (e.g., settings of home or community, familiarity with communication partner)

The Speech Chain = ICF Body/Structure Function Level
The Communication Model
= ICF Activities/Participation Levels

How many individuals with CP have communication problems?

- "Up to 80%...have at least some impairment of speech" Odding, et al (2006)
- Flawed numbers for a variety of reasons
  - No indication of the basis for the numbers
  - 30% have "hearing, speech, and language impairments" Pellegrino (2002)
  - No operational definitions
  - 56% with "communication problem" Bax et al (2006)
  - 7% with "hearing problem" Bax et al (2006)
  - Confusing definitions
    - Hearing "> 70 decibels in better ear" Colver & SPARCLE (2006)

Few Communication Measures in CP Studies

- Need: Better measures of speech, language, and hearing within existing CP epidemiological studies.
- Challenge: Quick, multidisciplinary measure of communication
- Hope: More SLPs and audiologists will be included on CP research teams

Functional Limitations in Daily Activities

<table>
<thead>
<tr>
<th>Levels</th>
<th>GMFCS</th>
<th>MACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Mobility without limitations.</td>
<td>Handles objects easily and successfully.</td>
</tr>
<tr>
<td>II.</td>
<td>Walks with limitations.</td>
<td>Handles most objects but with somewhat reduced quality and/or spread of achievement.</td>
</tr>
<tr>
<td>III.</td>
<td>Uses a hand-held mobility device.</td>
<td>Handles objects with difficulty; needs help to prepare and/or modify activities.</td>
</tr>
<tr>
<td>IV.</td>
<td>Self-mobility with limitations; May use powered mobility.</td>
<td>Handles a limited selection of easily managed objects in adapted situations.</td>
</tr>
<tr>
<td>V.</td>
<td>Transports in a manual wheelchair.</td>
<td>Does not handle objects and has severely limited ability to perform even simple actions.</td>
</tr>
</tbody>
</table>

How many individuals with CP have communication problems?

- Few recent studies conducted by SLPs and audiologists
  - Many citations are based on published U.S. research in 1950's and 1960's
  - Need for CP epidemiological studies of communication and eating
    - In U.S., no national registry of individuals with CP
    - Expensive research to carry out and maintain
    - Need for multidisciplinary teams

Few Communication Measures in CP Studies

- Need: Better measures of speech, language, and hearing within existing CP epidemiological studies.
- Challenge: Quick, multidisciplinary measure of communication
- Hope: More SLPs and audiologists will be included on CP research teams

Comparison of Classification Tools

<table>
<thead>
<tr>
<th>Levels</th>
<th>GMFCS</th>
<th>MACS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Mobility without limitations.</td>
<td>Handles objects easily and successfully.</td>
</tr>
<tr>
<td>II.</td>
<td>Walks with limitations.</td>
<td>Handles most objects but with somewhat reduced quality and/or spread of achievement.</td>
</tr>
<tr>
<td>III.</td>
<td>Uses a hand-held mobility device.</td>
<td>Handles objects with difficulty; needs help to prepare and/or modify activities.</td>
</tr>
<tr>
<td>IV.</td>
<td>Self-mobility with limitations; May use powered mobility.</td>
<td>Handles a limited selection of easily managed objects in adapted situations.</td>
</tr>
<tr>
<td>V.</td>
<td>Transports in a manual wheelchair.</td>
<td>Does not handle objects and has severely limited ability to perform even simple actions.</td>
</tr>
</tbody>
</table>
**Purpose of CFCS research**

- To create a communication classification to be used in CP clinical settings and research
- Must be grounded in speech-language pathology and audiology literature
- Must be understandable to all interested in CP
- Must be valid and reliable, yet short enough to be easily added to long protocols of measurements in multidisciplinary studies
- Will not replace existing communication assessments

**Research Aims**

Using an interdisciplinary research approach,
1. Create descriptions for each CFCS level.
2. Examine content validity using nominal group and Delphi survey methodology.
3. Measure inter-rater and intra-rater reliability of the CFCS among professional and lay team measures.
4. Produce a final version of CFCS suitable for cerebral palsy clinical and research settings.

**Method**

4 Phases:
1. Development
2. Nominal groups
3. Delphi surveys
4. Reliability studies

**Participants from 8 stakeholder groups**

1. Adults with CP
2. Parents of children with CP
3. Educators
4. Neurologists
5. Occupational Therapists
6. Pediatricians
7. Physical Therapists
8. Speech-Language Pathologists

**Participants**

<table>
<thead>
<tr>
<th>Stakeholder Groups</th>
<th>Development Team</th>
<th>Nominal Group</th>
<th>Delphi Survey Round 1</th>
<th>Delphi Survey Round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adults with CP</td>
<td>1 (9%)</td>
<td>3 (11%)</td>
<td>16 (14%)</td>
<td>12 (17%)</td>
</tr>
<tr>
<td>Educators</td>
<td>1 (9%)</td>
<td>4 (15%)</td>
<td>8 (7%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td>Neurologists</td>
<td>1 (9%)</td>
<td>1 (4%)</td>
<td>5 (5%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td>Occupational Therapists</td>
<td>2 (18%)</td>
<td>2 (7%)</td>
<td>8 (7%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Parents of Children with CP</td>
<td>1 (9%)</td>
<td>4 (15%)</td>
<td>7 (6%)</td>
<td>4 (6%)</td>
</tr>
<tr>
<td>Pediatricians</td>
<td>2 (18%)</td>
<td>3 (11%)</td>
<td>13 (12%)</td>
<td>8 (12%)</td>
</tr>
<tr>
<td>Physical Therapists</td>
<td>1 (9%)</td>
<td>3 (11%)</td>
<td>11 (10%)</td>
<td>5 (7%)</td>
</tr>
<tr>
<td>Speech-Language Pathologists/Researchers</td>
<td>3 (27%)</td>
<td>7 (26%)</td>
<td>42 (38%)</td>
<td>28 (41%)</td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>4 (15%)</td>
<td>24 (21%)</td>
<td>15 (19%)</td>
</tr>
<tr>
<td>N</td>
<td>11</td>
<td>27</td>
<td>112</td>
<td>69</td>
</tr>
</tbody>
</table>

**Results**

Delphi Survey Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Round 1 Yes</th>
<th>Round 1 No</th>
<th>Round 2 Yes</th>
<th>Round 2 No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you have a good idea of what the scope of the CFCS was when you read the bullet points?</td>
<td>97%</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do the instructions make sense?</td>
<td>94%</td>
<td>6%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do the definitions and explanations make sense?</td>
<td>95%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For Level I is the wording clear?</td>
<td>92%</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the wording of Level III clear?</td>
<td>95%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the wording of Level IV clear?</td>
<td>95%</td>
<td>5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the functional communication abilities and limitations of individuals with cerebral palsy sufficiently identified within the levels of the CFCS?</td>
<td>93%</td>
<td>7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any two levels which might be hard to tell apart or have some overlap?</td>
<td>56%</td>
<td>44%</td>
<td>3%</td>
<td>97%</td>
</tr>
</tbody>
</table>
Using the current CFCS

- Use the CFCS to classify the following video clips

If you are willing to turn in your classifications anonymously, we would be interested to see how people use the system.

Cooley Hidecker et al.
Current CFCS Draft

1. Effective Sender and Receiver with unfamiliar and familiar partners.
   -
2. Effective but slower paced Sender and/or Receiver with unfamiliar and/or familiar partners.
   -
3. Effective Sender and Receiver with familiar partners.
   -
4. Inconsistent Sender and/or Receiver with familiar partners.
   -
5. Seldom Effective Sender and Receiver even with familiar partners.
   -

Want to be Involved?

- Email CFCS Project Coordinator at cfcs@epi.msu.edu to:
  - Join our Listserv!
  - Find out what is going on with CFCS research via occasional emails
  - Participate in our Reliability Study.
  - http://www.msu.edu/~hidecke1/ReliabilityStudy.PDF

Clinical Implications - examples

- Knowing a person’s CFCS classification may suggest a starting point for intervention (need clinical evidence)
  - Level I – Any activity or participation limitations? Decrease any residual speech sound errors?
  - Level II – Any ways to speed up communication, especially with unfamiliar partners?

Clinical Implications - examples

- Level III – Increase communication partners? Improve communication repair strategies?
- Level IV – Increase sender and/or receiver skills?
- Level V – Improve partner recognition of gestures and unconventional messages?
  - Focus on communication partner training.
  - Create a communication dictionary of these unconventional message.
  - Pair AAC message with unconventional message.
Future research directions

- Create a snapshot of a person’s functional levels by reporting the CFCS in conjunction with GMFCS & MACS.
- Correlate the CFCS level to body structure/function measures of speech, language, and hearing.
- Correlate the CFCS level to quality of life and/or participation measures.

Acknowledgements

- Thank you to the individuals who participated:
  - Development Team: Safa Breslin, Koji Ohba, DT, Am-Christine Elkanen, PhD, Maria S. French, PhD, Dale Martin, Rebecca Jones, PhD, Lena Krumlinde-Sundholm, PhD

References


Contact us

- Mary Jo Cooley Hidecker, PI hidecke1@msu.edu
- CFCS Project Coordinator cfc@epi.msu.edu
- CFCS Phone: 517-353-8623 X 147