Eating and Drinking Ability Classification System for people with cerebral palsy: a study of stability and associations with growth over time. www.edacs.org
Cerebral Palsy

Affects many areas of function including:

- Sitting, standing, walking
- Speech and language development
- Use of hands
- Senses including vision and hearing
- Eating, drinking and swallowing
Functional Classification Systems

- Gross Motor Function (GMFCS Palisano et al. 1997)
- Manual Ability (MACS Eliasson et al. 2006)
- Communication Function (CFCS Hidecker et al. 2011)
- Viking Speech Scale (Pennington et al. 2013)
- Eating and Drinking Ability (EDACS Sellers et al. 2014)

  Ordinal scales (I – IV or V)

  Measures of extent of limitations to function

  Suitable for use in clinical and research contexts

  GMFCS and MACS have predictive validity
Eating and Drinking Ability Classification System

Is the individual able to swallow food and drink without risk of aspiration?
- Yes
- No

Can risks of aspiration be managed to eliminate harm to the individual?
- Yes
- No

Is the individual able to bite and chew on hard lumps of food without choking?
- Yes
- No

Is the individual able to eat a meal in the same time as peers?
- Yes
- No

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.

Level I
Eats and drinks safely and efficiently.

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

• Can we predict how a child’s eating and drinking ability will change over time?
• What are the links between a child’s ability to eat and drink and rates of growth?
• What are the links between a child’s ability to eat and drink and other abilities such as gross motor function, speech, hand function, and communication function?
Retrospective Case Note Review

• Case notes and online records examined for 100 children with CP e.g. mealtime guidance, multi-professional reports

• Rater 1 recorded children’s functional abilities using functional classification systems at Time Point 1

• Eating/drinking ability and gross motor function recorded with GMFCS and EDACS at 3 more time points > 2 years between each

• Rater 2 assigned EDACS levels for 25 children at all time points

• Recorded weights / age at 4 Time Points where available
## Results

### Demographic Information

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<th>Demographic Information</th>
<th>n=100 children (50 males)</th>
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| Age range               | Time Point 1  2yrs – 17yrs mean 8.55y SD 3.96  
                         | Time Point 4  7yrs – 26yrs mean 16.06y SD 4.33 |
| Gastrostomy / enterally fed | 49                      |
| Orthopaedic issues      | 85                       |
| Seizures                | 65                       |
| Reflux                  | 56                       |
| CP Subtype (SCPE)       | 55 spastic bilateral (including mixed presentation) 
                         | 34 dyskinetic 
                         | 1 spastic unilateral 
                         | 10 non-classifiable |
| GMFCS levels Time Point 1 | I  3  
                         | II  1 
                         | III 10 
                         | IV  44  
                         | V   42 |
Results

- **Reliability of EDACS:**
  Rater 1 vs Rater 2: ICC 0.95 (95%CI 0.91-0.97)
  ICC values > 0.9 indicate excellent reliability / agreement

- **Stability of EDACS over time:**
  ICC 0.97 (95%CI 0.96-0.98)
  EDACS levels remained stable although children changed how they used underlying abilities

- **EDACS changes over time:**
  - 15/100 changed by 1 level
  - 3/15 improved function from Level IV to Level III
  - 10/15 lost function by 1 level between 12 and 19yrs
  - 11/12 who lost function had orthopaedic issues and/or seizures (7 children GMFCS V; 4 children GMFCS IV)
Children’s eating and drinking ability (EDACS) and gross motor function (GMFCS)

Results

Significant moderate positive correlation between EDACS and GMFCS (Kendall’s Tau$^b = 0.6 \ p<0.001$)

Eating and Drinking Ability Classification System (EDACS)

- GMFCS V
- GMFCS IV
- GMFCS III
- GMFCS II
- GMFCS I

Number of Children's Classifications:
- EDACS I: 10
- EDACS II: 15
- EDACS III: 20
- EDACS IV: 30
- EDACS V: 35
Results

Associations between different areas of function

- Eating/drinking and manual ability
  - EDACS vs MACS $\tau^b = 0.7$ p<0.001

- Eating/drinking and speech
  - EDACS vs Viking Speech Scale $\tau^b = 0.7$ p<0.001

- Eating/drinking and communication
  - EDACS vs CFCS $\tau^b = 0.5$ p<0.001
Results

Associations between weight-for-age centiles and different areas of function:

Children without gastrostomies:

- **EDACS vs Weight for age centiles**
  - Kendall’s tau\(^b\) -0.4 p<0.001

- **GMFCS vs Weight for age centiles**
  - Kendall’s tau\(^b\) -0.2 p<0.05

6/49 children with gastrostomies classified EDACS levels I – III
10/37 children classified EDACS IV received all nutrition orally
16/16 children classified EDACS V received nutrition / fluids through gastrostomies
Results

Number of children (no gastrostomy) at Time Point 1 within each weight-for-age centile group by EDACS level

Weight for age centiles from typical growth charts
Case Studies

- Case 1. Female (GMFCS I, MACS I, VSS III, CFCS III at TP 1). EDACS Level IV to III between 3-6yrs with acquisition of biting / chewing / drinking skills.

- Case 2. Male (GMFCS V, MACS V, VSS IV, CFCS V at TP1). EDACS Level IV to V between 17-19yrs with progressive scoliosis and other orthopaedic issues. Aspiration of food/drink on VFSS.

- Case 3. Female (GMFCS III, MACS III, VSS III, CFCS III at TP1). EDACS Level III stable from 5yrs to 14yrs. Major concerns about weight at age 5; no concerns at 14yrs as eating more efficiently.
Conclusions

• Children’s eating and drinking abilities classified using EDACS appear stable over 6 or more years
• Most changes in EDACS levels occurred in adolescence
• Evidence to support use of EDACS to predict future outcomes and to inform families’ decisions about supplementary nutrition including enteral feeding
Any questions or comments?

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