Improving growth charts for children and adolescents with cerebral palsy through evidence-based clinical practice

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This commentary is on the article by Oeffinger et al. on pages e195–e201 of this issue.

Patterns of growth of children with cerebral palsy (CP) are different from those of the general population. A number of CP-specific charts of centiles of weight for age, stature (e.g. height or tibial length) for age, body mass index for age, and weight for stature have been published.[1–3] The CP charts demonstrate significant deviations from general population reference centiles, with deviations increasing with age and with severity of functional disability (as measured by, for example, Gross Motor Function Classification System [GMFCS] levels).

Deficiencies of CP-specific growth charts have tempered enthusiasm for their use in clinical practice for a number of reasons: (1) many charts are not available in a format useful to clinicians (exceptions are the Kennedy Krieger Growth Charts for Children with Quadriplegic CP, based on work by Krick et al.,[2] and the Life Expectancy Project Growth Charts for Children with CP[1]); (2) some charts of stature are based on unreliable or poorly documented measurements; (3) the charts are only *references* showing how certain populations of children with CP grew, rather than *standards* for how they *should* grow; (4) there is no link between centiles of growth and health outcomes; and (5) many of the children whose growth parameters have been used to develop reference curves for CP may have had confounding secondary medical conditions such as chronic malnutrition or growth hormone deficiency.

The US Maternal and Child Health Bureau and the Centers for Disease Control (CDC) advise against using CP-specific growth charts for another reason. In their jointly developed teaching module on growth charts for children with special needs they advise: 'Use of special charts developed to assess growth of children who have conditions with no genetic or chromosomal basis for an altered growth pattern, such as cerebral palsy, is not recommended.'[4] The module suggests that while some genetic conditions are known to alter growth, CP is a condition that only has 'the potential to alter growth.' Perhaps the point is that the patterns of growth in CP are more heterogeneous than in conditions for which a specific genetic cause of altered growth is present. Many recently developed growth charts for children with CP account for this heterogeneity by stratifying according to GMFCS level.

Oeffinger et al.[5] report on the development of tibial length growth curves for ambulatory children and adolescents with CP. The centiles illustrated in the curves are based on tibial length measurements obtained from routine video gait analysis data. The measurements are shown to be reliable and reproducible and the charts are stratified by GMFCS level (I, II, and III). Thus the second deficiency cited above is absent, and the problem of heterogeneity is addressed. If these charts were available in a format useful to clinicians, progress might be made in overcoming the remaining three deficiencies. For example, a clinician who uses these charts (or other CP growth charts) may find over time that children whose tibial lengths (or weights or other anthropomorphic measures) track below a certain centile are more likely to suffer from growth hormone deficiency, thus identifying a link between the charts and one health outcome.

One would hope that some clinicians might find the time and inclination to keep track of such data from their practices, and share their experiences in journals like this one, or at meetings like those of the American Academy for Cerebral Palsy and Developmental Medicine. If so, the value of the charts would surely grow, as would our understanding of the growth patterns and potentials of children with CP. Such collaborative exercises between clinicians and research scientists would be useful in improving even general population references (or standards). As a recent study comparing World Health Organization and CDC growth charts noted, 'Observations derived from evidence-based practice are needed to understand what the differences in charts and cutoff values mean clinically and to improve pediatric medical care.'[6]

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