Research Summit III Proceedings on Dosing in Children With An Injured Brain or Cerebral Palsy: Executive Summary

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Children with brain injuries or cerebral palsy (CP) comprise a large percentage of pediatric clients served by physical therapists. There is no consensus on what the basic parameters should be for different treatment protocols. A very important parameter of intervention that is pivotal for treatment efficacy is dosing. Dosing decisions are complex. To date, the minimum doses for changing structure and function, activity, and participation in children with various disabilities are unknown. This article describes the process and outcomes of a research summit with the goals of: (1) fostering a critical debate that would result in recommendations for the development of large-scale, second-generation research proposals to address thresholds for effective dosing of interventions for children with brain injuries or CP and (2) enhancing the research capacity of pediatric physical therapists through collaborative research networks. The summit brought together an interdisciplinary cadre of researchers (physical therapists, basic and clinical scientists), representatives from funding agencies, and consumers to an intensive 2.5-day think tank. The summit targeted questions of treatment dosage related to 3 areas: practice and neuromuscularity, structure-behavior connections, and designing clinical trials. The consensus was that the intervention must demonstrate some evidence of effectiveness before optimal dosing can be investigated. Constraint-induced movement therapy is used as an example of an intervention that has demonstrated effectiveness and that requires dosing-related research. Summit results, including factors that merit special consideration and recommendations for future dose-related studies, are highlighted.

Physical therapy is an important service for children with physical disabilities, particularly those with an injured brain resulting in neuromotor impairments and functional limitations. These children typically have multiple health complications that often result in complex functional limitations and require extensive health care, education, and vocational training. The costs of interventions result in substantial financial and social challenges for families and society. Although physical therapists frequently provide continuous interventions for children with physical disabilities, including CP, there remains limited empirical support for these services.

Dosing represents a critical and pressing aspect of intervention that is central for treatment efficacy. In this article, dose is defined as the frequency, intensity, time, and type of an intervention. Frequency refers to how often, such as the number of sessions for a given intervention per day, week, or month. Intensity refers to how hard the child works within the intervention session and is recorded as the number of repetitions per minute, day, or week or amount of work (e.g., 75% of maximal heart rate). Time refers to the duration of the intervention. Type refers to the kind of intervention and can be focused at any of the dimensions of the International Classification of Functioning, Disability and Health (ICF): body structures and function, activity, or participation. Within types, variation exists. For example, task practice can vary in the type of behavioral shaping (i.e., structured versus unstructured training) and amount of feedback or reward.

Type of intervention is central to the discussion because determining the “salient” or “active” ingredient of an intervention strategy is intimately related to the question of dosing. What is “it” that should be dosed? Intervention strategies also involve interactions with biomechanical, neuromuscular, and psychological elements of a child’s behavior, necessitating insight into the mechanism leading to a change in behavior. Consequently, the nature of optimal dosage can be expected to vary with different types of interventions.

Intervention-related dosing is a source of disagreement among service providers, policy makers, insurers, and researchers, whose recent findings show the potential for high-dosing intervention to be the catalyst for positive intervention outcomes. The cost related to high dosing is one impediment to implementation. Another is uncertainty about