

A magical moment in research translation: strategies for providing high intensity bimanual therapy

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In the last 10 years there has been an explosion of research into interventions targeting improvement in the upper limb skills of children with cerebral palsy (CP). Effective treatments are very important because population registers suggest that 60% of children with CP have difficulties using their upper limbs for activities of daily living. Proven upper limb rehabilitation interventions now include occupational therapy post botulinum toxin;¹ goal directed training;^{2,3} home program;^{2,3} constraint-induced movement therapy (CIMT);⁴ modified constraint-induced movement therapy (mCIMT);³ and bimanual therapy or hand–arm bimanual intensive therapy (HABIT).⁵ These non-pharmacological rehabilitation approaches are not the same, but are unified by their inclusion of intensive, repetitive, task-specific training, consistent with current neuroscientific knowledge about how to induce brain plasticity. All are hinged around motor learning theory, where the therapist guides the child's activity practice in a more 'hands-off' than 'hands-on' way, because the child is an active learner not a passive recipient of therapy. Furthermore, almost all of these authors emphasize that the high intensity of the therapy is an integral feature of the treatment success^{3,5} recommending a minimum of 30-hours practice with 60 hours being preferable.

Therapy involving repetitive practice at high intensity evokes important research translation questions: (1) How do you motivate children to practice the same tasks repeatedly without boring them and inciting opposition to therapy? (2) Are the results of clinical trials repeatable amongst different cultural groups? (3) Do all children respond to bimanual training or only the more mildly affected? and (4) How is it feasible and affordable to provide 30 (or more) hours of therapy within clinical practice

when existing services typically offer blocks of weekly therapy?

Green et al.'s⁶ multi-site study of functional outcomes from HABIT for children with hemiplegia is very important because it offers a number of answers to these translation questions.

First, Green et al. used a themed magic approach that captivated children's imagination. The novel learning mode provided the necessary motivation to practice activities repetitively towards the achievement of a 'greater magical goal', confirming what is known about the need to establish intervention founded upon a goal that is internally motivating to the child. Magic themes have been successfully employed within a number of high intensity children's rehabilitation studies.⁵ Second, Green et al.'s study establishes that intensive therapy can be successfully carried out amongst other cultural groups, in this case British and Israeli children. Third, Green et al.'s study establishes that children with more severe hemiplegia also benefit from bimanual therapy, consistent with findings from CIMT research. This is important because some clinicians have been reluctant to try bimanual training with children who are more severely affected in order to protect them from a sense of failure or frustration. Fourth, Green et al.'s⁵ study corroborates other studies by showing that high intensity therapy can be effectively carried out in a group camp format, which is likely to be more cost-effective. Camps, however, will not be feasible for all clinicians and in these cases clinicians could consider using the home program evidence, where high doses of activity-based practice are completed at home under the self-management of parents in partnership with the therapist.^{2,3}

In conclusion, there is an urgent need to consider a drastic rearrangement of therapy models for children with CP in order for high intensity therapy to succeed. Persistence with traditional models, involving blocks of weekly to fortnightly therapy, can now be considered as a barrier to therapists using best-available evidence for improving the upper limb skills of children with CP.

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