Changes in kinematic performance between structured and unstructured practice during intensive bimanual training for children with unilateral Cerebral Palsy

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Introduction

• Children with unilateral cerebral palsy (CP) have been shown to improve their motor performance with intensive practice.
• Little is known about what type of skill training is critical during intensive training.
• Improvements after intensive practice may be the result of neuroplasticity mechanisms.
• Quality and quantity of motor experience is suggested to be critical to reshape the brain after injury (Nudo, 2013).
• Comparable improvements in dexterity and functional hand use for both groups with and without structured progression of skill difficulty were found previously (Brandao et al., 2013).
• Structured practice focuses on the progression of skill difficulty for better movement control, but it is not known if it changes the movement pattern.

Hypothesis

• Children with unilateral CP will improve in both structured and unstructured practice groups, with better movement control specifically for structured group.

Methods

Twenty two children with USCP (age 6-13 years; MACS levels I-II) participated in the study. Eleven children were assigned to structured practice group (SPG) with skill progression and the other eleven children were in unstructured practice group (UPG) without skill progression. Both groups received same practice intensity of 6 hours a day for 15 days. Children were asked to perform a bimanual drawer task before and after intensive practice while 3-D kinematic analyses were performed.

Results

Temporal findings before and after intensive treatment of both groups. There was significant decreased in bimanual goal synchronization, and increased in normalized movement overlap time after treatment for both groups (all Ps<0.05). Additionally, both groups decreased their CV after treatment (all Ps<0.05).

Conclusions

• Both Structured practice group and Unstructured practice group improved temporal bimanual coordination and upper arm joint excursion in Children with Unilateral CP.
• Only Structured practice group showed better movement quality with less trunk involvement and greater elbow excursion.
• Such better movement performance was also more consistent after practice.
• The current study emphasized the importance of skill progression for better movement quality during intensive approaches, thus supports the idea of specificity of practice.

References

• Nudo (2013) Front Hum Neuropsy 7, 887.
• Brandao et al. (2013) Neurorehabil Neural Repair 28, 452-461.

Note: Standard deviation, CV(coefficient of variation), * = p<0.05 posttest condition compared with pretest condition, + = p<0.05 Structured group compared with unstructured group.