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Indications, benefits and potential shortcomings of lower limb orthoses in the management of children with hypotonia: clinical practice guidelines

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Background and Objective(s): The hypermobility and ligamentous laxity frequently observed in the lower extremities of children with hypotonia (HT) compromises normal biomechanics, impairing both stability and postural control. Further, sustained bony malalignment may lead to detrimental bony growth and remodeling overtime. The use of lower limb orthoses in the form of foot orthoses (FOs) and supramalleolar orthoses (SMOs) has become a common modality in this population to promote stability and functional mobility. Our purpose was to create succinct, evidence-based clinical practice guidelines (CPGs) regarding the established benefits and indications for Lower Limb Orthoses (LLO) for children with HT.

Study Design: CPG development was based on the model described and utilized by the American College of Physicians. Namely, systematic review to identify the highest levels of published evidence, subsequent extraction of evidence statements related to comparative efficacy, benefits and harms of the targeted treatment modality, and synthesis into concise clinical recommendations.

Study Participants and Settings: Identified systematic reviews reported upon on 10 publications from 9 clinical trials with 9 of the 10 publications from each review common to the other review. Individual studies ranged from 1 to 25 children with diagnoses of Down syndrome, developmental delay, autism, Prader Willi syndrome and hypotonic cerebral palsy.

Materials and Methods: A systematic literature search was conducted using the following search terms: (“hypoton* OR Down syndrome OR Rett syndrome OR Joubert syndrome OR Prader-Willi OR Mowat-Wilson) AND (“orthos*” OR “orthot*” OR “AFO”) AND (“systematic review” OR “meta-analysis”). The original search yielded 5 abstracts. Reviews on the effects of treadmill training were excluded from selection. Ultimately, two papers met the inclusion criteria.

Evidence statements were extracted through consensus agreement from the identified source publications by the authors. Specifically, statements related to comparative efficacy, potential benefits and potential harms of the use of LLOs by children with HT were identified. These were subsequently synthesized to generate the recommendations of the CPG.

Results: The original search yielded 5 abstracts. Two publications met the inclusion criteria.

The following recommendations were synthesized from the secondary knowledge sources and their extracted evidence statements as CPGs.

Recommendation #1: Among children with HT, LLOs are indicated to improve foot alignment

Recommendation #2: Among children with HT, LLOs may improve gross motor function

Recommendation #3: The impact of full time use of LLOs by children with HT prior to independent ambulation is not fully understood and requires additional research.

Limitations: Consistent with much of the evidence related to orthotic rehabilitation, reviewers reported that the overall quality of evidence related to the orthotic management of HT was compromised by small sample sizes, lack of randomization or control group, a lack of blinded assessors and a lack of power analyses. The comparative efficacy observed between FOs and SMOs has thus far been confined to a single pilot study and fails to provide adequate insight to influence clinical decision making.

Conclusions or Significance: While additional research is needed, existing evidence supports the role of lower limb orthoses in improving foot alignment, and by extension body alignment in children with hypotonia, as well as augmenting gross motor function.

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Strength, motor competence and physical activity in very preterm and term-born preschool age children

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Background and Objective(s): WHO's International Classification of Functioning, Disability and Health, children and youth version (ICF-CY) framework is a valuable method of conceptualizing the multi-domain difficulties experienced by children born very preterm (VP; <32wks' gestation). Preschool age children born VP experience greater body structure and function impairments, and activity limitations than children born full-term (FT; ≥37wks' gestation), but little is known about physical activity (PA) participation. We aimed to compare motor outcomes across ICF-CY body structure and function, activity and participation domains by examining the grip strength, motor competence and PA levels of VP and FT preschool age children.

Study Design: Cohort study.

Study Participants and Settings: One hundred and eighty-two (98 VP, 84 FT) children were recruited at birth from a tertiary hospital in Melbourne, Australia and assessed at 4–5 years of age.

Materials and Methods: Outcomes were: grip strength (kg), the Movement Assessment Battery for Children 2nd edition (MABC-2), the Little Developmental Coordination Disorder Questionnaire (Little DCDQ), accelerometer-measured PA and a parent-completed PA diary. Linear regression and mixed effects models were used to examine differences between VP and FT children.

Results: Children born VP had poorer grip strength (preferred hand mean difference 95% confidence interval [CI] -0.6kg $[-1.1, -0.04]$, $p=0.04$) and poorer motor competence (MABC-2 standard score mean difference -2.3 $[-3.4, -1.2]$, $p<0.001$; Little DCDQ total score mean difference -5.0 $[-8.7, -1.3]$, $p=0.01$). Children born VP completed completed