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## Interventions and Management

### 1. Cervicothoracic ventral-dorsal rhizotomy for bilateral upper-extremity hypertonia in cerebral palsy: illustrative case

Ryan Kelly, Hanna R Kemeny, Sunny Abdelmageed, Robin Trierweiler, Tim Krater, Melissa A LoPresti, Jeffrey S Raskin

J Neurosurg Case Lessons. 2024 Apr 1;7(14):CASE2438. doi: 10.3171/CASE2438. Print 2024 Apr 1.

Background: Management of medically refractory limb-specific hypertonia is challenging. Neurosurgical options include deep brain stimulation, intrathecal baclofen, thalamotomy, pallidotomy, or rhizotomy. Cervical dorsal rhizotomy has been successful in the treatment of upper-extremity spasticity. Cervical ventral and cervical ventral-dorsal rhizotomy (VDR) has been used in the treatment of torticollis and traumatic hypertonia; however, the use of cervicothoracic VDR for the treatment of upper-extremity mixed hypertonia is not well described. Observations: A 9-year-old girl with severe quadriplegic mixed hypertonia secondary to cerebral palsy (CP) underwent cervicothoracic VDR. Modified Ashworth Scale scores, provision of caregiving, and examination improved. Treatment was well tolerated. Lessons: Cervicothoracic VDR can afford symptomatic and quality of life improvement in patients with medically refractory limb hypertonia. Intraoperative positioning and nuances in surgical techniques are particularly important based on spinal cord position as modified by scoliosis. Here, the first successful use of cervicothoracic VDR for the treatment of medically refractory upper-limb hypertonia in a pediatric patient with CP is described.

PMID: [38560926](https://pubmed.ncbi.nlm.nih.gov/38560926/)

### 2. The effect of upper limb loading with external weights on gait and trunk control in ambulatory children with spastic hemiplegic cerebral palsy: a randomized controlled trial

A Alkhajeh, A Arumugam, E Abd ElKafy, F Hegazy

Randomized Controlled Trial Eur Rev Med Pharmacol Sci. 2024 Mar;28(6):2117-2126. doi: 10.26355/eurrev\_202403\_35715.

Objective: Children with hemiplegic cerebral palsy (CP) are typically ambulant with high motor functioning levels but with gait asymmetry and a greater risk of instability and falling. Physiotherapy is considered the core part of CP rehabilitation due to the risk of neurosurgery and the side effects of drug interventions. Although growing evidence has looked at the effect of upper limb loading during walking in many populations, such interventions in children with CP remain unexplored yet. The purpose of this study was to investigate if loading the upper limbs with external weights could improve walking speed, trunk control, and balance in ambulatory children with hemiplegic CP. Patients and methods: The following outcome measures were recorded at baseline and six weeks after the intervention: gait speed [10-Meter Walk Test (10 MWT)], trunk control [Trunk Control Measurement Scale (TCMS)], and balance [Pediatric Balance Scale (PBS)]. Multiple 2 (groups) x 2 (time-points) mixed analysis of variance models (ANOVAs) were used for analysis. Results: Both groups showed a significant improvement ( $p < 0.001$ ) in 10 MWT, TCMS, and PBS scores post-intervention. However, the magnitude of change in the outcome measures was higher in the intervention group (10 MWT = 0.59 m/s, TCMS = 10.41, PBS = 9.35) compared to the control group (10 MWT = 0.37 m/s, TCMS = 6.43, PBS = 4.68). Conclusions: This study demonstrated that although both control and intervention groups showed improvements in terms of gait speed, trunk control, and balance, the intervention

group that had upper limb loading showed higher significant improvements. Clinicaltrial.gov ID: NCT05444387.

PMID: [38567574](#)

### **3. Commentary for "Inspiratory Training for Improving Respiratory Strength, Pulmonary Function, and Walking in Cerebral Palsy: A Meta-Analysis"**

Noula Gibson, Julie Depiazzi

Meta-Analysis *Pediatr Phys Ther.* 2024 Apr 1;36(2):216. doi: 10.1097/PEP.0000000000001103. Epub 2024 Mar 29.

No abstract available

PMID: [38568268](#)

### **4. Inspiratory Training for Improving Respiratory Strength, Pulmonary Function, and Walking in Cerebral Palsy: A Meta-Analysis**

Kênia K P Menezes, Patrick R Avelino, Maria T M Alvarenga, Lucas R Nascimento

Meta-Analysis *Pediatr Phys Ther.* 2024 Apr 1;36(2):207-215. doi: 10.1097/PEP.0000000000001092. Epub 2024 Mar 29.

**Purpose:** To investigate the effects of inspiratory strength training on respiratory muscle strength, pulmonary function, and walking capacity in children with cerebral palsy, with Gross Motor Function Classification System I to III. **Methods:** Searches were conducted in CINAHL, LILACS, MEDLINE, and Physiotherapy Evidence Database (PEDro) databases. The outcomes of interest were respiratory muscle strength, pulmonary function, and walking capacity. The quality was assessed by PEDro Scale. The Grading of Recommendations Assessment, Development, and Evaluation system was used to summarize the quality of evidence. **Results:** Inspiratory strength training increased the strength of inspiratory muscles and may increase the strength of the expiratory muscles. No changes were observed in pulmonary function or walking capacity. **Conclusions:** This systematic review provides moderate-quality evidence that inspiratory strength training is effective for increasing inspiratory muscle strength in children with cerebral palsy. Benefits may be carried over to improving expiratory muscle strength but were not observed on pulmonary function or walking capacity.

PMID: [38568267](#)

### **5. Three-Dimensional Instrumented Gait Analysis for Children With Cerebral Palsy: An Evidence-Based Clinical Practice Guideline**

Rebecca A States, Yasser Salem, Joseph J Krzak, Ellen M Godwin, Mark L McMulkin, Sandra L Kaplan

*Pediatr Phys Ther.* 2024 Apr 1;36(2):182-206. doi: 10.1097/PEP.0000000000001101. Epub 2024 Mar 29.

**Background:** Children with cerebral palsy (CP) who walk have complex gait patterns and deviations often requiring physical therapy (PT)/medical/surgical interventions. Walking in children with CP can be assessed with 3-dimensional instrumented gait analysis (3D-IGA) providing kinematics (joint angles), kinetics (joint moments/powers), and muscle activity. **Purpose:** This clinical practice guideline provides PTs, physicians, and associated clinicians involved in the care of children with CP, with 7 action statements on when and how 3D-IGA can inform clinical assessments and potential interventions. It links the action statement grades with specific levels of evidence based on a critical appraisal of the literature. **Conclusions:** This clinical practice guideline addresses 3D-IGA's utility to inform surgical and non-surgical interventions, to identify gait deviations among segments/joints and planes and to evaluate the effectiveness of interventions. Best practice statements provide guidance for clinicians about the preferred characteristics of 3D-IGA laboratories including instrumentation, staffing, and reporting practices. **Video Abstract:** Supplemental digital content available at <http://links.lww.com/PPT/A524>.

PMID: [38568266](#)

### **6. Effect of split posterior tibialis tendon transfer on foot progression angle in children with cerebral palsy**

De Sayan, Austin Skinner, Alex Tagawa, Wade Coomer, Jason Koerner, Lori Silveira, James Carollo, Jason Rhodes

*Foot (Edinb).* 2024 Mar 11:59:102087. doi: 10.1016/j.foot.2024.102087. Online ahead of print.

**Objectives:** A common orthopedic issue for patients with spastic cerebral palsy (CP) is hindfoot varus deformity. One method of treatment is the split posterior tibialis tendon transfer (SPOTT). There is limited literature on the effect of SPOTT on foot progression angle (FPA) in children with CP who have equinovarus deformities. The objective of our study was to evaluate the

change in FPA after SPOTT to determine if this procedure can improve FPA. Research question: This study aims to determine what axial changes are generated from a split posterior tibial tendon transfer in children with CP. Methods: We performed a retrospective analysis of all ambulatory children with a diagnosis of CP who underwent SPOTT at our institution. Patients with bony rotational procedures were excluded. Descriptive statistics including mean and standard deviation (SD) were used to characterize continuous variables. Paired t-tests were used to evaluate outcomes, in which a target outcome was defined as a post-operative FPA between 0-10° of external rotation. Results: 44 limbs were included. Demographics were as follows: 26/13 female/male; mean age[SD] (years): 9.8[3.5]; 30 hemiplegic, 9 diplegic, and 1 triplegic. Of the 44 limbs, 18 limbs had a target outcome, 4 had no change, and 22 had a non-target outcome. Of the 22 with an outcome outside of the target, 4 limbs trended away from a target outcome. The overall change in FPA measured was  $-10.9 \pm 14.7^\circ$  ( $p < 0.0001$ ). Age at time of surgery, CP involvement, pre-operative FPA, and GMFCS level were not predictors of outcome ( $p > 0.05$ ). Conclusions: SPOTT produced a change of 10.9° external rotation in FPA post-operatively and its effects should be considered when planning a SEMLS.

PMID: [38569253](#)

## 7. Efficacy of hinged and carbon fiber ankle-foot orthoses in children with unilateral spastic cerebral palsy and drop-foot gait pattern

Florian Dobler, Robin Mayr, Harald Lengnick, Peter Federolf, Nathalie Alexander

Prosthet Orthot Int. 2024 Apr 5. doi: 10.1097/PXR.0000000000000337. Online ahead of print.

Background: In children with unilateral spastic cerebral palsy (USCP), ankle-foot orthoses (AFOs) are widely used to correct common gait deviations such as a drop-foot pattern. Most studies on this topic have investigated specific time points while omitting other parts of the gait cycle. Objectives: This study investigated the separate effects of prefabricated carbon fiber AFOs and custom-made hinged AFOs compared with barefoot walking in children with USCP with a drop-foot gait pattern using statistical parametric mapping. Study design: Retrospective, cross-sectional, repeated measures study. Methods: Twenty ambulatory children ( $9.9 \pm 2.5$  years) with USCP and a drop-foot gait pattern were included. Kinematics, kinetics, and spatiotemporal parameters assessed during 3-dimensional gait analysis were compared between barefoot and AFO walking. Statistical parametric mapping was used to compare joint angles and moment waveforms. Kinematics, kinetics and spatiotemporal parameters assessed during 3-dimensional gait analysis were compared between barefoot and AFO walking for each AFO type but not between the 2 AFO types. Results: Compared with barefoot walking, there was a steeper sole angle at initial contact, corresponding to a heel strike pattern, and an increased ankle dorsiflexion in swing with the use of both AFOs. The ankle plantar flexion moment during loading response increased. Ankle power generation during pre-swing decreased in the carbon fiber AFO group when walking with AFOs. Conclusions: Both AFOs were beneficial for improving a drop-foot gait pattern in these small patient groups and can, therefore, be recommended to treat this gait deviation in patients with unilateral cerebral palsy. However, the reduction in ankle power generation during push-off and additional goals targeted by AFOs, such as correction of structural or flexible foot deformities, should be considered for prescription.

PMID: [38579167](#)

## 8. Imaging Review of Pediatric Monogenic CNS Vasculopathy with Genetic Correlation

Neetika Gupta, Elka Miller, Aashim Bhatia, Julie Richer, Richard I Aviv, Nagwa Wilson

Radiographics. 2024 May;44(5):e230087. doi: 10.1148/rg.230087.

Monogenic cerebral vasculopathy is a rare but progressively recognizable cause of pediatric cerebral vasculopathy manifesting as early as fetal life. These monogenic cerebral vasculopathies can be silent or manifest variably as fetal or neonatal distress, neurologic deficit, developmental delay, cerebral palsy, seizures, or stroke. The radiologic findings can be nonspecific, but the presence of disease-specific cerebral and extracerebral imaging features can point to a diagnosis and guide genetic testing, allowing targeted treatment. The authors review the existing literature describing the frequently encountered and rare monogenic cerebral vascular disorders affecting young patients and describe the relevant pathogenesis, with an attempt to categorize them based on the defective step in vascular homeostasis and/or signaling pathways and characteristic cerebrovascular imaging findings. The authors also highlight the role of imaging and a dedicated imaging protocol in identification of distinct cerebral and extracerebral findings crucial in the diagnostic algorithm and selection of genetic testing. Early and precise recognition of these entities allows timely intervention, preventing or delaying complications and thereby improving quality of life. It is also imperative to identify the specific pathogenic variant and pattern of inheritance for satisfactory genetic counseling and care of at-risk family members. Last, the authors present an image-based approach to these young-onset monogenic cerebral vasculopathies that is guided by the size and predominant radiologic characteristics of the affected vessel with reasonable overlap. ©RSNA, 2024 Test Your Knowledge questions for this article are available in the supplemental material.

PMID: [38573816](#)

## 9. Validation of the Arabic Version of Feeding Handicap Index for Children with Developmental Disabilities (A-FHI-C)

Nesreen Fathi Mahmoud, Zeinab Mohammed, Hassnaa Othman Mohammed, Alshimaa Mohsen Mohamed Lotfy

J Autism Dev Disord. 2024 Apr 2. doi: 10.1007/s10803-024-06289-3. Online ahead of print.

Children with developmental disabilities have different feeding and swallowing problems. The purposes of the present study were to develop an Arabic version of the FHI-C and to evaluate its validity, consistency, and reliability in Arabic children with developmental disabilities for assessing how feeding and swallowing problems impair the physical, functional, and emotional aspects of children's lives. A prospective study including 113 children [62 children with autism spectrum disorder (ASD), 24 with cerebral palsy (CP), 27 with intellectual disability (ID)], in the age range of 2 to 10 years, selected randomly from the swallowing clinic, phoniatrics unit, Otorhinolaryngology department, University hospital between September 2023 and December 2023 complaining of feeding and swallowing problems. Validity was established by comparing patients' scores to typically developed controls (31 children). For test-retest reliability, forty parents filled out the A-FHI-C again two weeks after their initial visit. Cronbach's alpha for A-FHI-C was 0.986, indicating good internal consistency. Intraclass correlation showed 0.850 with a 95% confidence interval from 0.779 to 0.898. All three clinical groups had significantly higher total FHI-C and FHI-C domain scores than the control group, indicating good validation. A-FHI-C was found to have significantly high test-retest reliability. The current study indicates that in children with ASD, CP, ID, feeding problems are more prevalent than children who are typically developed. The scores obtained can be used by phoniatricans to evaluate feeding problems and monitor the progress of the therapy plan in children with developmental disorders.

PMID: [38564065](#)

## 10. A National Observational Study From 2010 to 2021 of the Trends in the Timing of Hip Surgery in Children With Cerebral Palsy: Is Surgery Being Performed Earlier?

Anthony K Chiu, Sarah Dance, Samantha L Ferraro, Alana O'Mara, Savyasachi C Thakkar, Sean Tabaie

Cureus. 2024 Apr 3;16(4):e57536. doi: 10.7759/cureus.57536. eCollection 2024 Apr.

Background Hip instability is a concern in pediatric cerebral palsy (CP) patients, with approximately one-third developing hip displacement. This may lead to pain, functional limitations, and decreased quality of life. Due to the progressive nature of hip displacement in CP, earlier surgical interventions may be beneficial. However, any shifts in practice to earlier surgical intervention, on a national scale, is not well described. The purpose of this study was to determine the recent trends in the surgical timing of hip interventions in children with CP. Methods A retrospective study was conducted using the PearlDiver Mariner all-payer claims database (PearlDiver Technologies, Colorado Springs, Colorado, United States). CP patients aged 10 years and younger were identified between 2010 and 2021. Hip surgeries including open reduction, adductor tenotomy, and pelvic osteotomy were identified. Patients were stratified by their age on the date of surgery and the year of the procedure. Linear regression analysis was conducted for temporal trends. Further, the compounded annual growth rate (CAGR) was calculated. Results A total of 309,677 CP patients were identified. For those aged one to four years old, the percentage undergoing hip surgery increased from 10.2% in 2010 to 19.4% in 2021. In the five- to 10-year-old age group, the surgery rate peaked at 14.9% in 2016 and steadily declined to 11.5% in 2021. The overall CAGR from 2010 to 2021 was +6.03% for the one- to four-year-old group and +0.88% for the five- to 10-year-old group. Linear regression demonstrated a significant association between year and the percentage of operations for patients ages one to four ( $R^2=0.792$ ,  $p<0.001$ ), but not ages five-10 ( $R^2=0.019$ ,  $p=0.704$ ). Conclusions Rates of surgical hip procedures in one- to four-year-old CP patients have been increasing since 2010, whereas the rate in five- to 10-year-old CP patients has been decreasing since 2016. Recently, CP patients may be undergoing hip surgery at younger ages.

PMID: [38572177](#)

## 11. Effects of Speech Cues on Acoustics and Intelligibility of Korean-Speaking Children With Cerebral Palsy

Younghwa M Chang, Pil-Yeon Jeong, KyungHae Hwang, Bo-Yeon Ihn, Megan J McAuliffe, Hyunsub Sim, Erika S Levy

J Speech Lang Hear Res. 2024 Apr 4:1-16. doi: 10.1044/2024\_JSLHR-23-00457. Online ahead of print.

Purpose: Reduced speech intelligibility is often a hallmark of children with dysarthria secondary to cerebral palsy (CP), but effects of speech strategies for increasing intelligibility are understudied, especially in children who speak languages other than English. This study examined the effects of (the Korean translation of) two cues, "speak with your big mouth" and "speak with your strong voice," on speech acoustics and intelligibility of Korean-speaking children with CP. Method: Fifteen Korean-speaking children with CP repeated words and sentences in habitual, big mouth, and strong voice conditions. Acoustic analyses were performed and intelligibility was assessed by means of 90 blinded listeners' ease-of-understanding (EoU) ratings and percentage of words correctly transcribed (PWC). Results: In response to both cues, children's vocal intensity and utterance duration increased significantly and differentially, whereas their vowel space area gains did not reach statistical significance. EoU increased significantly in the big mouth condition at word, but not sentence, level, whereas in the strong voice condition,

EoU increased significantly at both levels. PWC increases were not statistically significant. Considerable variability in children's responses to cues was noted overall. Conclusions: Korean-speaking children with CP modify their speech styles differentially when provided with cues aimed to increase their articulatory working space and vocal intensity. The results provide preliminary support for the use of the strong voice cue, in particular, to increase EoU. While the findings do not offer conclusive evidence of the intelligibility benefits of these cues, investigation with a larger sample size should provide further insight into optimal cueing strategies for increasing intelligibility in this population. Implications for language-specific versus language-independent treatment approaches are discussed.

PMID: [38573834](#)

## **12. General movement assessment efficacy for assessment of nervous system integrity in children after hypoxic-ischemic encephalopathy in middle income countries**

Zhanna Zhussupova, Altynshash Jaxybayeva, Dinmukhamed Ayaganov, Latina Tekebayeva, Aytan Mamedbayli, Amin Tamadon, Gulmira Zharmakhanova

Early Hum Dev. 2024 Mar 24;192:105992. doi: 10.1016/j.earlhumdev.2024.105992. Online ahead of print.

Background: Many infants who survive hypoxic-ischemic encephalopathy (HIE) face long-term complications like epilepsy, cerebral palsy, and developmental delays. Detecting and forecasting developmental issues in high-risk infants is critical. Aim: This study aims to assess the effectiveness of standardized General Movements Assessment (GMA) and Hammersmith Infant Neurological Examinations (HINE) in identifying nervous system damage and predicting neurological outcomes in infants with HIE. Design: Prospective. Subjects and measures: We examined full-term newborns with perinatal asphyxia, classifying them as Grade 2 HIE according to Sarnat and Sarnat. The study included 31 infants, with 14 (45.2 %) receiving therapeutic hypothermia (Group 1) and 17 (54.8 %) not (Group 2). We evaluated general movements during writhing and fidgety phases and conducted neurological assessments using the HINE. Results: All infants exhibited cramped-synchronized - like movements, leading to cerebral palsy (CP) diagnosis. Three children in Group 1 and four in Group 2 lacked fidgety movements. During active movements, HINE and GMA showed high sensitivity and specificity, reaching 96 % and 100 % for all children. The ROC curve's area under the curve (AUC) was 0.978. Conclusion: Our study affirms HINE and GMA as effective tools for predicting CP in HIE-affected children. GMA exhibits higher sensitivity and specificity during fidgety movements. However, study limitations include a small sample size and data from a single medical institution, necessitating further research.

PMID: [38574696](#)

## **13. Hypotonic cerebral palsy**

Monica S Cooper, Giuliana C Antolovich, Michael C Fahey, David J Amor

Child Care Health Dev. 2024 May;50(3):e13258. doi: 10.1111/cch.13258.

No abstract available

PMID: [38558298](#)

## **14. Commentary on "Physical Therapy Services During the COVID-19 Pandemic: Perception of Families of Brazilian Children With Physical Disabilities"**

Jamie B Hall, Dana Chole, Jennifer Turner

Pediatr Phys Ther. 2024 Apr 1;36(2):224. doi: 10.1097/PEP.0000000000001099. Epub 2024 Mar 29.

No abstract available

PMID: [38568270](#)

## **15. Physical Therapy Services During COVID-19 Pandemic: Perception of Families of Brazilian Children With Physical Disabilities**

Pedro Bittencourt de Oliveira, Isabella Pessóta Sudati, Laura Gabrielle Lima Gonçalves, Ana Carolina de Campos

Pediatr Phys Ther. 2024 Apr 1;36(2):217-223. doi: 10.1097/PEP.0000000000001089. Epub 2024 Mar 29.

Purpose: To describe the perspective of caregivers about physical therapy (PT) during the COVID-19 pandemic and the effect



of social distancing on the health of children with physical disabilities. Methods: This survey research used a remote questionnaire to identify the perceptions of caregivers about the effect of the COVID-19 pandemic on the health of children and adolescents with physical disabilities and on PT services. Data were analyzed using the frequency of responses; open-ended questions were analyzed through a hybrid approach to thematic analysis. Results: Caregivers of 47 children with cerebral palsy were included. Although most received regular PT services during the pandemic, worsened children's physical conditions and anxiety were prevalent. Caregivers believed that they lacked technical skills. Conclusions: Social distancing impacted the health of children with physical disabilities, especially their physical conditions. Identifying facilitators and barriers for PT services can be helpful in future similar scenarios. Video abstract Supplemental Digital Content available at: <http://links.lww.com/PPT/A503>.

PMID: [38568269](#)

### **16. Motor imagery for paediatric neurorehabilitation: how much do we know? Perspectives from a systematic review**

Amalia Egle Gentile, Sergio Rinella, Eleonora Desogus, Cristiano Maria Verrelli, Marco Iosa, Vincenzo Perciavalle, Martino Ruggieri, Agata Polizzi

Review Front Hum Neurosci. 2024 Mar 20;18:1245707. doi: 10.3389/fnhum.2024.1245707. eCollection 2024.

Background: Motor Imagery (MI) is a cognitive process consisting in mental simulation of body movements without executing physical actions: its clinical use has been investigated prevalently in adults with neurological disorders. Objectives: Review of the best-available evidence on the use and efficacy of MI interventions for neurorehabilitation purposes in common and rare childhood neurological disorders. Methods: systematic literature search conducted according to PRISMA by using the Scopus, PsycArticles, Cinahl, PUBMED, Web of Science (Clarivate), EMBASE, PsychINFO, and COCHRANE databases, with levels of evidence scored by OCEBM and PEDro Scales. Results: Twenty-two original studies were retrieved and included for the analysis; MI was the unique or complementary rehabilitative treatment in 476 individuals (aged 5 to 18 years) with 10 different neurological conditions including, cerebral palsies, stroke, coordination disorders, intellectual disabilities, brain and/or spinal cord injuries, autism, pain syndromes, and hyperactivity. The sample size ranged from single case reports to cohorts and control groups. Treatment lasted 2 days to 6 months with 1 to 24 sessions. MI tasks were conventional, graded or ad-hoc. MI measurement tools included movement assessment batteries, mental chronometry tests, scales, and questionnaires, EEG, and EMG. Overall, the use of MI was stated as effective in 19/22, and uncertain in the remnant studies. Conclusion: MI could be a reliable supportive/add-on (home-based) rehabilitative tool for pediatric neurorehabilitation; its clinical use, in children, is highly dependent on the complexity of MI mechanisms, which are related to the underlying neurodevelopmental disorder.

PMID: [38571523](#)

### **17. Cerebral Palsy and Motor Impairment after Extreme Prematurity: Prediction of Diagnoses at Ages 2 and 10 Years**

Timothy Marinelli, Joe X Yi, T Michael O'Shea, Robert M Joseph, Stephen R Hooper, Karl C K Kuban, Christina Sakai, Michael E Msall, Rebecca Fry, Rachana Singh; ELGAN-ECHO Study Investigators

J Pediatr. 2024 Apr 3;114037. doi: 10.1016/j.jpeds.2024.114037. Online ahead of print.

Objective: To identify perinatal factors in children born extremely preterm (EP) that were associated with motor impairment (MI) at 2 and 10 years of age and develop a predictive algorithm to estimate the risk of MI during childhood. Methods: Participants of the ELGAN Study were classified as: no MI, MI only at 2 years, MI only at 10 years, and MI at both 2 and 10 years, based on a standardized neurological examination at 2 and the Gross Motor Function Classification System at 10 years of age. Least Absolute Shrinkage and Selection Operator (LASSO) regression was used to develop the final predictive model. Results: Of the 849 study participants, 64 (7.5%) had a diagnosis of MI at both 2 and 10 years and 63 (7.4%) had a diagnosis of MI at one visit but not the other. Of 22 total risk factors queried, 4 variables most reliably and accurately predicted MI: gestational age, weight z-score growth trajectory during NICU stay, ventriculomegaly, and cerebral echolucency on head ultrasound. By selecting probability thresholds of 3.5% and 7.0% at ages 2 and 10, respectively, likelihood of developing MI can be predicted with a sensitivity and specificity of 71.2%/72.1% at age 2 and 70.7%/70.7% at age 10. Conclusion: In our cohort, the diagnosis of MI at 2 years did not always predict a diagnosis of MI at 10 years. Specific risk factors are predictive of MI and can estimate an individual infant's risk at NICU discharge of MI at age 10 years.

PMID: [38580191](#)

### **18. Effectiveness of atropine in managing sialorrhoea: A systematic review and meta-analysis**

Venkata K Yellepeddi, Jonathan A Race, Mary M McFarland, Jonathan E Constance, Elika Fanaeian, Nancy A Murphy

Int J Clin Pharmacol Ther. 2024 Apr 5. doi: 10.5414/CP204538. Online ahead of print.

Objectives: To describe the efficacy of atropine in controlling salivary flow in patients with sialorrhoea or drooling. Materials

and methods: We included randomized controlled studies, quasi-randomized trials, case reports, clinical trials, systematic reviews, and meta-analyses assessing the use of atropine in patients with sialorrhea or drooling. The endpoints were reduction in salivary flow rate, amount of saliva secreted, reduction in clinical symptoms of sialorrhea, death rattle intensity, or reduction in drooling intensity as measured by an objective scale such as the drooling intensity scale. Results: A total of 56 studies with 2,378 patients were included in the systematic review. The underlying disease states included brain injury, amyotrophic lateral sclerosis, cerebral palsy, clozapine- and perphenazine-induced sialorrhea, Parkinson's disease, and terminal illness. The routes of atropine administration included sublingual, intravenous, subcutaneous, oral tablet or solution, and direct injection of atropine into parotid glands or at the base of the tongue. The generalized estimated equation regression models showed that sublingual administration is superior to oral and subcutaneous routes. Conclusion: Atropine is efficacious in managing sialorrhea in most disease states. Sublingual administration of atropine is superior to other routes of administration in reducing salivary flow in patients with sialorrhea.

PMID: [38577753](#)

### 19. Impaired Vibratory and Reciprocal Inhibition in Soleus H-Reflex Testing in Children With Spastic Cerebral Palsy

Sangeeta Gupta, Abhimanyu Vasudeva, Gaurav Gupta

Cureus. 2024 Mar 5;16(3):e55541. doi: 10.7759/cureus.55541. eCollection 2024 Mar.

**Introduction** Cerebral palsy (CP) is a neurodevelopmental condition that results from an injury to a developing brain. Children with CP fail to execute precise, well-coordinated movements, and excessive muscular co-contraction or co-activation is a prominent attribute of CP. The normal reciprocal relationship between agonists and antagonists during voluntary movements is altered in patients with CP. H-reflex, which is often regarded as the electrical equivalent of the spinal stretch reflex, can be used to examine the overall reflex arc, including the Ia sensory afferent strength and the spinal motoneuron excitability state. Furthermore, neuromodulatory influence of vibration on H-reflex has been found, which has been increasingly investigated to ascertain its potential use as an intervention in patients with increased spinal reflex excitability. Our goal was to identify the brain mechanism underlying the motor deficits by studying Soleus H-reflex changes during voluntary movement (dorsiflexion) and also to determine the role of vibration in H-reflex modulation in children with spastic CP. **Methods** Soleus H-reflex was recorded in 12 children with spastic CP (10-16 years) and 15 age-matched controls. Recordings were obtained at rest, during dorsiflexion, and during vibratory stimulation for each subject. H-responses (Hmax amplitudes and Hmax-to-Mmax ratio) were compared among the controls and the cases (CP), for the experiments performed, by the Wilcoxon signed-rank test. The recruitment curves depicting the distribution of mean H-response amplitudes with stimulus intensity increment, for dorsiflexion and vibration were compared among controls and cases by the two-sample Kolmogorov-Smirnov (KS) test. p-value <0.05 was considered as statistically significant. Results Hmax amplitudes and the Hmax-to-Mmax ratio increased (15 % and 12.2 % increment, respectively) from the resting values in the children with CP (p<0.05), while controls exhibited a decrease (reduction of 62% and 57 %, respectively) during dorsiflexion (p<0.05). Vibratory stimulation produced a decreasing trend in H-response measures in both the groups. There was about 15 % and 16 % reduction respectively among children with CP while that of 24 % and 21 % respectively among the controls. The differences in the recruitment curves (distribution of average H-response amplitudes with stimulation intensity) recorded during dorsiflexion and vibration experiments among controls compared with those with CP were found to be statistically significant by the two-sample KS test (p<0.0001). **Conclusion** The failure of H-reflex suppression during voluntary antagonist muscle activation suggests the presence of impaired reciprocal inhibition in spastic CP. The relatively modest H-response reduction caused by vibratory stimulation in children with CP provides limited evidence of vibratory regulation of the H-reflex in CP. More research into the mechanisms driving motor abnormalities in children with CP is needed, which could aid in therapy planning.

PMID: [38576699](#)

### 20. Does the use of higher versus lower oxygen concentration improve neurodevelopmental outcomes at 18-24 months in very low birthweight infants?

Georg M Schmölzer, Elizabeth V Asztalos, Marc Beltempo, Hector Boix, Eugene Dempsey, Walid El-Naggar, Neil N Finer, Jo -Anna Hudson, Amit Mukerji, Brenda H Y Law, Maryna Yaskina, Prakesh S Shah, Ayman Sheta, Amuchou Soraisham, William Tarnow-Mordi, Max Vento; behalf of the HiLo trial collaborators

Randomized Controlled Trial *Trials*. 2024 Apr 4;25(1):237. doi: 10.1186/s13063-024-08080-2.

**Background:** Immediately after birth, the oxygen saturation is between 30 and 50%, which then increases to 85-95% within the first 10 min. Over the last 10 years, recommendations regarding the ideal level of the initial fraction of inspired oxygen (FiO<sub>2</sub>) for resuscitation in preterm infants have changed from 1.0, to room air to low levels of oxygen (< 0.3), up to moderate concentrations (0.3-0.65). This leaves clinicians in a challenging position, and a large multi-center international trial of sufficient sample size that is powered to look at safety outcomes such as mortality and adverse neurodevelopmental outcomes is required to provide the necessary evidence to guide clinical practice with confidence. **Methods:** An international cluster, cross-over randomized trial of initial FiO<sub>2</sub> of 0.3 or 0.6 during neonatal resuscitation in preterm infants at birth to increase survival free of major neurodevelopmental outcomes at 18 and 24 months corrected age will be conducted. Preterm infants

born between 230/7 and 286/7 weeks' gestation will be eligible. Each participating hospital will be randomized to either an initial FiO<sub>2</sub> concentration of either 0.3 or 0.6 to recruit for up to 12 months' and then crossed over to the other concentration for up to 12 months. The intervention will be initial FiO<sub>2</sub> of 0.6, and the comparator will be initial FiO<sub>2</sub> of 0.3 during respiratory support in the delivery room. The sample size will be 1200 preterm infants. This will yield 80% power, assuming a type 1 error of 5% to detect a 25% reduction in relative risk of the primary outcome from 35 to 26.5%. The primary outcome will be a composite of all-cause mortality or the presence of a major neurodevelopmental outcome between 18 and 24 months corrected age. Secondary outcomes will include the components of the primary outcome (death, cerebral palsy, major developmental delay involving cognition, speech, visual, or hearing impairment) in addition to neonatal morbidities (severe brain injury, bronchopulmonary dysplasia; and severe retinopathy of prematurity). Discussion: The use of supplementary oxygen may be crucial but also potentially detrimental to preterm infants at birth. The HiLo trial is powered for the primary outcome and will address gaps in the evidence due to its pragmatic and inclusive design, targeting all extremely preterm infants. Should 60% initial oxygen concentration increase survival free of major neurodevelopmental outcomes at 18-24 months corrected age, without severe adverse effects, this readily available intervention could be introduced immediately into clinical practice. Trial registration: The trial was registered on January 31, 2019, at ClinicalTrials.gov with the Identifier: NCT03825835.

PMID: [38576007](#)

## 21. Who really decides? Feeding decisions 'made' by caregivers of children with cerebral palsy

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S Afr J Commun Disord. 2024 Mar 18;71(1):e1-e14. doi: 10.4102/sajcd.v71i1.1001.

Background: There are no definitive guidelines for clinical decisions for children with cerebral palsy (CP) requiring enteral feeds. Traditionally, medical doctors made enteral feeding decisions, while patients were essentially treated passively within a paternalistic 'doctor knows best' approach. Although a more collaborative approach to decision-making has been promoted globally as the favoured model among healthcare professionals, little is known about how these decisions are currently made practically. Objectives: This study aimed to identify the significant individuals, factors and views involved in the enteral feeding decision-making process for caregivers of children with CP within the South African public healthcare sector. Method: A single-case research design was used in this qualitative explorative study. Data were collected using semi-structured interviews and analysed using reflexive thematic analysis. Results: Four primary individuals were identified by the caregivers in the decision-making process: doctors, speech therapists, caregivers' families and God. Four factors were identified as extrinsically motivating: (1) physiological factors, (2) nutritional factors, (3) financial factors and (4) environmental factors. Two views were identified as intrinsically motivating: personal beliefs regarding enteral feeding tubes, and feelings of fear and isolation. Conclusion: Enteral feeding decision-making within the South African public healthcare sector is currently still dominated by a paternalistic approach, endorsed by a lack of caregiver knowledge, distinct patient-healthcare provider power imbalances and prescriptive multidisciplinary healthcare dialogues. Contribution: This study has implications for clinical practice, curriculum development at higher education training facilities, and institutional policy changes and development, thereby contributing to the current knowledge and clinical gap(s) in the area.

PMID: [38572900](#)

## 22. Allogeneic mesenchymal stem cells may be a viable treatment modality in cerebral palsy

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Clinical Trial World J Clin Cases. 2024 Mar 26;12(9):1585-1596. doi: 10.12998/wjcc.v12.i9.1585.

Background: Cerebral palsy (CP) describes a group of disorders affecting movement, balance, and posture. Disturbances in motor functions constitute the main body of CP symptoms. These symptoms surface in early childhood and patients are affected for the rest of their lives. Currently, treatment involves various pharmacotherapies for different types of CP, including antiepileptics for epilepsy and Botox A for focal spasticity. However, none of these methods can provide full symptom relief. This has prompted researchers to look for new treatment modalities, one of which is mesenchymal stem cell therapy (MSCT). Despite being a promising tool and offering a wide array of possibilities, mesenchymal stem cells (MSCs) still need to be investigated for their efficacy and safety. Aim: To analyze the efficacy and safety of MSCT in CP patients. Methods: Our sample consists of four CP patients who cannot stand or walk without external support. All of these cases received allogeneic MSCT six times as  $1 \times 10^6/\text{kg}$  intrathecally, intravenously, and intramuscularly using umbilical cord-derived MSCs (UC-MSC). We monitored and assessed the patients pre- and post-treatment using the Wee Functional Independence Measure (WeeFIM), Gross Motor Function Classification System (GMFCS), and Manual Ability Classification Scale (MACS) instruments. We utilized the Modified Ashworth Scale (MAS) to measure spasticity. Results: We found significant improvements in MAS scores after the intervention on both sides. Two months: Right  $\chi^2 = 4000$ ,  $P = 0.046$ , left  $\chi^2 = 4000$ ,  $P = 0.046$ ; four months: Right  $\chi^2 = 4000$ ,  $P = 0.046$ , left  $\chi^2 = 4000$ ,  $P = 0.046$ ; 12 months: Right  $\chi^2 = 4000$ ,  $P = 0.046$ , left  $\chi^2 = 4000$ ,  $P = 0.046$ . However, there was no significant difference in motor functions based on WeeFIM results ( $P > 0.05$ ). GMFCS and MACS scores differed significantly at 12 months after the intervention ( $P = 0.046$ ,  $P = 0.046$ ). Finally, there was



no significant change in cognitive functions ( $P > 0.05$ ). Conclusion: In light of our findings, we believe that UC-MS therapy has a positive effect on spasticity, and it partially improves motor functions.

PMID: [38576742](#)