

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at cerebralpalsy.org.au/our-research

Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

[Subscribe to CP Research News](#)

Interventions and Management

1. Children With Cerebral Palsy's Experiences With Adaptive Climbing: A Qualitative Study on Parents' Perspectives

Gwen Weinstock-Zlotnick, Aviva Wolff, Gillian Potter, Laura Robbins

HSS J. 2024 Aug;20(3):377-382. doi: 10.1177/15563316241249912. Epub 2024 May 7.

Background: Interest in adaptive sports for children with cerebral palsy (CP) is growing, but current evidence on the benefits and indications for one sport, adaptive climbing, is limited. **Purpose:** We sought to describe perceived changes observed by parents of children with CP who participated in adaptive climbing. **Methods:** Parents whose children with CP participated in 5 or more adaptive climbing sessions were eligible to participate and were emailed a recruitment letter and flyer. Data were collected through semi-structured interviews, using a moderator guide. Interviews were transcribed and content analyzed, with data grouped into concepts, categories, and themes until data saturation. **Results:** Ten parents (9 mothers, 1 father) of 10 children with CP (5 girls, 5 boys; ages 7 to 19 years) were interviewed for 15 to 45 minutes each, yielding 4 themes. First, parents perceived that adaptive climbing challenged the children physically (in reach, balance, strength, and head/neck and lower limb motion); second, that it sharpened children's cognitive skills (in focus, problem-solving, and strategic thinking); third, that it raised children's confidence (socially, physically, and emotionally); and fourth, that it expanded children's sense of what they could do (in mastering a challenge, claiming an athletic identity, and participating in a sport like their peers). **Conclusions:** In this qualitative study, parents described physical, cognitive, and psychosocial benefits of adaptive climbing for their children with CP. These descriptions can be used to inform future studies of children with CP who participate in adaptive climbing.

PMID: [39108453](https://pubmed.ncbi.nlm.nih.gov/39108453/)

2. Progression of Scoliosis after Skeletal Maturity in Patients with Cerebral Palsy: A Systematic Review

Klaas Victor, Pierre Moens

Review J Clin Med. 2024 Jul 27;13(15):4402. doi: 10.3390/jcm13154402.

Background: The progression of scoliosis has been observed in skeletally mature patients with cerebral palsy (CP). The aims of this systematic review were to determine the incidence of curve progression of untreated scoliosis after skeletal maturity, to estimate the average annual increase and to identify factors that influence the progression. **Methods:** A systematic literature search was performed in PubMed, Embase and the Cochrane Library for original research articles published between 1968 and May 2024 with a retrospective, prospective or cross-sectional design, investigating CP patients that were followed up beyond the age of 15 years. The search was limited to articles in English, French, German and Dutch. Articles were excluded if the study population concerned neuromuscular diseases other than CP. After an assessment of the methodological quality of each study, estimates of annual curve progression and the effect of the investigated risk factors for progression were recorded systematically and synthesized. **Results:** Fifteen studies met the inclusion criteria, resulting in a total sample size of 2569 participants. The study populations of the included original research articles were small and heterogeneous in terms of patient age and the type and severity of CP. Curve progression after skeletal maturity occurred in all included studies. A greater curve magnitude at the end of adolescence and a severe motor deficit (an inability to walk or GMFCS IV-V) were identified as

significant risk factors for the progression of scoliosis after skeletal maturity. If at least one of these risk factors was present, scoliotic curves progressed after skeletal maturity in up to 74% of patients, with an average annual increase of 1.4 to 3.5 degrees per year. No significant association was found between curve progression and the physiologic type of CP, the type of scoliotic curve, previous hip surgery, positioning and gravity, weight and length, sex, epilepsy, or pelvic obliquity. Findings on the effect of hip instability were inconsistent: a positive correlation was found with the progression of scoliosis overall, but not after skeletal maturity in particular. A significant selection bias should be considered in the calculation of average annual curve progression, as patients that received interventions to halt curve progression were excluded from follow-up. Conclusions: The identification of risk factors in patients with CP and scoliosis can aid in predicting curve progression and managing follow-ups in clinical practice. Based on the findings in this review a radiographic follow-up once every 3 years is recommended for skeletally mature CP patients with at least one risk factor, and once every 5 years if no risk factors are present.

PMID: [39124669](#)

3. Reliability and Accuracy of Ultrasound Measurement of Hip Displacement in Children with Cerebral Palsy

Thanh-Tu Pham, Lawrence H Le, John Andersen, Edmond Lou

Ultrasound Med Biol. 2024 Aug 3:S0301-5629(24)00264-3. doi: 10.1016/j.ultrasmedbio.2024.07.002. Online ahead of print.

Objective: Hip migration percentage (MP) measured on anteroposterior pelvis radiographs is the gold standard to assess the severity of hip displacement in children with cerebral palsy (CP). Repeated exposure of these children to ionizing radiation under a hip surveillance program is undesirable. Recently, a semi-automatic approach to measure MPUS on ultrasound (US) images was validated in a phantom study. This pilot in vivo study applied the previous phantom method and aimed to determine the reliability and accuracy of the MPUS. Methods: Thirty-four children (23 boys and 11 girls) aged 8.9 ± 3.1 y old and diagnosed with CP were recruited. A total of 59 hips were scanned once, while 43 of these were scanned twice to evaluate the test-retest reliability. Two raters (R1 and R2) manually measured MPUS; procedures included selecting images of interest, cropping a region of interest and removing soft tissues on hip US images. Custom software was developed to measure MP automatically after the manual pre-image processing. Results: The intra-class correlation coefficients (ICC_{2,1}) for the test-retest (R1), intra-rater (R1) and inter-rater (R1 vs R2) reliabilities were 0.90, 0.94 and 0.82, respectively. The standard error of measurement of MPUS for all three evaluations was $\leq 3.0\%$. The mean absolute difference between MPUS and MPX-ray and the percentage of MPUS within clinical acceptance error of 10% for R1 and R2 were (R1: $6.2\% \pm 4.9\%$, 84.7%) and (R2: $7.6\% \pm 6.1\%$, 73.7%), respectively. Conclusion: This study demonstrated that US scans were repeatable and MPUS could be measured reliably and accurately.

PMID: [39098471](#)

4. Hip Displacement After Triradiate Closure in Ambulatory Cerebral Palsy: Who Needs Continued Surveillance?

Amelia M Lindgren, Ali Asma, Kenneth J Rogers, Freeman Miller, M Wade Shrader, Jason J Howard

J Pediatr Orthop. 2024 Aug 5. doi: 10.1097/BPO.0000000000002783. Online ahead of print.

Background: Hip surveillance in cerebral palsy (CP) is an accepted practice with evidence-based guidelines implemented. For the skeletally immature with open triradiate cartilage (TRC), recommendations for radiographic surveillance stemmed from population-based studies. For nonambulatory CP, progression of hip displacement after skeletal maturity has been reported; less is known for ambulatory CP. We aimed to determine the prevalence and risk factors associated with progressive hip displacement after TRC closure, a proxy for skeletal maturity, for ambulatory CP. Methods: This is a retrospective cohort study of patients with ambulatory CP (Gross Motor Function Classification System I-III), with unilateral or bilateral involvement, hypertonic motor type, regular hip surveillance (≥ 3 radiographs after age 10 yr, 1 before TRC closure, ≥ 1 after age 16 yr), and 2-year follow-up post-TRC closure. The primary outcome was migration percentage (MP). Other variables included previous preventative/reconstructive surgery, topographic pattern, sex, scoliosis, epilepsy, and ventriculoperitoneal shunt. An "unsuccessful hip" was defined by MP $\geq 30\%$, MP progression $\geq 10\%$, and/or requiring reconstructive surgery after TRC closure. Statistical analyses included chi-square and multivariate Cox regression. Kaplan-Meier survivorship curves were also determined. Receiver operating characteristic analysis was used to determine the MP threshold for progression to an "unsuccessful hip" after TRC closure. Results: Seventy-six patients (39.5% female) met the inclusion criteria, mean follow-up 4.7 ± 2.1 years after TRC closure. Sixteen (21.1%) patients had an unsuccessful hip outcome. By chi-square analysis, diplegia ($P=0.002$) and epilepsy ($P=0.04$) were risk factors for an unsuccessful hip. By multivariate analysis, only first MP after TRC closure ($P<0.001$) was a significant risk factor for progression to an unsuccessful hip; MP $\geq 28\%$ being the determined threshold (receiver operating characteristic curve analysis, area under curve: 0.845, $P<0.02$). Conclusions: The risk of MP progression after skeletal maturity is relatively high (21%), similar to nonambulatory CP. Annual hip surveillance radiographs after TRC closure should continue for Gross Motor Function Classification System I-III with an MP $\geq 28\%$ after TRC closure, especially for bilateral CP and epilepsy. Level of evidence: III.

PMID: [39099047](#)

5. Comparison of Single Session Auditory Versus Visual Feedback on Performance and Postural Balance in Hemiplegic Children With Cerebral Palsy

Ghaith Fadhil Lafta Alhashimi, Azadeh Shadmehr, Sara Fereydownnia, Behrouz Attarbashi Moghadam, Firas Mohammed Abdulgani

Cureus. 2024 Jul 7;16(7):e64003. doi: 10.7759/cureus.64003. eCollection 2024 Jul.

Background: Cerebral palsy (CP) is a pediatric disorder characterized by a motor impairment resulting from a permanent, non-progressive lesion in the brain. Cerebral palsy is marked by movement and postural control impairments, which greatly affect body structure, function, daily activities, and participation. **Objective:** To compare the single-session auditory versus visual feedback on performance and postural balance in children with hemiplegic cerebral palsy. **Method:** The study was a crossover clinical trial involving a group of 25 patients diagnosed with CP hemiplegia, aged between 6 and 12 years, including both genders. Each patient underwent conventional balance therapy followed by either auditory feedback or visual feedback intervention. After a 48-hour wash-out period, they received conventional balance therapy again before undergoing the alternative intervention initially assigned. The Modified Ashworth scale (MAS), pediatric balance scale (PBS), timed one-leg stance, time up and go test (TUG), and center of pressure (CoP) displacements were assessed as the outcome measures before and after the interventions. **Results:** Based on the one-leg stand test, TUG, and CoP displacement outcome measures results, both interventions improved balance time, speed of movement, and postural stability in children with hemiplegic spastic cerebral palsy ($P < 0.05$). Moreover, after a single session of the intervention, the visual feedback group demonstrated a significantly greater improvement in the TUG test, one-leg stand test, and CoP displacement compared to the auditory group ($P < 0.05$). **Conclusions:** The results of the study suggest that combining auditory or visual feedback with conventional balance therapy is effective in treating children with hemiplegic spastic cerebral palsy; furthermore, the utilization of visual feedback would be more effective. Further research is needed to determine the long-term effects of visual and auditory feedback on the assessed outcome measures.

PMID: [39109135](#)

6. Muscle in children with cerebral palsy: current evidence, knowledge gaps, and emerging research opportunities : Focus on Cerebral Palsy

Christopher M Modlesky, Alessandra B Matias

Pediatr Res. 2024 Aug 7. doi: 10.1038/s41390-024-03422-x. Online ahead of print.

No abstract available

PMID: [39112788](#)

7. Effects of exercise intervention on balance function in children with cerebral palsy: a systematic review and meta-analysis of randomized controlled trials

Junjian Xiao, Linghong Liu, Nan Tang, Chao Yi

BMC Sports Sci Med Rehabil. 2024 Aug 7;16(1):164. doi: 10.1186/s13102-024-00922-5.

Objective: To determine the effectiveness of exercise intervention on postural balance, gait parameters, and muscle strength in children with cerebral palsy by quantifying the information from randomized controlled trials (RCTs). **Methods:** We conducted a systematic search for RCTs from the databases, including PubMed, ISI Web of Science, and Scopus using a between-group design involving children with cerebral palsy and assessing the effect of exercise intervention on postural balance, gait parameters, and muscle strength. The specified inclusion criteria were determined by the PICOS tool. The outcomes of included studies were evaluated by meta-analysis, and subgroup and sensitivity analyses were conducted to analyze the observed heterogeneities using Review Manager 5.4 and Stata version 18.0. The revised Cochrane risk of bias tool for randomized trials (RoB 2) was used to evaluate the risk of bias and quality of the included studies. **Results:** Twenty-four studies were included in this meta-analysis, with 579 children with cerebral palsy. Exercise intervention showed a statistically significant favorable effect on gross motor function (SMD = 0.32; 95%CI [0.03 to 0.61]; I² = 16%), anteroposterior stability index (SMD = -0.93; 95%CI [-1.69 to -0.18]; I² = 80%), and mediolateral stability index (SMD = -0.60; 95%CI [-1.16 to -0.03]; I² = 73%) compared to control group among children with cerebral palsy. None of the above meta-analyses exhibited publication bias, as indicated by Egger's test with p-values greater than 0.05 for all. **Conclusions:** Exercise is effective in improving gross motor function and balance in children with cerebral palsy. Due to the lack of studies examining the efficacy of each exercise type, we are unable to provide definitive training recommendations.

PMID: [39113106](#)

8. Single procedure tibialis anterior tendon shortening in combination with Achilles tendon lengthening in unilateral cerebral palsy improves swing phase dorsiflexion in gait

Michèle Widmer, Monica Staganello, Morgan Sangeux, Marco Odorizzi, Reinald Brunner, Elke Viehweger

J Child Orthop. 2024 Apr 29;18(4):441-449. doi: 10.1177/18632521241244624. eCollection 2024 Aug.

Purpose: Tibialis anterior tendon shortening combined with tendon Achilles lengthening showed satisfactory short- and long-term outcomes for pes equinus treatment. This retrospective study aimed to evaluate the effectiveness of a single tibialis anterior tendon shortening-tendon Achilles lengthening procedure for treating pes equinus, in a homogeneous unilateral cerebral palsy patient group. Methods: Gait analysis was conducted on 22 unilateral cerebral palsy patients (mean age at surgery = 13.3 years, standard deviation = 3 years) before and within 2.5 years (standard deviation = 0.61 years) after the tibialis anterior tendon shortening-tendon Achilles lengthening procedure. Primary outcome measures included foot drop occurrence in swing, foot dorsiflexion and the first ankle rocker presence compared to healthy reference data. Movement analysis profile and gait profile score were also calculated for the entire gait cycle. The clinical exam and the A2 peak ankle power were analyzed. Statistical analysis used the paired Wilcoxon's sign rank test ($p < 0.05$). Results: Post-operatively, significant improvements were observed in ankle dorsiflexion during swing ($p = 0.0006$) and reduced foot drop in swing ($p = 0.0107$). The occurrence of a first ankle rocker did not significantly change ($p = 0.1489$). Significant improvements in gait profile score and movement analysis profile for all joints and planes indicate overall gait quality improvement. The foot progression changed significantly ($p = 0.0285$), with a greater external orientation. Nineteen out of 22 patients were able to quit wearing their ankle foot orthoses. Conclusion: Tibialis anterior tendon shortening and tendon Achilles lengthening combination yielded positive outcomes, showing increased foot dorsiflexion, first ankle rocker presence, and overall improved gait quality. These findings support the effectiveness of this surgical approach for treating pes equinus in children with unilateral spastic cerebral palsy.

PMID: [39100984](#)

9. Does botulinum neurotoxin A make walking easier in children with cerebral palsy? A randomized clinical trial

No authors listed

Dev Med Child Neurol. 2024 Aug 7. doi: 10.1111/dmcn.16064. Online ahead of print.

No abstract available

PMID: [39110642](#)

10. The pilot study of the effect of six-week robot-assisted ankle training on mobility and strength of lower extremity and life habits for children with cerebral palsy

Madawi Alotaibi, Brent L Arnold, Niki Munk, Tracy Dierks, Peter Altenburger, Samiah Alqabbani, Afrah Almuwais

Heliyon. 2024 Jul 10;10(14):e34318. doi: 10.1016/j.heliyon.2024.e34318. eCollection 2024 Jul 30.

Background: Children with cerebral palsy often have weak ankle muscles and reduced ankle dorsiflexion, which leads to activity limitations and eventually affects quality of life. Robotic ankle training was recently developed to facilitates muscle function through a high repetition of exercises. This study investigated the effect of six-week ankle training using the Anklebot device to improve lower limb structural and functional impairments and the resulting impact on quality of life. Methods: Five children with spastic cerebral palsy aged between 4 and 11 years participated in six weeks of bilateral ankle assistive training using the Anklebot device. All lower limb muscle strength was measured with a hand-held dynameter, and range of motion was measured with a goniometer, at four different time points. Muscle architecture was assessed using a portable diagnostic ultrasound device, and quality of life was assessed using the Life Habits for Children scale, at two points in time only. Results: Muscle strength and range of motion for all lower limb joints demonstrated significant improvement on both sides after training. The ankle muscle architecture showed non-significant improvement, while an overall significant improvement in the total score of the Life Habits for Children scale was detected after training. Conclusion: Robot-assisted task-specific ankle training provides promising effects by allowing the required repetition to improve structural and functional muscle and joint impairments, which has a positive influence on the children's quality of life. However, due to a limited sample size, these results should be considered as preliminary; further study is needed.

PMID: [39114037](#)

11. Motor adaptation to continuous lateral trunk support force during walking improves trunk postural control and walking in children with cerebral palsy: A pilot study

Shijun Yan, Seoung Hoon Park, Weena Dee, Renee Keefer, Ana-Marie Rojas, William Zev Rymer, Ming Wu

Hum Mov Sci. 2024 Aug 7:97:103258. doi: 10.1016/j.humov.2024.103258. Online ahead of print.

Purpose: To determine whether the application of continuous lateral trunk support forces during walking would improve trunk postural control and improve gait performance in children with CP. **Materials and methods:** Nineteen children with spastic CP participated in this study (8 boys; mean age 10.6 ± 3.4 years old). Fourteen of them were tested in the following sessions: 1) walking on a treadmill without force for 1-min (baseline), 2) with lateral trunk support force for 7-min (adaptation), and 3) without force for 1-min (post-adaptation). Overground walking pre/post treadmill walking. Five of them were tested using a similar protocol but without trunk support force (i.e., control). **Results:** Participants from the experimental group showed enhancement in gait phase dependent muscle activation of rectus abdominis in late adaptation period compared to baseline ($P = 0.005$), which was retained during the post-adaptation period ($P = 0.036$), reduced variability of the peak trunk oblique angle during the late post-adaptation period ($P = 0.023$), and increased overground walking speed after treadmill walking ($P = 0.032$). Participants from the control group showed modest changes in kinematics and EMG during treadmill and overground walking performance. These results suggest that applying continuous lateral trunk support during walking is likely to induce learning of improved trunk postural control in children with CP, which may partially transfer to overground walking, although we do not have a firm conclusion due to the small sample size in the control group.

PMID: [39116509](#)

12. Early intensive rehabilitation reverses locomotor disruption, decrease brain inflammation and induces neuroplasticity following experimental Cerebral Palsy

Eduardo Sanches, Dini Ho, Yohan van de Looij, Audrey Aebi Toulotte, Laetitia Baud, Farha Bouteldja, Quentin Barraud, Rodrigo Araneda, Yannick Bleyenheuft, Sylvain Brochard, Claudia Kathe, Grégoire Courtine, Stéphane Sizonenko

Brain Behav Immun. 2024 Aug 2:121:303-316. doi: 10.1016/j.bbi.2024.08.005. Online ahead of print.

Background: Cerebral Palsy (CP) is a major cause of motor and cognitive disability in children due to injury to the developing brain. Early intensive sensorimotor rehabilitation has been shown to change brain structure and reduce CP symptoms severity. We combined environmental enrichment (EE) and treadmill training (TT) to observe the effects of a one-week program of sensorimotor stimulation (EETT) in animals exposed to a CP model and explored possible mechanisms involved in the functional recovery. **Methods:** Pregnant Wistar rats were injected with Lipopolysaccharide (LPS - 200 $\mu\text{g}/\text{kg}$) intraperitoneally at embryonic days 18 and 19. At P0, pups of both sexes were exposed to 20' anoxia at 37 °C. From P2 to P21, hindlimbs were restricted for 16 h/day during the dark cycle. EETT lasted from P21 to P27. TT - 15 min/day at 7 cm/s. EE - 7 days in enriched cages with sensorimotor stimulus. Functional 3D kinematic gait analysis and locomotion were analyzed. At P28, brains were collected for ex-vivo MRI and histological assessment. Neurotrophins and key proteins involved in CNS function were assessed by western blotting. **Results:** CP model caused gross and skilled locomotor disruption and altered CNS neurochemistry. EETT reversed locomotor dysfunction with minor effects over gait kinematics. EETT also decreased brain inflammation and glial activation, preserved myelination, upregulated BDNF signaling and modulated the expression of proteins involved in excitatory synaptic function in the brain and spinal cord. **Conclusions:** Using this translational approach based on intensive sensorimotor rehabilitation, we highlight pathways engaged in the early developmental processes improving neurological recovery observed in CP.

PMID: [39098438](#)

13. Efficacy and threshold dose of intensive training targeting mobility for children with cerebral palsy: A systematic review and meta-analysis

Isabella Pessóta Sudati, Leanne Sakzewski, Carolina Fioroni Ribeiro da Silva, Michelle Jackman, Matthew Haddon, Dayna Pool, Maharshi Patel, Roslyn N Boyd, Ana Carolina de Campos

Review Dev Med Child Neurol. 2024 Aug 6. doi: 10.1111/dmcn.16040. Online ahead of print.

Aim: To systematically review the evidence for intensive mobility training in cerebral palsy (CP) and to determine the minimum effective dose to improve mobility. **Method:** Randomized controlled trials (RCTs) or quasi-RCTs that included participants with CP, and which used intensive task-oriented training (TOT) mobility interventions and reported mobility outcomes, were included. Five databases were searched; two independent reviewers selected studies and extracted data. The Grading of Recommendations Assessment, Development, and Evaluation system and the Cochrane Risk of Bias 2 tool were used to rate the certainty of evidence at the outcomes level and to determine the risk of bias respectively. Meta-analyses were conducted with clinically homogeneous studies. Threshold dose was analysed through meta-regression. **Results:** Forty-six RCTs with 1449 participants (mean age range 1 year 2 months to 16 years 4 months) were included. TOT had statistically and clinically significant effects on walking speed ($p = 0.001$), cadence ($p = 0.02$), gross motor function ($p = 0.03$), and functional mobility ($p = 0.009$) compared with control interventions. The threshold dose was undeterminable owing to the high heterogeneity of studies. **Interpretation:** TOT may improve walking speed, walking endurance, and balance. Studies with

homogeneous samples and outcomes are needed to support clinical recommendations for intensive mobility interventions.

PMID: [39108099](#)

14. A Scoping Review on the Effects of Kinesio Taping on Oropharyngeal Function Related to Swallowing and Feeding

Zohreh Gholami, Marziyeh Poorjavad, Rasool Nouri

Review Dysphagia. 2024 Aug 3. doi: 10.1007/s00455-024-10739-6. Online ahead of print.

Following the expansion of interdisciplinary communication among rehabilitative service providers, new techniques have been introduced for treating swallowing disorders. Kinesio taping (KT) is one of the recently noticed techniques in the rehabilitation of swallowing and feeding disorders. Given the novelty of this technique in research and practice, the present scoping review aimed to summarize the available evidence on the effects of KT on the oropharyngeal function related to swallowing, and to identify current knowledge gaps to guide future studies. The initial comprehensive search was conducted in the six databases in November 2022 and then was updated in June 2023. Studies were independently reviewed by two authors to exclude all types of reviews and study protocols, studies published only in an abstract form and also studies that used KT for improving voice and dysarthria symptoms. The methodology of the included studies was also critically appraised using Joanna Briggs Institute (JBI) standard tools by two authors. The results of the studies were categorized and reported based on their overall objectives. In final analysis, 21 articles were described. Study designs ranged from randomized control trials (RCTs) to the case reports. The effects of KT had been investigated on drooling, oral feeding skills of infants, immediate activation of swallowing muscles, and management of dysphagia in patients with stroke or cerebral palsy (CP). Although innovative approaches to use KT as a therapeutic method in swallowing disorders have been investigated in the studies, there are many methodological limitations that affected validity of the results. In general, it seems there is not enough evidence to add KT to the usual management of feeding and swallowing disorders yet. Further studies, therefore, are required to achieve more accurate conclusions in each of the objectives summarized in this study.

PMID: [39096332](#)

15. Letter to the editor: "Development and validation of a predictive model for poor prognosis of communication disorders in children with cerebral palsy after cervical perivascular sympathectomy"

Kanwal Majeed, Hassam Ali, Zainab Muhammad Hanif

Neurosurg Rev. 2024 Aug 6;47(1):405. doi: 10.1007/s10143-024-02620-9.

No abstract available

PMID: [39105935](#)

16. Pain Phenotypes and Pain Multimorbidity Among Medicare Beneficiaries With Cerebral Palsy

Mark D Peterson, Kathryn Ashbaugh, Michael O'Leary, Mary Schmidt, Heidi Haapala, Neil Kamdar, Edward A Hurvitz

JAMA Neurol. 2024 Aug 5. doi: 10.1001/jamaneurol.2024.2443. Online ahead of print.

No abstract available

PMID: [39102256](#)

17. Corrigendum to "The effect of structured supportive approach based on Kolcaba's comfort theory applied to parents of children with cerebral palsy on child's comfort, quality of life, and parent's self-efficacy: A randomised controlled trial" [Journal of Pediatric Nursing / 75 (2024) e65-e74]

Bircan Kahraman Berberoğlu, Hüsniye Çalışır

Published Erratum J Pediatr Nurs. 2024 Aug 6:S0882-5963(24)00300-2. doi: 10.1016/j.pedn.2024.07.035. Online ahead of print.

No abstract available

PMID: [39112123](#)

18. Motor-Based Application Process for Cerebral Visual Impairment-Related Questionnaires for School-Age Children with Cerebral Palsy

Eray Kılıç, Ayşe Turan, Zühal Özen Tunay, Mariam Kavakci, Esra Aki

Occup Ther Health Care. 2024 Aug 7;1-23. doi: 10.1080/07380577.2024.2389387. Online ahead of print.

This study aims to examine the psychometric properties of questionnaires related to cerebral visual impairment (CVI) in school-age children with cerebral palsy (CP). Additionally, it proposes an application process based on motor functionality for occupational therapists. A total of 288 children with CP were recruited for the study and administered the CVI Motor Questionnaire (CVI-MQ). The children's daily visual performance was assessed using the CVI Inventory and the Functional Vision Questionnaire (FVQ) considering the children's ambulatory status. The FVQ and the two factors extracted from the CVI Inventory significantly predicted visual functioning. Specific questionnaires related to CVI, applied with gross motor function in mind, can be valuable tools for occupational therapists to assess daily visual performance.

PMID: [39110868](#)

19. Impact of neonatal sepsis on neurocognitive outcomes: a systematic review and meta-analysis

Wei Jie Ong, Jun Jie Benjamin Seng, Beijun Yap, George He, Nooriyah Aliasgar Moochhala, Chen Lin Ng, Rehena Ganguly, Jan Hau Lee, Shu-Ling Chong

Meta-Analysis BMC Pediatr. 2024 Aug 7;24(1):505. doi: 10.1186/s12887-024-04977-8.

Introduction: Sepsis is associated with neurocognitive impairment among preterm neonates but less is known about term neonates with sepsis. This systematic review and meta-analysis aims to provide an update of neurocognitive outcomes including cognitive delay, visual impairment, auditory impairment, and cerebral palsy, among neonates with sepsis. **Methods:** We performed a systematic review of PubMed, Embase, CENTRAL and Web of Science for eligible studies published between January 2011 and March 2023. We included case-control, cohort studies and cross-sectional studies. Case reports and articles not in English language were excluded. Using the adjusted estimates, we performed random effects model meta-analysis to evaluate the risk of developing neurocognitive impairment among neonates with sepsis. **Results:** Of 7,909 studies, 24 studies (n = 121,645) were included. Majority of studies were conducted in the United States (n = 7, 29.2%), and all studies were performed among neonates. 17 (70.8%) studies provided follow-up till 30 months. Sepsis was associated with increased risk of cognitive delay [adjusted odds ratio, aOR 1.14 (95% CI: 1.01-1.28)], visual impairment [aOR 2.57 (95%CI: 1.14- 5.82)], hearing impairment [aOR 1.70 (95% CI: 1.02-2.81)] and cerebral palsy [aOR 2.48 (95% CI: 1.03-5.99)]. **Conclusion:** Neonates surviving sepsis are at a higher risk of poorer neurodevelopment. Current evidence is limited by significant heterogeneity across studies, lack of data related to long-term neurodevelopmental outcomes and term infants.

PMID: [39112966](#)

20. Validation of the Kinematic Assessment Protocol Used in the Technology-Supported Neurorehabilitation System, Rehabilitation Technologies for Hand and Arm (R3THA™), in Children and Teenagers with Cerebral Palsy

Qinyin Qiu, Ashley J Mont, Amanda Gross, Gerard Fluet, Sergei Adamovich, Mee Eriksson

Sensors (Basel). 2024 Aug 2;24(15):5013. doi: 10.3390/s24155013.

This study evaluates the R3THA™ assessment protocol (R3THA-AP™), a technology-supported testing module for personalized rehabilitation in children with cerebral palsy (CP). It focuses on the reliability and validity of the R3THA-AP in assessing hand and arm function, by comparing kinematic assessments with standard clinical assessments. Conducted during a 4-week summer camp, the study assessed the functional and impairment levels of children with CP aged 3-18. The findings suggest that R3THA is more reliable for children aged 8 and older, indicating that age significantly influences the protocol's effectiveness. The results also showed that the R3THA-AP's kinematic measurements of hand and wrist movements are positively correlated with the Box and Blocks Test Index (BBTI), reflecting hand function and dexterity. Additionally, the R3THA-AP's accuracy metrics for hand and wrist activities align with the Melbourne Assessment 2's Range of Motion (MA2-ROM) scores, suggesting a meaningful relationship between R3THA-AP data and clinical assessments of motor skills. However, no significant correlations were observed between the R3THA-AP and MA2's accuracy and dexterity measurements, indicating areas for further research. These findings validate the R3THA-AP's utility in assessing motor abilities in CP patients, supporting its integration into clinical practice.

PMID: [39124059](#)

21. Self-perceived quality of life by institutionalised adults with cerebral palsy in Spain

Diana Marcela Nova Díaz, María Errea Rodríguez, Juan Manuel Cabasés Hita, Eduardo Sánchez Iriso

Gac Sanit. 2024 Aug 3;38:102416. doi: 10.1016/j.gaceta.2024.102416. Online ahead of print.

Objective: To assess the self-perceived quality of life of institutionalized adults with cerebral palsy and to identify factors that influence their well-being, including sociodemographic, clinical, and diagnostic characteristics, as well as the degree of institutionalization. **Method:** A descriptive cross-sectional study was conducted using the San Martin Quality of Life Scale among adults with cerebral palsy. Data were collected in 2021 and 2022 in a sample of adults with cerebral palsy in Navarra, Spain. Multivariate regression was used to explore the relationship between quality of life and various influential factors. **Results:** The self-determination dimension positively influenced quality of life scores, whereas the social inclusion dimension had the opposite effect. Descriptive and regression analyses revealed that factors such as residing outside the city and a high degree of dependency had a negative influence on quality of life, while the degree of institutionalization had a positive impact. **Conclusions:** It is important to highlight the positive effects of the degree of institutionalization on rehabilitation and well-being, as it seeks to enhance autonomy and social integration when talking about patient-centered models of institutionalization.

PMID: [39098171](#)

22. Prevalence of Seizures in Children Diagnosed With Neurodevelopmental Disorders

Osama Y Muthaffar, Abrar Y Abbar, Mohammed T Fitaih

Cureus. 2024 Jul 3;16(7):e63765. doi: 10.7759/cureus.63765. eCollection 2024 Jul.

Introduction Neurodevelopmental disorders (NDDs) typically emerge in early childhood and have a profound impact on the development of the nervous system, leading to various neurological challenges in cognition, communication, social interaction, motor skills, and behavior. These disorders arise from disruptions in brain development mechanisms. NDDs include conditions such as cerebral palsy (CP), global developmental delay (GDD), intellectual disability (ID), attention-deficit/hyperactivity disorder (ADHD), and autism spectrum disorder (ASD), with ADHD and ASD being the most prevalent. However, there is a lack of comprehensive research on the causes of NDDs in children receiving care at tertiary hospitals in Saudi Arabia. **Therefore,** in this study, we aim to investigate the characteristics of patients with NDDs and explore the association between NDDs and seizures. It also focuses on identifying specific risk factors that may influence the relationship between NDDs and seizures. **Methods** We conducted a retrospective cross-sectional study at the pediatric neurology and developmental assessment clinic of King Abdulaziz University Hospital in Jeddah, Saudi Arabia. The study involved a review of electronic medical records from January 2021 to May 2023 for 200 pediatric patients who attended the clinic for NDD and seizures. Descriptive statistics summarized the data, using frequencies and percentages for categorical variables, and mean \pm standard deviation for quantitative variables. The chi-square test identified differences between qualitative variables, with a significance threshold of $p < 0.05$. **Results** The study sample comprised 200 children ranging in age from one month to 14 years, with the majority of patients being from Jeddah city. Participants were categorized into four age groups: 17.0% (n=34) were aged between one month and three years, 18.5% (n=37) were aged between three and six years, 55.0% (n=110) were aged between six and 12 years old, and 9.5% (n=19) were aged between 12 and 14 years. The NDD subtypes identified were ASD 9.5%, ADHD 16.0%, CP 8.5%, GDD 30.5%, ID 5.5%, and 30% had multiple types of NDD. Generalized tonic-clonic seizures were the most common type observed. **Conclusion** Children with NDDs exhibit a high prevalence of seizures, with the age of the patient and consanguinity emerging as significant influencing factors in this correlation. Among the key findings is an emphasis on the importance of early detection and intervention for children with NDDs at higher risk of developing seizures. Overall, the study sheds light on the characteristics of NDD patients and their association with seizures, contributing to a better understanding of the complex relationship between NDDs and seizure occurrence. It also emphasizes the need for comprehensive assessment and management strategies that consider seizures in children with NDDs.

PMID: [39099967](#)

23. DIRECT HEALTHCARE COSTS for PEOPLE with CEREBRAL PALSY in the BRAZILIAN UNIFIED HEALTH SYSTEM BETWEEN 2015 and 2019

Emilie Batista Freire, Henry Maia Peixoto, Kênnea Martins Almeida Ayupe, Everton Nunes da Silva, Rodrigo Luiz Carregaro, Aline Martins de Toledo

Expert Rev Pharmacoecon Outcomes Res. 2024 Aug 8. doi: 10.1080/14737167.2024.2390043. Online ahead of print.

Background: Estimate the costs of inpatient and outpatient care for people with Cerebral Palsy (CP) in Brazil. **Research design and methods:** Health records of people with CP in the Hospital and Outpatient Information's Systems of Brazil between 2015 to 2019 were analyzed. Variables analyzed were gender, age, ICD, Intensive Care Unit (ICU) use, total cost, and ICU cost. Costs were adjusted for inflation and converted to dollars. Linear regression analysis was performed to investigate the association

between social and clinical variables and direct costs. Results: A total direct cost of approximately \$166 million to the National Health System was identified, with \$7.08 million/year and \$26.1 million/year of inpatient and outpatient costs, respectively. The healthcare was primarily for children up to 14 years of age. The ICD 'spastic quadriplegic CP' received the most attendance. Rehabilitation was responsible for 75% of the outpatient care, with physiotherapy standing out. Increased age, use of ICU and the types of CP are related to increased cost. Conclusions: Healthcare for people with CP produced expressive costs for the Brazilian public health system, mainly with outpatient procedures and rehabilitation, with children being the most attended. Estimating these costs assists in better resource allocation for more effective healthcare provision.

PMID: [39115979](#)

24. Socioeconomic status moderates associations between hippocampal development and cognition in preterms

Julia Konrad, Ting Guo, Steven Ufkes, Thiviya Selvanathan, Min Sheng, Eiman Al-Ajmi, Helen M Branson, Vann Chau, Linh G Ly, Edmond N Kelly, Ruth E Grunau, Steven P Miller

Ann Clin Transl Neurol. 2024 Aug 8. doi: 10.1002/acn3.52168. Online ahead of print.

Objective: The hippocampus plays a critical role in cognitive networks. The anterior hippocampus is vulnerable to early-life stress and socioeconomic status (SES) with alterations persisting beyond childhood. How SES modifies the relationship between early hippocampal development and cognition remains poorly understood. This study examined associations between SES, structural and functional development of neonatal hippocampus, and 18-month cognition in very preterm neonates. **Methods:** In total, 179 preterm neonates were followed prospectively. Structural and resting-state functional MRI were obtained early-in-life and at term-equivalent age (median 32.9 and 41.1 weeks post-menstrual age) to calculate anterior and posterior hippocampal volumes and hippocampal functional connectivity strength. Eighteen-month cognition was assessed via Bayley-III. Longitudinal statistical analysis using generalized estimating equations, accounting for birth gestational age, post-menstrual age at scan, sex, and motion, was performed. **Results:** SES, measured as maternal education level, modified associations between anterior but not posterior hippocampal volumes and 18-month cognition (interaction term $p = 0.005$), and between hippocampal connectivity and cognition (interaction term $p = 0.05$). Greater anterior hippocampal volumes and hippocampal connectivity were associated with higher cognitive scores only in the lowest SES group. Maternal education alone did not predict neonatal hippocampal volume from early-in-life and term. **Interpretation:** SES modified the relationship between neonatal hippocampal development and 18-month cognition in very preterm neonates. The lack of direct association between maternal education and neonatal hippocampal volumes indicates that socio-environmental factors beyond the neonatal period contribute to modifying the relationship between hippocampal development and cognition. These findings point toward opportunities to more equitably promote optimal neurodevelopmental outcomes in very preterm infants.

PMID: [39116913](#)

25. Associations between body weight trajectories and neurodevelopment outcomes at 24 months corrected age in very-low-birth-weight preterm infants: a group-based trajectory modelling study

Ts-Ting Wang, Yen-Ju Chen, Yi-Han Su, Yun-Hsiang Yang, Wei-Ying Chu, Wei-Ting Lin, Yu-Shan Chang, Yung-Chieh Lin, Chyi-Her Lin, Yuh-Jyh Lin; Taiwan Premature Infant Follow-up Network

Front Pediatr. 2024 Jul 25;12:1393547. doi: 10.3389/fped.2024.1393547. eCollection 2024.

Introduction: This study aimed to explore the relationship between the trajectories of body weight (BW) z-scores at birth, discharge, and 6 months corrected age (CA) and neurodevelopmental outcomes at 24 months CA. **Methods:** Conducted as a population-based retrospective cohort study across 21 hospitals in Taiwan, we recruited 3,334 very-low-birth-weight (VLBW) infants born between 2012 and 2017 at 23-32 weeks of gestation. Neurodevelopmental outcomes were assessed at 24 months CA. Instances of neurodevelopmental impairment (NDI) were defined by the presence of at least one of the following criteria: cerebral palsy, severe hearing loss, profound vision impairment, or cognitive impairment. Group-based trajectory modeling was employed to identify distinct BW z-score trajectory groups. Multivariable logistic regression was used to assess the associations between these trajectories, postnatal comorbidity, and neurodevelopmental impairments. **Results:** The analysis identified three distinct trajectory groups: high-climbing, mid-declining, and low-declining. Significant associations were found between neurodevelopmental impairments and both cystic periventricular leukomalacia (cPVL) [with an adjusted odds ratio (aOR) of 3.59; $p < 0.001$] and belonging to the low-declining group (aOR: 2.59; $p < 0.001$). **Discussion:** The study demonstrated that a low-declining pattern in body weight trajectory from birth to 6 months CA, along with cPVL, was associated with neurodevelopmental impairments at 24 months CA. These findings highlight the importance of early weight trajectory and specific health conditions in predicting later neurodevelopmental outcomes in VLBW infants.

PMID: [39119193](#)

26. Cerebral oxygenation during immediate fetal-to-neonatal transition and fidgety movements between six to 20 weeks of corrected age: An ancillary study to the COSGOD III trial

Christina Helene Wolfsberger, Bernhard Schwabegger, Berndt Urlesberger, Anna Scheuchenegger, Alexander Avian, Marlene Hammerl, Ursula Kiechl-Kohlendorfer, Elke Griesmaier, Gerhard Pichler

Eur J Pediatr. 2024 Aug 10. doi: 10.1007/s00431-024-05711-3. Online ahead of print.

Fidgety movements provide early information about a potential development of cerebral palsy in preterm neonates. The aim was to assess differences in the combined outcome of mortality and fidgety movements defined as normal or pathological in very preterm neonates according to the group allocation in the randomised-controlled multicentre COSGOD III trial. Preterm neonates of two centres participating in the COSGOD III trial, whose fidgety movements were assessed as normal or pathological at six to 20 weeks of corrected age, were analysed. In the COSGOD III trial cerebral oxygen saturation (crSO₂) was measured by near-infrared spectroscopy (NIRS) during postnatal transition and guided resuscitation in preterm neonates randomised to the NIRS-group, whereby medical support was according routine, as it was also in the control group. Fidgety movements were classified in normal or abnormal/absent at six to 20 weeks of corrected age. Mortality and fidgety movements of preterm neonates allocated to the NIRS-group were compared to the control-group. Normal outcome was defined as survival with normal fidgety movements. One-hundred-seventy-one preterm neonates were included (NIRS-group n = 82; control-group n = 89) with a median gestational age of 29.4 (27.4-30.4) and 28.7 (26.7-31.0) weeks in the NIRS-group and the control-group, respectively. There were no differences in the combined outcome between the two groups: 90.2% of the neonates in the NIRS-group and 89.9% in the control-group survived with normal outcome (relative risk [95% CI]; 0.96 [0.31-2.62]). Conclusions: In the present cohort of preterm neonates, monitoring of crSO₂ and dedicated interventions in addition to routine care during transition period after birth did not show an impact on mortality and fidgety movements defined as normal or pathological at six to 20 weeks corrected age. What is Known • Fidgety movements display early spontaneous motoric pattern and may provide early information about a potential development of cerebral palsy in preterm neonates. What is New • This retrospective observational study of the randomised-controlled multicentre COSGOD III trial is the first study investigating the potential influence of cerebral oxygenation guided resuscitation during postnatal transition period on combined outcome of mortality and fidgety movements up to 20 weeks of corrected age in very preterm neonates. • This study adds to the growing interest of assessing cerebral oxygenation, that monitoring of cerebral oxygen saturation and dedicated interventions during postnatal transition period according to the COSGOD III trial has no significant influence on mortality and fidgety movements defined as normal or pathological in very preterm neonates.

PMID: [39126518](#)

27. Markers of Intestinal Permeability and Inflammation in Enterally Fed Children with Cerebral Palsy

Dorota Mickiewicz-Góra, Katarzyna Sznurkowska, Karolina Skonieczna-Żydecka, Arleta Drozd, Anna Borkowska, Maciej Zagierski, Joanna Troch, Agnieszka Szlagatys-Sidorkiewicz

Nutrients. 2024 Jul 27;16(15):2447. doi: 10.3390/nu16152447.

Cerebral palsy (CP) results in non-progressive damage to the central nervous system, leading to functional disorders of the gastrointestinal tract and requiring enteral nutrition via gastrostomy in some patients. The aim of the study was to assess the impact of enteral nutrition on intestinal inflammation expressed by stool calprotectin and intestinal permeability determined by fecal zonulin and IFABP, and to determine whether CP affects these parameters. The study group consisted of 30 children with CP, fed enterally (Cerebral Palsy Enteral Nutrition-CPEN), and two reference groups: 24 children with CP, fed orally with a standard diet (CPC-Cerebral Palsy Controls) and 24 healthy children (HC-healthy controls). The differences between these groups and between the combined CP groups (CPG and CPEN + CPC) and HC were analyzed. Fecal zonulin, calprotectin, and intestinal fatty acid-binding protein 2 (IFABP2) levels were determined by ELISA. The concentrations of fecal calprotectin and zonulin were significantly higher in the CPEN group than in the CPC group ($p = 0.012$, $p = 0.025$). When comparing the CPG (n = 53) with the HC group (n = 24), statistically significant differences were observed for calprotectin ($p = 0.000018$, higher in the CPG) and IFABP ($p = 0.021$, higher in HC). Enteral nutrition was associated in our cohort with increased fecal calprotectin and zonulin. Children with cerebral palsy presented with increased fecal calprotectin but not increased intestinal permeability expressed by stool zonulin.

PMID: [39125328](#)

28. Home Enteral Nutrition in Patients with Cerebral Palsy in the Years 2012-2022: A Longitudinal Analysis of Data from the National Health Fund of Poland

Maciej Zagierski, Angelika Górka, Agnieszka Zagierska, Joanna Augustyńska, Michał Seweryn, Agnieszka Szlagatys-Sidorkiewicz

Nutrients. 2024 Jul 24;16(15):2394. doi: 10.3390/nu16152394.

Background: Cerebral palsy (CP) often correlates with a higher risk of malnutrition, negatively affecting the quality of life of patients and their families. Enteral nutrition via a feeding tube should be considered to improve the nutritional status of CP patients. To date, there has been no nationwide registry of patients with CP in Poland. This study aimed to assess the prevalence of home enteral nutrition (HEN) provision in pediatric and adult patients with CP. **Methods:** We retrospectively analyzed data from the Polish National Health Fund (NFZ) on the provision of HEN in patients with CP in 2012-2022. A specially designed and validated questionnaire was sent to the 16 regional branches of NFZ. **Results:** Completed questionnaires were sent back from 12 NFZ branches. In 2022, CP cases increased by 7%, primarily among adults, while pediatric cases dropped by 21%. Despite a rising trend, the proportion of patients receiving HEN remained relatively low. Among children, it increased from 2.1% in 2012 to 3.3-3.5% in 2019-2021. For adults, it nearly doubled from 0.8% in 2012 to 1.7% in 2022. The prevalence of enteral feeding correlated with patient age, with a noticeable increase among older children and adolescents. **Conclusions:** National Health Fund data highlight the need for a nationwide registry of patients with CP. A relatively small proportion of pediatric and adult CP patients receive HEN. Increasing clinicians' awareness of HEN availability is necessary to improve the quality of life for more CP patients.

PMID: [39125275](#)

29. High-calorie, whole protein/peptide nutritional formulations for children with cerebral palsy: a retrospective clinical study

Xia Cai, Yingying Qin, Chaoyun Liu, Ling Xie, Juelong Zhu

Am J Transl Res. 2024 Jul 15;16(7):3171-3181. doi: 10.62347/BQPN6962. eCollection 2024.

Background: Children with cerebral palsy often experience inadequate nutritional intake due to factors like anorexia, intellectual impairments, underdeveloped motor skills of the oral sensory system, and eating and swallowing disorders. These challenges not only hinder their rehabilitation but also impose various degrees of burden on society and their families. Addressing malnutrition in children with cerebral palsy has become a pressing international clinical issue. This study assessed the nutritional status of children with cerebral palsy and examined the impact of a high-calorie enteral nutrition formula as a nutritional intervention. **Methods:** This retrospective study involved 132 malnourished children with cerebral palsy undergoing rehabilitation at the First People's Hospital of Yulin City from July 2020 to July 2023. Sixty-six children received conventional nutritional interventions after their parents were educated and trained in dietary practices and feeding techniques, forming the general group. The other sixty-six children were given a high-calorie intact protein or short peptide enteral nutrition formula milk powder (Nuiren JUNIOR or Peptamen Junior), and were referred to as the nutrient group. Data on anthropometric measurements, blood indicators, gross motor function, and adverse events were collected at baseline, three months, and six months. **Results:** After 6 months of intervention, both groups showed improvements in height, weight, weight-for-height Z-score, weight-for-age Z-score and gross motor function. There were statistical differences in height change, body mass index-for-age Z-score, and gross motor function between the two groups ($P < 0.05$). The efficiency of nutritional intervention was significantly higher in the nutrient group than in the general group ($P < 0.05$). In addition, total albumin, albumin, prealbumin, and 25-hydroxyvitamin D levels were higher in the nutrient group than in the general group ($P < 0.05$). An incidence of side effects was observed in 15.15% of the children in the general group and 9.09% in the nutrient group, without significant difference ($\chi^2 = 1.138$, $P = 0.286$). **Conclusion:** High-calorie whole protein or peptide nutritional formulas can significantly improve malnutrition and enhance gross motor function development in children with cerebral palsy and has a low incidence of adverse events. These interventions hold promise for broader clinical application.

PMID: [39114733](#)

30. Nutritional status of children with cerebral palsy in Ghana

Israt Jahan, Risad Sultana, Francis Laryea, Samuel Kofi Amponsah, Frederick Inkum Danquah, Mohammad Muhit, Sk Md Kamrul Bashar, Hayley Smithers-Sheedy, Sarah McIntyre, Nadia Badawi, Gulam Khandaker

Afr J Disabil. 2024 Jul 31;13:1335. doi: 10.4102/ajod.v13i0.1335. eCollection 2024.

Background: Limited knowledge on nutritional epidemiology in Ghanaian children with Cerebral Palsy (CP) necessitates a comprehensive investigation for an improved understanding of malnutrition in this population. **Objectives:** We aimed to describe the epidemiology of malnutrition among children with CP in Ghana. **Methods:** The study used data collected as part of the Ghana CP Register (GCPR). The GCPR is an institution-based surveillance of children with CP aged < 18 years in Ghana. Between October 2018 and April 2020, $N = 455$ children with CP were registered. Data were collected on (i) weight, length or height, mid-upper-arm-circumference of children with CP; (ii) socio-demographic characteristics; (iii) motor type and topography, gross motor function classification system level (GMFCS); (iv) associated impairments; (v) educational and rehabilitation status for each child. Descriptive and bivariate analyses were performed. **Results:** Mean and standard deviation age of the registered children at assessment was 5.9 ± 4.1 years, and 42.1% were female. Two-thirds of the children had \geq one form of undernutrition (underweight or severely underweight: 38.9%, stunted or severely stunted: 51.2%, thin or severely thin: 23.8%). In the adjusted analysis, low maternal education, GMFCS-IV, speech impairment and epilepsy significantly increased the odds of undernutrition among participating children (aOR: 2.6 [95% CI:1.3-5.4]; 2.2 [95% CI:1.0-4.8]; 2.0 [95% CI:1.1-

3.6]; 2.9 [95% CI:1.1-7.5] respectively). Conclusions: The high malnutrition rate indicates an urgent need for nutrition interventions and translational research to improve nutritional status and prevent adverse outcomes among children with CP in Ghana. Contribution: Our study contributes important data and a framework to develop guidelines and evidence-based interventions for children with CP in Ghana.

PMID: [39114454](#)

31. Muscle satellite cells and fibro-adipogenic progenitors from muscle contractures of children with cerebral palsy have impaired regenerative capacity

No authors listed

Dev Med Child Neurol. 2024 Aug 7. doi: 10.1111/dmcn.16063. Online ahead of print.

No abstract available

PMID: [39110645](#)

32. 'I Didn't Know What Was Going to Happen': Children's and Young People's Experiences and Their Involvement Before and After Selective Dorsal Rhizotomy

Deepti Chugh, Gillian Waite, Phillip Harniess, Kate Oulton, Jo Wray, Stephanie Cawker

Phys Occup Ther Pediatr. 2024;44(5):733-747. doi: 10.1080/01942638.2024.2323192. Epub 2024 Mar 3.

Aims: To explore experiences, expectations, and involvement of children and young people (CYP) in decision-making for selective dorsal rhizotomy (SDR) surgery, post-operative physiotherapy treatment and outcomes. Methods: A qualitative study design using one to one interviews. Five CYP (2 girls and 3 boys) participated, and interviews lasted between 45 min and 2 h. Data were analyzed using thematic analysis. Results: Children and young people are reliant on their parents to make decisions and inform them of the SDR process. Experiences of living with cerebral palsy and its management are centered on their routine social, psychological, and physiological challenges. Individual characteristics and attributes of CYP have an impact on how they cope with the rehabilitation burden and adjust to their changing levels of function and participation. Conclusions: Although CYP reported that SDR offers them a greater 'freedom to choose' in how they participate in daily life, further consideration is required to meet their psychosocial needs, particularly in preparing for SDR and adjusting afterwards.

PMID: [39118452](#)

33. Effects of ultrasound-guided thoracolumbar interfascial plane block combined with general anaesthesia versus general anaesthesia alone on emergence agitation in children with cerebral palsy undergoing selective posterior rhizotomy: protocol for a randomised controlled clinical trial

Xueyang Li, Xiao Huang, Kai Xu, Jingwei Zan, Guokai Liu, Yuan Sun, Huilong Ren

Randomized Controlled Trial BMJ Open. 2024 Aug 7;14(8):e082533. doi: 10.1136/bmjopen-2023-082533.

Introduction: Selective posterior rhizotomy (SPR) is a preferred procedure for relieving spastic children with cerebral palsy, but it is associated with severe pain and significant emergence agitation (EA). The thoracolumbar interfascial plane (TLIP) block provides an effective blockade to the dorsal branch of the spinal nerve. We hypothesise that the TLIP block may be an effective tool to alleviate EA and postoperative pain scores in children with cerebral palsy undergoing SPR. Methods and analysis: This study is a single-centre, randomised, parallel-controlled trial being conducted in Beijing, China. A total of 50 paediatric patients with cerebral palsy scheduled for SPR are randomised in a 1:1 ratio to receive bilateral TLIP block with 0.2% ropivacaine 0.5 mL/kg or control. Patients in the TLIP group receive general anaesthesia combined with TLIP block, while patients in the control group receive only general anaesthesia, without a TLIP block. The primary outcome is the Paediatric Anaesthesia Emergence Delirium Score. The secondary outcomes are the incidence of EA, the Wong-Baker Faces Pain-rating Scale, the perioperative haemodynamics, the intraoperative remifentanyl and propofol dosage, the extubation time and recovery time, and adverse reactions. Ethics and dissemination: This study was approved by the Ethics Committee of Dongzhimen Hospital, Beijing University of Chinese Medicine on 21 September 2023 (2023DZMEC-379-02). Written informed consent is obtained from the legal guardian of each patient. The results of this study will be published in peer-reviewed international journals. Trial registration number: ChiCTR2300076397.

PMID: [39117416](#)

34. The role of teleassessment in family-centered approaches for cerebral palsy

Sefa Ünes

Dev Med Child Neurol. 2024 Aug 5. doi: 10.1111/dmcn.16053. Online ahead of print.

No abstract available

PMID: [39101250](#)**35. Transitioning health care for adults with cerebral palsy**

Edward Hurvitz, Duncan Wyeth, Mark Peterson

Dev Med Child Neurol. 2024 Aug 4. doi: 10.1111/dmcn.16055. Online ahead of print.

No abstract available

PMID: [39099208](#)

Prevention and Cure

36. MicroRNA-128-3p Affects Neuronal Apoptosis and Neurobehavior in Cerebral Palsy Rats by Targeting E3 Ubiquitin-Linking Enzyme Smurf2 and Regulating YY1 Expression

Xiaoqi Nie, Rui Cheng, Pengfei Hao, Yuhong Guo, Gang Chen, Lei Ji, Lu Jia

Mol Neurobiol. 2024 Aug 5. doi: 10.1007/s12035-024-04362-7. Online ahead of print.

This study was dedicated to investigating the effects of microRNA-128-3p (miR-128-3p) on neuronal apoptosis and neurobehavior in cerebral palsy (CP) rats via the Smurf2/YY1 axis. In vivo modeling of hypoxic-ischemic (HI) CP was established in neonatal rats. Neurobehavioral tests (geotaxis reflex, cliff avoidance reaction, and grip test) were measured after HI induction. The HI-induced neurological injury was evaluated by HE staining, Nissl staining, TUNEL staining, immunohistochemical staining, and RT-qPCR. The expression of miR-128-3p, Smurf2, and YY1 was determined by RT-qPCR and western blot techniques. Moreover, primary cortical neurons were used to establish the oxygen and glucose deprivation (OGD) model in vitro, cell viability was detected by CCK-8 assay, neuronal apoptosis was assessed by flow cytometry and western blot, and the underlying mechanism between miR-128-3p, Smurf2 and YY1 was verified by bioinformatics analysis, dual luciferase reporter assay, RIP, Co-IP, ubiquitination assay, western blot, and RT-qPCR. In vivo, miR-128-3p and YY1 expression was elevated, and Smurf2 expression was decreased in brain tissues of hypoxic-ischemic CP rats. Downregulation of miR-128-3p or overexpression of Smurf2 improved neurobehavioral performance, reduced neuronal apoptosis, and elevated Nestin and NGF expression in hypoxic-ischemic CP rats, and downregulation of Smurf2 reversed the effects of downregulation of miR-128-3p on neurobehavioral performance, neuronal apoptosis, and Nestin and NGF expression in hypoxic-ischemic CP rats, while overexpression of YY1 reversed the effects of Smurf2 on neurobehavioral performance, neuronal apoptosis, and Nestin and NGF expression in hypoxic-ischemic CP rats. In vitro, downregulation of miR-128-3p effectively promoted the neuronal survival, reduced the apoptosis rate, and decreased caspase3 protein expression after OGD, and overexpression of YY1 reversed the ameliorative effect of downregulation of miR-128-3p on OGD-induced neuronal injury. miR-128-3p targeted to suppress Smurf2 to lower YY1 ubiquitination degradation and decrease its expression. Inhibition of miR-128-3p improves neuronal apoptosis and neurobehavioral changes in hypoxic-ischemic CP rats by promoting Smurf2 to promote YY1 ubiquitination degradation and reduce YY1 expression.

PMID: [39102109](#)**37. Neuroprotective Effect of Clemastine Improved Oligodendrocyte Proliferation through the MAPK/ERK Pathway in a Neonatal Hypoxia Ischemia Rat Model**

Maria E Bernis, Charlotte Hakvoort, Efe Nacarkucuk, Hannah Burkard, Anna-Sophie Bremer, Margit Zweyer, Elke Maes, Kora A Grzelak, Hemmen Sabir

Int J Mol Sci. 2024 Jul 27;25(15):8204. doi: 10.3390/ijms25158204.

Neonatal hypoxic-ischemic encephalopathy is the most common cause of long-term disability in term neonates, and white matter injury is the primary cause of cerebral palsy. Therapies that focus on the neuroprotection of myelination and oligodendrocyte proliferation could potentially ameliorate long-lasting neurological impairments after hypoxic-ischemic encephalopathy. Clemastine, a histamine H1 antagonist, has been shown to exert neuroprotective effects in multiple sclerosis and spinal cord injury by promoting oligodendrogenesis and re-myelination. In this study, we demonstrated the neuroprotective effects of clemastine in our rat model of neonatal hypoxic-ischemic brain injury. Animals received a single intraperitoneal injection of either vehicle or clemastine (10 mg/kg) for 6 consecutive days. Our results showed a significant reduction in white matter loss after treatment, with a clear effect of clemastine on oligodendrocytes, showing a significant increase in the number of Olig2+ cells. We characterized the MAPK/ERK pathway as a potential mechanistic pathway underlying the neuroprotective effects of clemastine. Altogether, our results demonstrate that clemastine is a potential compound for the treatment of hypoxic-ischemic encephalopathy, with a clear neuroprotective effect on white matter injury by promoting oligodendrogenesis.

PMID: [39125778](#)