# Cerebral palsy research news

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## Interventions and Management

**1.Current Concepts to Muscle-Based Procedures to Treat Upper Limb Spasticity: Forearm, Wrist, and Hand Deformities**

Trina Stephens, Peter Charles Rhee

*Physical Medicine and Rehabilitation Clinics of North America. 2026 May;37(2):297–309.*

Abstract
Spastic forearm, wrist, and hand deformities in isolation or collectively can markedly hinder function and/or provide challenges with hygiene. When muscle contracture is the main contributor to the spastic deformity, muscle-based and tendon-based procedures can effectively correct the abnormal posture. Tendons from expendable muscles can be transferred to the weak or paralyzed muscle to improve the static position of the joint or to restore active function. When employed for the correct underlying pathology, muscle-based procedures can effectively correct the spastic deformity, which can lead to improved quality of life and function.
PMID: 42062021

**2.Current Concepts to Muscle-Based Procedures to Treat Upper Limb Spasticity: Shoulder and Elbow Deformities**

Trina Stephens, Peter Charles Rhee

*Physical Medicine and Rehabilitation Clinics of North America. 2026 May;37(2):281–296.*

Abstract
Muscle-based procedures have been the mainstay of surgical treatment of spastic upper limb deformities, in particular when muscle contractures are a main contributor to the deformity. The type of muscle-based procedures that are utilized to correct a spastic deformity is dependent upon the presence of volitional motor activation and the magnitude of muscle contracture. These procedures can markedly improve patient's quality of life and enhance upper limb function. However, comprehensive multidisciplinary care and establishment of shared patient-physician or caretaker-physician decision-making is integral to successful surgical outcomes.
PMID: 42062020

**3.Long-term multidimensional outcomes following selective dorsal rhizotomy in children with cerebral palsy: a prospective single-center study**

Shalwin Mathew, Anjum Aarifa Khanom, Munashe Veremu, Youssef Chedid, Matthew Kingham, Alexandra Lisitsyna, William H Cook, Benjamin Hall, Conor Scott Gillespie, Benedetta Pettorini

*Journal of Neurosurgery: Pediatrics. 2026 May 1. Online ahead of print.*

Objective: The aim of this study was to evaluate the influence of age group (3–9 vs 10–18 years), sex, Gross Motor Function Classification System (GMFCS) level, and presence of dystonia on changes in multidimensional functional test outcomes at 24 months, along with extended assessment of long-term effects at 5 and 10 years, following selective dorsal rhizotomy (SDR).
Methods: This was a prospective single-center observational study of children aged 3–18 years with functionally significant bilateral spastic cerebral palsy who underwent SDR between 2012 and 2025. Outcomes were assessed before SDR and at follow-up time points up to 10 years using a tiered, multimodal framework. Longitudinal changes were analyzed using linear mixed-effects models.
Results: A total of 420 children underwent SDR. Mean age was 7.02 ± 3.02 years and 62% were male, with GMFCS level III most common preoperatively. At 24 months, significant improvements were observed in Gross Motor Function Measure scores, Timed Up and Go test, Pediatric Evaluation of Disability Inventory (self-care and mobility), 6-minute walk test, Functional Mobility Scale, Gillette Functional Assessment Questionnaire, and PEDI Computer Adaptive Test. Pain and hypertonicity scores decreased, while quality-of-life measures improved and were sustained at extended follow-up.
Conclusions: SDR is associated with improvements in gross motor function, quality of life, and functional outcomes at 24 months, with benefits persisting in long-term follow-up. Further prospective multicenter studies with control groups are needed to better define effectiveness and safety.
PMID: 42066344

**4.Selective dorsal rhizotomy – the treatment of choice for cerebral palsy spasticity in non-ambulant GMFCS IV children?**

Ahmed Mahmoud Elnaggar, Dulanka Silva, Claudia Craven, Ivana Jankovic, Stephanie Cawker, Deepti Chugh, Lucinda Carr, Belinda Crowe, Aneeta Gandekhar, Hatem Ibraheem Badr, Ashraf Elbadry, Walid Ahmed Abdel Ghany, Samer Serag El-Deen, Kristian Aquilina

*British Journal of Neurosurgery. 2026 Apr 27. Online ahead of print.*

Objectives: Selective dorsal rhizotomy (SDR) is established for ambulant children with cerebral palsy (CP), but its role in non-ambulant children remains debated. We evaluated two-year clinical and functional outcomes of SDR in GMFCS IV children.
Methods: A retrospective cohort study of SDR (2013–2022) at a tertiary paediatric neurosurgical centre was performed. Children with significant spasticity were included; those with severe dystonia or genetic/metabolic causes were excluded. Of 41 GMFCS IV patients, 30 had ≥2-year follow-up. Outcomes included Modified Ashworth Scale (MAS), range of motion (ROM), Gross Motor Function Measure (GMFM-88, GMFM-66), CP Quality of Life (CP QOL-Child), and need for orthopaedic surgery. Associations with prematurity and MRI findings were analysed using non-parametric tests.
Results: All children showed sustained spasticity reduction with significant MAS improvement at one and two years. Hip abduction and ankle dorsiflexion improved, while popliteal angle decreased. GMFM-88 and GMFM-66 improved at 6 months and 2 years ($P<0.001$). Dystonia remained stable. No SDR-related complications occurred. Five children (16.7%) required orthopaedic surgery. Outcomes were not associated with prematurity or MRI findings.
Conclusions: SDR is safe and effective in GMFCS IV children, providing functional and quality-of-life gains, and may be a cost-effective alternative to intrathecal baclofen in selected patients.
PMID: 42045137

**5.The relationship between exposure to long-term training, neuromuscular function and muscular structure in adolescents with cerebral palsy and typically-developed peers: a cross-sectional follow-up analysis**

Alice Minghetti, Ralf Roth, Sereina Büttiker, Eric Lichtenstein, Paul Ritsche, Martin Keller

*BMC Musculoskeletal Disorders. 2026 May 1. Online ahead of print.*

Background: This cross-sectional study examined whether exposure to long-term resistance and endurance training can counteract muscular weakness on a functional, neurological and structural level in adolescents with cerebral palsy (CP) compared to typically-developed peers (TD) in dependence of training status.
Methods: Five trained (4 males; mean age: 19.8) and four untrained adolescents with CP (3 males; 20.2) were compared to nine age- and sex-matched TD trained (7 males; 19.8) and nine untrained peers (7 males; 20.3). Isometric and isokinetic measurements assessed strength in knee flexion and extension, voluntary activation (VA) was assessed using the twitch interpolation technique and ultrasound imaging of the quadriceps was performed to assess anatomical cross sectional area (ACSA) and architecture.
Results: Linear regression models revealed that CP trained had lower absolute isometric strength (dominant: -18% [-48; 11]; non-dominant: -35% [-58; -11]) than TD untrained while CP untrained showed between 29% and 33% lower strength than TD untrained. VA in CP trained (dominant: -13% [-23; -3]; non-dominant: -10% [-30; 11]) and CP untrained (dominant: -14% [-23; -4]; non-dominant: -8% [-29; 13]) showed similar deficits compared to TD untrained. CP trained showed higher ACSA than TD untrained in the dominant leg of the vastus lateralis muscle (+16% [-7; 38]), while the non-dominant side showed lower values (-18% [-45; 9]).
Conclusion: Exposure to long-term resistance and endurance training is associated with a smaller gap in muscle strength and muscle volume in the dominant leg of adolescents with CP while neural drive does not seem to be affected through training exposure. It is discussed that training load might have been too low in the non-dominant leg of CP trained to induce relevant neuromuscular adaptations.
PMID: 42067866

**6.Examination of the relationship between respiratory muscle strength, postural control, functional exercise capacity, and daily living activities in individuals with spastic cerebral palsy: A case-control study**

Nur Sena Güçlü Sayin, Saniye Aydoğan Arslan, Duygu Korkem Yorulmaz

*Developmental Neurorehabilitation. 2026 Apr 29. Online ahead of print.*

Background and objective: Respiratory dysfunction is a prevalent but underrecognized problem in individuals with spastic cerebral palsy (CP). Despite extensive research on postural control, functional capacity, and activities of daily living (ADL), the role of respiratory muscle strength in these functional domains remains largely unexplored. This study aimed to examine whether respiratory muscle strength is associated with postural control, functional exercise capacity, and activities of daily living (ADL) in individuals with spastic CP.
Methods: In this cross-sectional study, 29 individuals with spastic cerebral palsy and 29 typically developing peers were evaluated. Respiratory muscle strength was assessed using maximal inspiratory (MIP) and expiratory (MEP) pressures. Postural control (Trunk Control Measurement Scale (TCMS), Pediatric Berg Balance Scale (PBBS)), functional skills (Pediatric Disability Assessment Inventory (PEDI)- Functional Skills Section (FSS)), and exercise capacity (2MWT) were recorded.
Results: Individuals with CP demonstrated significantly lower MIP, MEP, TCMS, PBBS, PEDI-FSS, and 2MWT scores compared to typically developing peers ($p < .001$). Moderate to high correlations were found between respiratory muscle strength and postural control, ADL performance, and functional exercise capacity ($r = 0.44$-$0.88$). MIP explained 32% of trunk control, 30% of functional skills, and 39% of exercise capacity.
Discussion: Respiratory muscle strength is a key determinant of trunk stability, balance, functional capacity, and ADL performance in spastic CP. Systematic assessment and incorporation of respiratory muscle training into rehabilitation may enhance functional outcomes. Clinicaltrials.gov identifier: NCT05682079.

Plain language summary: The study demonstrated that respiratory muscle strength in individuals with spastic CP is significantly associated not only with pulmonary-related outcomes but also with postural control, functional exercise capacity, and independence in activities of daily living. Respiratory muscle strength was independently associated with postural control and functional capacity, suggesting a meaningful relationship between respiratory function and neuromotor performance. These results highlight the importance of taking respiratory muscle strength into account when doing a thorough functional evaluation on people with spastic CP.
PMID: 42057323

**7.Radiographic and patient-specific predictors of poor outcome following hip reconstruction in children with cerebral palsy**

Stefanos Tsitlakidis, Angelika Kolmann, Paul Mick, Johannes Weishorn, Julius Stupp, Pit Hetto, Nicholas A Beckmann

*BMC Pediatrics. 2026 Apr 28.*

Aims: Patients with spastic cerebral palsy (CP) are at a high risk of neurogenic hip dysplasia/subluxation depending on the severity of the neuromuscular disorder. Untreated, approximately one third of all patients develop hip dislocation. Reconstruction with femoral varus derotational osteotomy (VDRO) combined with Dega acetabuloplasty (PO) represents the gold standard. The goal of this study was the radiographic assessment after reconstructive treatment of spastic hip dysplasia/(sub)luxation and to derive specific thresholds and target values of neck shaft angle (NSA) and femoro-epiphyseal acetabular roof (FEAR)-index that could be beneficial in predicting long-term outcome.
Methods: In this retrospective evaluation, 121 patients (224 hips) with CP who underwent VDRO/acetabuloplasty were grouped according to their age at surgery and postoperative radiographic parameters (NSA and FEAR-index) and compared with each other over time (5-year follow-up). The preoperative, postoperative and follow-up X-rays were analyzed. For this purpose, the FEAR, lateral center-edge angle (LCE) and migration percentage (MP) were analyzed as outcome measures at hip -level using linear mixed models (LMM).
Results: Patients older than 8 years and with a postoperative FEAR > −20° or a postoperative NSA > 130° showed a significantly worse postoperative result (FEAR, LCE and MP). A deterioration of the outcome parameters was found in all subgroups to approximately the same extent up to 2 years postoperatively. After 5 years, the findings remained stable. Failure rates and relative risks of inferior subgroups (FEAR-index ≥ −20°, NSA ≥ 130°, age ≥ 8 years) were approximately twice as high (nAGE 18/114 vs. 34/110; nFEAR 20/150 vs. 25/74; nNSA 22/132 vs. 27/92).
Conclusion: A sufficient postoperative head coverage/reduction of MP and thus joint stability is crucial for long-term outcomes after VDRO and PO. Particularly the FEAR-index seems to be a useful parameter for the surgeon for preoperative planning and postoperative aftercare. If postoperative risk factors are present, an individualized aftercare program and hip monitoring plan that establishes more frequent postoperative assessment and possible prolonged abduction therapy should be considered.
PMID: 42050546

**8.Subtalar joint biomechanics in children with cerebral palsy with midfoot break: A pilot study**

Erik Meilak, Luca Modenese, Andrew P Roberts, Julie Stebbins, Edward K Chadwick, Caroline Stewart

*Clinical Biomechanics. 2026 Apr 21. Online ahead of print.*

Background: Midfoot break deformity is common in children with cerebral palsy, presenting as extreme planovalgus, with midfoot dorsiflexion. Muscle imbalance, particularly between tibialis posterior (tib-post) and tibialis anterior (tib-ant), is frequently blamed. Recent work has shown that midfoot break is associated with an altered subtalar joint axis orientation but the impact on dynamic moments and moment arms remains unknown. This pilot study aims to determine whether a novel methodology for determining subtalar joint biomechanics reveals clinically important biomechanical differences in a sample of children with midfoot break compared with typically developing children, informing future trial design.
Methods: Weight-bearing cone-beam CT scans of the foot and ankle were obtained, and gait analysis conducted on nine typically developing children and six with midfoot break. Personalized musculoskeletal models were generated. Subtalar joint moments were calculated and muscle moment arms of tib-post and tib-ant estimated throughout the gait cycle.
Findings: The novel methodology successfully identified differences between children with midfoot break and typically developing children. Five out of six children with midfoot break exhibited significantly larger everting subtalar joint moments for at least part of the gait cycle, with ground reaction force moment arms 60% greater. Tib-ant acted as a stronger evertor for those with midfoot break and tib-post had significantly lower inverting moment arms for four midfoot break children.
Interpretation: This novel methodology has demonstrated a relationship between subtalar joint alignment and midfoot break, revealing biomechanical pathways which may be contributing to the development of the deformity in children with cerebral palsy.
PMID: 42054873

**9.Neurosurgery to restore function in cerebral palsy: current practice and emerging therapies**

Akshay Sankar, Awa Jobe, Bailey McDonald, Taylor J Abel, Amit Sinha, Martin G Piazza

*Frontiers in Rehabilitation Sciences. 2026 Apr 15.*

Abstract
Cerebral palsy (CP) affects 1.5-2.5 per 1,000 live births and manifests as diverse movement disorders including spasticity, dystonia, and mixed phenotypes that significantly impact motor function and quality of life. This review examines surgical and neuromodulatory interventions for medically refractory CP-associated movement disorders. Selective dorsal rhizotomy (SDR) offers a novel treatment option for spastic diplegia in ambulatory children (GMFCS II-III), with combined dorsal-ventral rhizotomy showing promise for mixed presentations. Peripheral neurectomies provide targeted focal spasticity management with sustained improvements in muscle tone and walking speed. Intrathecal baclofen (ITB) effectively reduces spasticity and dystonia through programmable drug delivery, though infection rates and potential scoliosis progression require monitoring. Deep brain stimulation (DBS) targeting the globus pallidus internus demonstrates efficacy for dystonia-predominant CP, with younger patients showing greater improvement. Emerging cerebellar DBS approaches show early promise for spasticity and mixed presentations. Spinal cord stimulation (SCS) may benefit select patients with spasticity or painful dystonia, though evidence remains limited. Focused ultrasound represents a novel noninvasive ablative option currently under investigation. Treatment selection requires multidisciplinary evaluation considering movement disorder phenotype, functional goals, patient age, and family factors. As understanding of CP pathophysiology advances, mechanism-based, individualized treatment algorithms will increasingly optimize functional outcomes for this heterogeneous patient population.
PMID: 42063808

**10.Effectiveness comparison of Kinect-based and therapist-based bimanual intensive training in children with unilateral cerebral palsy: A randomized controlled trial**

Ching-Wei Ye, Wen-Feng Huang, Ting-Chia Hsu, Tsai-Yu Shih, Jeng-Yi Shieh, Tien-Ni Wang, Hao-Ling Chen

*Archives of Physical Medicine and Rehabilitation. 2026 Apr 28. Online ahead of print.*

Objective: Compare the effectiveness of Kinect-based bimanual intensive training (K-BIT) and therapist-based bimanual intensive training (T-BIT) in children with unilateral cerebral palsy (UCP) in upper limb motor function.
Design: Single-blind, randomized controlled trial.
Setting: The K-BIT and T-BIT were conducted in the child's natural environment, such as their home or school classroom.
Participants: Thirty-one children with UCP were randomly allocated to the K-BIT (mean age 8 years 1 months [SD = 2 years 1 months], 9 males, 7 females) or T-BIT (mean age 8 years 7 months [SD = 1 year 5 months], 5 males, 10 females).
Interventions: Both the K-BIT and T-BIT groups received two 2.25-hour intervention sessions per week, for eight weeks (total = 36 hours).
Main outcome measures: The more-affected UE's motor control and bimanual coordination were assessed by unimanual and bimanual reaching-to-grasp (RTG) tasks. Daily motor functions were assessed by the Pediatric Motor Activity Log-Revised and ABILHAND-Kids.
Results: K-BIT and T-BIT were generally comparable in the more-affected UE's motor control, bimanual coordination, and daily motor functions. Additionally, K-BIT had a faster reaction time in RTG tasks ($p = 0.03$, $\eta^2p = 0.17$), while T-BIT had smoother movement in bimanual RTG tasks ($p = 0.02$, $\eta^2p = 0.21$).
Conclusions: K-BIT may serve as an effective alternative to T-BIT, reducing therapists' workload and improving the clinical utility of BIT. Time constraints in K-BIT's exergames may prompt faster reactions and more efficient movement preparation. Additionally, incorporating tangible objects that provide haptic feedback in K-BIT might further improve the movement smoothness.
PMID: 42061601

**11.The Impact of Dosing Schedule on the Efficacy of Hand-Arm Bimanual Intensive Therapy Including the Lower Extremities (HABIT-ILE) in Children With Bilateral Cerebral Palsy**

Susan E Sienko, Cathleen Buckon, Nicole Metelski, Astrid Carton de Tournai, Yannick Bleyenheuft, Marina Brandao, Grace-Anne Herard, Andrew M Gordon

*Neurorehabilitation and Neural Repair. 2026 Apr 30. Online ahead of print.*

Background Recent studies indicate that 60 to 90 hours of motor learning-based interventions provided over a 2 to 3 weeks period improve upper and lower extremity function, balance, and trunk control in children with bilateral cerebral palsy (BCP). However, this treatment dose and schedule may not be feasible for many families and treatment centers. The present study aimed to determine whether a distributed dosing schedule spread out over a longer period would yield gains and retention of functional motor skills and activity. Methods Following randomization, 21 children age 5 to 17 years with BCP participated in a 90-hour Hand-Arm Bimanual Intensive Therapy Including the Lower Extremities (HABIT-ILE) program provided in either a massed (6 hours/day, 5 days/week for 3 weeks) or distributed (6 hours/day, 1 day/week for 15 weeks) dosing schedule. Primary outcomes included upper extremity dexterity (Box and Blocks Test), gross motor function (Gross Motor Function Measure-66), and trunk control (Trunk Control Measurement Scale). Results Both dosing schedules led to significant gains in upper and lower extremity function, balance, and trunk control ($P < .05$ on all primary measures). Overall, there was not an advantage of 1 dosing schedule over the other. Conclusions A distributed model of HABIT-ILE can produce similar gains and retention in gross motor function, manual dexterity, balance, and trunk control in children with BCP. The findings may allow clinicians more flexibility in decision-making with regard to the delivery method to fit the preferences for family routines, potentially increasing the feasibility of implementing intensive therapies into clinical practice. Trial Registration NumberNCT03940989.
PMID: 42057736

**12.Feasibility and perceived impact of a clinician-led bimanual training program using joystick-operated ride-on toys incorporated into an intensive task-oriented hybrid summer camp for children with unilateral cerebral palsy**

Kush Kataria, Patrick D Kumavor, Sudha Srinivasan

*Pilot and Feasibility Studies. 2026 Apr 29. Online ahead of print.*

Background: Children with Unilateral Cerebral Palsy (UCP) have significant limitations in upper extremity (UE) function impacting their independence and quality of life. Our study objectives were to assess (a) the feasibility and acceptability of incorporating a novel, bimanual ride-on-toy navigation (RNT) training program within a 3-week intensive, hybrid UE training camp (modified constraint induced movement therapy + bimanual training) and (b) the combined benefits of the comprehensive camp training model as perceived by clinicians.
Methodology: We employed a single-group, pretest-posttest design. Ten children with UCP (M(SD): 6.99(2.13) years) and 6 clinicians/camp staff were recruited through convenience sampling from an annually held intensive therapy camp for children with UCP. In the 3-week camp, children practiced goal-oriented and task-focused activities for 6 h/day (5 h of UE practice with a constraint on the less-affected arm and 1-h of bimanual practice without the constraint). Following an initial training session, camp staff delivered fourteen RNT sessions (~20 min/session) per child over the 3 weeks as part of the bimanual portion of the camp. Feasibility and acceptability of the RNT program were assessed by monitoring adherence, through child and camp staff exit questionnaires, the Physical Activity Enjoyment Scale, and video-based behavioral coding. Clinician-perceived benefits of the overall camp programming, inclusive of RNT, was assessed using an exit questionnaire administered with camp staff and the ABILHAND-Kids Questionnaire. Given the pilot nature of this study and the small sample size, we report descriptive data, effect sizes, and 95% confidence intervals around the effect sizes.
Results: All 10 participants completed the study (Adherence: Mean(SD): 90.7% (13.5%)). Staff were able to successfully deliver RNT with minimal issues and wanted to repeat it in subsequent camp iterations. Children found RNT enjoyable and were highly engaged across sessions. In combination with other camp programming, RNT led to clinician-perceived improvements in children's bimanual function and spontaneous affected UE use during daily activities.
Conclusions: Our work suggests that RNT is an engaging, versatile, and easy-to-implement therapy adjunct that clinicians may use to incentivize affected UE use and motor practice in children with UCP.
PMID: 42050668

**13.Long-term outcomes of selective adductor muscle release for House type 1 thumb-in-palm deformity in cerebral palsy**

Okyar Altas, Emre Meriç, Gaye Torna, Bora Edim Akalın, Hayri Ömer Berkoz, Atakan Aydın

*Journal of Hand Surgery (European Volume). 2026 Apr 26. Online ahead of print.*

Introduction: This study retrospectively assessed the long-term outcomes of surgical treatment for House type 1 thumb-in-palm deformities in 25 patients with spastic hemiplegic cerebral palsy.
Methods: The study included 25 patients (mean age: 12.8 years) who met the inclusion criteria. The surgical technique involved the release of spastic thumb adductors, enhancement of thumb abduction and extension and stabilization of the first metacarpophalangeal joint. Patients wore a below-elbow palmar splint with the first phalanx in abduction for 6 weeks, followed by static splinting between weeks 6 and 8, dynamic splinting and rehabilitation between weeks 8 and 16 and night splinting until month 6. The Manual Ability Classification System (MACS) scores and fine and gross grasping abilities were measured and compared with those on the contralateral side.
Results: The mean follow-up period was 8.8 years. The MACS score decreased from 2.72 preoperatively to 1.56 in the long term. Marked improvements in grasping ability were observed: key-pinch improved by 19%, tip-to-pinch by 19.2%, triple-pinch by 19.5% and gross grasping by 37%.
Conclusion: This study suggests that surgical treatment can improve long-term functional outcomes of thumb-in-palm deformities in patients with cerebral palsy.Level of evidence: III, Therapeutic.
PMID: 42036970

**14.Managing Baclofen Pump Infection with an Externalized Intrathecal Catheter: A Viable Bridging Option**

Michael Suarez, Jordan Erdfrocht, David M Gallacher, Pratima Bajaj, Mustafa Broachwala, Joo Won Choi, Rajiv Reddy

*Pain Medicine Case Reports. 2026 Apr;10(2):127–131.*

Background: Intrathecal baclofen therapy is effective for severe spasticity, but pump infections present a significant treatment challenge. Standard management includes removal of both pump and catheter, which may lead to baclofen withdrawal in complex patients.
Case report: A 47-year-old man with spastic quadriplegic cerebral palsy and longstanding intrathecal baclofen therapy developed a pump infection after replacement surgery. The pump was removed while the intrathecal catheter was preserved and externalized. Continuous intrathecal baclofen infusion was maintained with gradual oral supplementation, preventing withdrawal. After antibiotic treatment, the pump was successfully reimplanted using the preserved catheter.
Conclusion: Externalization of an intrathecal catheter may serve as a safe and effective bridging strategy in selected high-risk patients with baclofen pump infections.
PMID: 42066264

**15.Acute neurotoxicity in a child following multi-component medicinal fungi supplementation: a case report**

Hacer Efnan Melek Arsoy, Öner Özdemir

*BMC Complementary Medicine and Therapies. 2026 Apr 30. Online ahead of print.*

Background: Medicinal fungi supplements have gained widespread recognition, increasing off-label use in pediatric populations. However, their safety profile remains inadequately characterized, and the potential for toxic effects, including neurotoxicity, is underrecognized in clinical practice. Here we report a pediatric case of suspected multi-component medicinal fungi supplement-related neurotoxicity, in which the parents were aware that the ingredient was a mushroom for their son's alternative treatment.
Case presentation: We report acute neurotoxicity in a 9-year-old boy with prematurity, cerebral palsy, and well-controlled epilepsy presenting with generalized myoclonic seizures, hallucinations, and altered mental status following ingestion of multiple medicinal fungi supplements, including Ganoderma lucidum and Cordyceps sinensis. Comprehensive investigations, including laboratory studies and neuroimaging, excluded infectious, structural, and metabolic etiologies. The temporal relationship between dose escalation of the supplement and symptom onset, combined with resolution upon discontinuation, suggested a supplement-related mechanism.
Conclusions: This case highlights the potential neurotoxic effects of mushroom supplements containing both Ganoderma lucidum (reishi mushroom) and Cordyceps sinensis in children with underlying neurological disorders. The temporal association between dose escalation and symptom onset, with complete symptom resolution upon discontinuation, suggests a supplement-related mechanism. Given the increasing use of medicinal fungi in complementary medicine, greater clinical vigilance and public awareness of their potential risks are essential.
PMID: 42063068

**16.Fatigue and sleep in adults with cerebral palsy: feasibility of two self-guided neurocognitive rehabilitation programmes to support self-management**

Ilse Margot van Rijssen, Natasja Charon Wouda, Jan Willem Gorter, Johanna Maria Augusta Visser-Meily, Olaf Verschuren

*Disability and Rehabilitation. 2026 Apr 27. Online ahead of print.*

Purpose: Fatigue and sleep problems affect daily life in adults with cerebral palsy (CP). Self-guided interventions supporting self-management are promising but not evaluated in this population. We assessed feasibility and preliminary efficacy of two self-guided neurocognitive rehabilitation modules targeting fatigue and sleep in adults with CP.
Methods: Feasibility was evaluated across adoption, adherence, acceptability and satisfaction using predefined thresholds. Fatigue and sleep were measured pre- and post-modules using self-report (scale 1–10), real-time fatigue, and bed sensor data. Outcomes were examined descriptively.
Results: Twenty-two adults with CP (mean age 44 (24–63); GMFCS I–III: 14 participants; GMFCS IV–V: 2 participants; unknown: 6 participants; 7/22 male) engaged with the modules, with 17/22 participants independently completing both. Satisfaction averaged 6.5, below the threshold of seven. The fatigue module met acceptability criteria, whereas the sleep module did not (53% vs benchmark ≥70%). Post-module self-reported fatigue decreased, supported by real-time fatigue data showing less fatigue, particularly in early mornings. Sleep quantity and quality remained stable, with high baseline sleep quality.
Conclusion: Self-guided neurocognitive rehabilitation is feasible for adults with CP and shows promise for managing fatigue. Larger studies are warranted to evaluate implementation and effectiveness across varying mobility and cognitive functioning.
Plain language summary
Self-guided neurocognitive rehabilitation modules can provide adults with cerebral palsy with accessible tools to manage fatigue and sleep, with the option to add professional support in a stepped-care approach. Providing limited, personalized guidance (e.g. during goal setting or identifying helpful sleep habits) may improve satisfaction and impact of self-guided modules. Device-based monitoring of fatigue and sleep provides valuable insights into daily fluctuations. User-friendly methods are needed to optimize adherence.
PMID: 42046412

**17.SecurePose: Automated face blurring and human movement kinematics extraction from videos recorded in clinical settings**

Rishabh Bajpai, Bhooma Aravamuthan

*Scientific Reports. 2026 May 2. Online ahead of print.*

Abstract
Movement disorder diagnosis often relies on expert evaluation of patient videos, but sharing these videos poses privacy risks. Existing de-identification approaches are frequently manual, inconsistent or inaccurate and can compromise automated kinematics extraction. SecurePose is an open-source software tool that provides reliable face de-identification alongside automated body kinematic extraction from videos recorded in clinical settings using mobile devices. Validation on gait videos from 116 children with cerebral palsy showed superior automated face detection performance compared with six existing methods, accuracy comparable to manual blurring, and a 91.08% reduction in processing time. Usability testing with experienced researchers confirmed high usability. SecurePose provides an effective solution for protecting patient privacy while enabling accurate movement analysis in clinical contexts.
PMID: 42067553

**18.User Experience of a Virtual Reality-Based Treadmill for Children With a Chronic Disease Affecting Physical Health: Cross-Sectional Feasibility Study**

Capucine Hennequin, Lena Carcreff, Adélie Christiaens, Mickaël Dinomais, Josselin Demas

*JMIR Serious Games. 2026 Apr 29.*

Background: For children with chronic conditions affecting physical health and who require long-term care, the use of a connected treadmill for gait training as part of a home program can be a way to promote motivation in rehabilitation. Furthermore, the device must be evaluated by all user groups to ensure that its development best meets the rehabilitation needs of children.
Objective: The study aimed to assess the user experience of a connected treadmill called Amy-with both immersive and nonimmersive virtual reality-among children with a chronic disease impacting physical health, as well as their parents and therapists, to explore the feasibility and potential of such a device for home-based rehabilitation in this population.
Methods: Children with cerebral palsy, neuromuscular diseases, or obesity, along with one of their parents and rehabilitation therapists, were recruited. The study involved evaluating preexisting Amy solutions and collecting user experience feedback from participants with questionnaires. Amy solutions consisted of immersive virtual reality (using a virtual reality headset) and nonimmersive (tablet-based) games, both controlled through body movements on a treadmill conceived to train walking and balance. Questionnaires were the short version of the User Experience Questionnaire; the Usability Metric for User Experience; the Virtual Reality Sickness Questionnaire; a customized questionnaire evaluating comfort, fun, sense of presence and immersion; and a customized questionnaire evaluating parent's perception.
Results: Twenty-eight children, 28 parents, and 18 therapists participated in the study. Compared with User Experience Questionnaire benchmark data, the overall results with immersive and nonimmersive virtual reality in all participants were in the range of 10% best results or in the "excellent" category. The mean (95% CI) scores for each group of participants, with nonimmersive and immersive virtual reality, were as follows: 1.9 (1.6-2.2) and 2.1 (1.6-2.5) for children, 2.0 (1.7-2.2) and 2.3 (2.0-2.5) for parents, and 1.4 (1.1-1.7) and 1.4 (1.1-1.7) for therapists, respectively. User experience was significantly better for children and parents than for therapists (P adjusted .001). From the Usability Metric for User Experience, participants rated the Amy treadmill's usability as "good to excellent" on the System Usability Scale, regardless of whether immersive virtual reality was used. Immersive virtual reality was well tolerated by children. Children experienced immersive virtual reality positively in terms of comfort, immersion, presence, and fun. Parents' acceptability of the connected treadmill was positively assessed.
Conclusions: This study is, to our knowledge, the first to assess the user experience of a playful treadmill-based virtual environment controller in children with chronic conditions affecting physical health in a user-centered and multidisciplinary team-based approach. This initial test demonstrates promising potential for using the connected treadmill as a rehabilitation tool. Therapists may need improvements to better meet their expectations, highlighting the importance of further iterations to align technological features and practical clinical context.
PMID: 42054672

**19.A Lightweight Multi-articular Passive Exoskeleton Using a Single Elastic Band to Improve Crouch Gait Pattern: A Pilot Study**

Jisang Kang, Jae-Ryeong Choi, Sukyung Kang, Juyeon Park, Moon Seok Park, Kyu-Jin Cho

*IEEE Transactions on Neural Systems and Rehabilitation Engineering. 2026 Apr 27. Online ahead of print.*

Abstract
Crouch gait, characterized by excessive flexion of the lower-limb joints, is a common gait disorder among children with cerebral palsy (CP) that compromises mobility and increases energy expenditure. Although surgical and orthotic interventions can improve alignment, maintaining these benefits requires continued postural support and gait practice. While powered exoskeletons have been developed to support upright and coordinated movement, they are often too heavy and complex for practical use. To address this, we developed a lightweight passive exoskeleton that assists the hip, knee, and ankle simultaneously using a single elastic band. The device is designed to provide self-adjusting torque dependent on posture without the need for sensors or active control. It also features user-centric design components to ensure wearability and lightness through a garment-like waist belt and carbon-fiber knee-ankle exoskeleton. We evaluated the biomechanical effects of the exoskeleton in four children with crouch gait (GMFCS levels I-III) by comparing baseline and exoskeleton conditions during overground walking. The preliminary results showed that the exoskeleton tended to increase the mean hip and knee extension angles during the stance phase by 3.5◦ and 3.3◦, respectively, and increased ankle plantarflexion by 1.4◦, indicating the mechanical feasibility of assisting a more extended gait posture. Furthermore, the range of motion of the joints increased by 1.7◦ in the hip, 4.2◦ in the knee, and 8.5◦ in the ankle, suggesting that the passive assistance does not restrict motion and may allow for dynamic joint movement. These preliminary findings suggest the feasibility of passive, multi-joint assistance strategies to facilitate more upright gait patterns in children with crouch gait.
PMID: 42043992

**20.Quantifying Correlogram Shape to Analyze Neuronal Firing Dynamics Recorded in TBI-on-a-Chip**

Casey Erin Adam, Shatha J Mufti, Jhon Martinez, Edmond A Rogers, Martina Dalolio, Nikita Krishnan, Timothy Beauclair, Riyi Shi

*Neuroinformatics. 2026 Apr 27;24(2):24.*

Abstract
Changes in neuronal network dynamics in response to different treatments or conditions underly brain function and pathology. A multitude of tools, including electroencephalography, voltage or calcium imaging, and microelectrode array (MEA) recordings, exist to record signals from neuronal firing at different length scales. Correlograms are a standard analysis tool to study the relationship between a pair of recorded neuronal signals. Correlogram shape can provide information about signal independence, firing pattern, and firing order. However, such analysis is performed manually and qualitatively, limiting the amount of information gained. To overcome this limitation, a MATLAB algorithm was developed to automate correlogram shape quantification by calculating correlogram uniformity, peak count and location, and area left of zero, which respectively quantify signal independence/dependence, firing pattern, and firing order. Algorithm outputs were validated using three different MEA recordings during which cells were exposed to bicuculline methiodide, pH shock, or impact injury. Algorithm outputs described signaling changes in all three recordings, bridged changes in individual signal pairings to changes in the entire signal population, and agreed with literature studies. Therefore, this algorithm serves as a useful means of automatically quantifying changes in signal dependence, firing pattern, and firing order across time within a single recording, and across different recordings. These features are also common to all recording techniques, and therefore can be compared across different types of recordings. Therefore, the MATLAB algorithm described in this article can help provide insight into how neural network dynamics are altered by different drugs or conditions.
PMID: 42036490

**21.Biomechanics of manual wheeled propulsion in children and adolescents with neuromuscular disorders: A scoping review**

Jessica Lewis, Mallory Rowan, Matthew Parrett, Joshua Leonardis, Stephanie Russo, Kirsten Tulchin-Francis

*Clinical Biomechanics. 2026 Apr 21. Online ahead of print.*

Background: Manual wheelchair use supports independence and participation for children with neuromuscular disorders; however, pediatric propulsion biomechanics remain poorly defined. Clinical practice often relies on adult data despite developmental differences in growth, motor control, and endurance. A pediatric-specific synthesis is needed to inform wheelchair prescription, training, and shoulder preservation strategies. This scoping review aimed to map biomechanical outcomes, methods, and propulsion protocols in pediatric manual wheelchair users with neuromuscular disorders, while identifying clinical implications and research gaps.
Methods: A scoping review following PRISMA-ScR guidelines was conducted using PubMed and Embase through August 2025. Eligible studies included individuals ≤18 years with neuromuscular conditions using manual or power-assist wheelchairs and reporting at least one biomechanical outcome. Data were extracted on study design, populations, measurement tools, propulsion tasks, and key findings. Methodological quality was also assessed.
Findings: Seventeen studies met inclusion criteria, most involving pediatric-onset spinal cord injury, with fewer including spina bifida, cerebral palsy, muscular dystrophy, or Charcot-Marie-Tooth disease. Three domains emerged: (1) upper extremity mechanics: children experienced substantial shoulder loading (6–10% body weight), distinct kinematics, and high interindividual variability; (2) propulsion efficiency: smaller contact angles, higher cadences, and less mature stroke patterns were common, though brief training improved efficiency; and (3) physiologic cost: limited evidence indicated high metabolic demand, with $VO_2$ during the 6-Minute Push Test reaching 85–89% of $VO_2$peak in myelomeningocele.
Interpretation: Pediatric propulsion is biomechanically demanding and developmentally distinct, emphasizing the need for pediatric-specific training and early shoulder-preservation strategies. Key research gaps include broader diagnostic representation, standardized protocols, seating-interface biomechanics, and longitudinal outcomes.
PMID: 42034074

**22.Prevalence and aetiology of cerebral palsy among Nigerian children: a systematic review and meta-analysis**

Udochukwu Michael Diala, Aderonke O Uhunmwangho-Courage, Fatima Abdullahi, Paul Ikhurionan, Caitlin Bakker, Duke Appiah, David Danjuma Shwe, Rose Gelineau-Morel, Kabiru Gurama, Olugbenga Akinyemi Ofakunrin, Angela McGillivray, Gabriel E Ofovwe, Tina Slusher

*BMC Neurology. 2026 May 1. Online ahead of print.*

Background: Nigeria is among the leading countries contributing to the burden of cerebral palsy (CP). CP is the commonest physical disability in childhood, accounting for 16.2% of child neurology referrals. Lack of reliable data on the burden of disease limits comprehensive national policy directed to prevention, care and rehabilitation. This study aimed to describe the pooled prevalence of CP in Nigeria, its potential causes and types.
Methods: This systematic review and meta-analysis included published articles on Nigerian children less than 18 years with CP. Searches were conducted in nine databases and articles were screened using Rayyan. Data extraction forms were developed by the team and risk of bias was assessed using a tool derived from the Mixed Methods Appraisal Tool (MMAT) 2018.
Results: One hundred and twelve articles passed title and abstract screening, with 39 studies involving 194,831 children included. The pooled prevalence of CP was 32.5% in neurology/physiotherapy clinics, 1.7% in general paediatric clinics, and 0.22% in community settings. Males accounted for 59.4% of cases. Asphyxia and neonatal jaundice were the leading causes, accounting for 37.1% and 24.8% of cases respectively. Substantial heterogeneity was observed across prevalence estimates. Meta-regression showed higher prevalence in studies including younger children, though this was attenuated after multivariable analysis.
Conclusion: This review demonstrates a high prevalence of cerebral palsy in Nigeria. Addressing preventable causes requires urgent improvements in obstetric and neonatal care alongside strengthened rehabilitation services.
PMID: 42067836

**23.Consensus on factors critical to Augmentative and Alternative Communication (AAC) use in Canada from multiple stakeholder perspectives: a Delphi study**

Stephanie Lackey, Shane Pinder, T Claire Davies, Tracy Shepherd, Petra Karlsson, Beata Batorowicz

*Disability and Rehabilitation: Assistive Technology. 2026 May 1. Online ahead of print.*

Purpose: Despite evidence supporting AAC benefits, underutilization and discontinuation remain common. This study aimed to establish consensus on factors critical to AAC use in Canada from multiple stakeholder perspectives.
Materials and methods: A two-round modified Delphi study was conducted using 123 survey items developed from prior focus group research. Participants rated items on a 9-point numeric scale across two online survey rounds.
Results: Consensus was reached on 52 statements rated as important by at least 75% of participants. These statements addressed environmental and technological factors including AAC system characteristics, social interaction, service provision, school contexts, physical environments, and societal attitudes.
Conclusion: Key priorities for AAC use span individual, technological, service-related, and social domains. Consensus across stakeholder groups provides direction for future research and development of AAC service delivery guidelines in Canada.
Plain language summary: This study reports on consensus from lived experience and professional viewpoints on the factors that are most important to AAC use in Canada Findings speak to the urgent need to enhance resources in many areas especially services, AAC training, and support at schools for AAC use. The results of the study highlight the importance of developing service delivery guidelines that aim to address priorities and support social participation of people who may benefit from AAC.
PMID: 42065971

**24.“It is about more than just equipment”: service providers' vision for AAC services in Ontario, Canada**

Stephanie Lackey, Véronique Légaré, T Claire Davies, Petra Karlsson, Shane Pinder, Beata Batorowicz

*Augmentative and Alternative Communication. 2026 Apr 30. Online ahead of print.*

Abstract
Without appropriate support, communication disabilities can limit social participation in education, employment, and community engagement. Augmentative and alternative communication (AAC) services can help to mitigate barriers to participation. Research on AAC services is growing internationally, however, remains limited in Canada. The purpose of this study was to explore the perspective of service providers on AAC services in Ontario. A total of 21 participants, comprised of speech language pathologists, occupational therapists, and a communicative disorders assistant participated in focus groups. Authors used Appreciative Inquiry, a strengths-based approach to organizational change, guided by four phases: Discovery, Dream, Design, and Destiny. Using reflexive thematic analysis, the authors generated four themes that reflected areas of change in AAC services: expanding the reach of AAC services; aligning service delivery with client needs; leveraging the strengths of service providers; and focusing on the lived experience. Findings highlight key areas for improvement including enhancing professional autonomy, increasing service availability, and providing interventions in natural environments. Participants envisioned service delivery grounded in client-centeredness, efficiency, equity, accessibility, and support for service providers. This study provides a critical evidence base to guide future research and drive informed recommendations for transforming AAC service practices and policies across Ontario.
PMID: 42059100

**25.Switching adult patients with spasticity from onabotulinumtoxinA to abobotulinumtoxinA: a real-world data analysis across three US-based treatment centers**

Nate Way, Edward Dabrowski, Mitchell Paulin, Martin Taylor, John Madden, Amandeep Mann, Jonathan Bouchard

*Journal of Comparative Effectiveness Research. 2026 May 1. Online ahead of print.*

Aim: To assess patient characteristics, treatment patterns, botulinum toxin type-A (BoNT-A) costs and describe safety in adults with spasticity who switched from onabotulinumtoxinA to abobotulinumtoxinA. Materials & methods: Chart data from three US-based treatment centers was collected in patients aged ≥18 years with upper limb (ULS), lower limb (LLS) or ULS and LLS (ULS + LLS) spasticity. Eligible patients had ≥2 onabotulinumtoxinA treatment cycles before switching to abobotulinumtoxinA; they were followed for three additional abobotulinumtoxinA treatment cycles. A *post hoc* analysis of estimated drug costs was conducted. Results: Eighty-eight patients (mean age 44.9 years; 62.5% male) switched from onabotulinumtoxinA to abobotulinumtoxinA; in 84 (95.5%), the switch was due to 'medical need/effectiveness not achieved.' Most common spasticity etiologies were cerebral palsy (43.2%) and stroke (25.0%). Fifty-one patients (58.0%) had bilateral spasticity with a mean ± SD of 5.1 ± 2.2 muscles injected at each visit over the 5-injection-cycle treatment period. No adverse events were reported following switching. Mean estimated cost per visit was $2731 with onabotulinumtoxinA and $1452 with abobotulinumtoxinA. **Conclusion:** In this real-world study, patients with ULS, LLS or ULS + LLS who were switched from onabotulinumtoxinA to abobotulinumtoxinA continued for ≥3 treatment cycles without any reported adverse events. Switching resulted in lower estimated BoNT-A costs.
Plain language summary: What is this article about? This article explores what happens when adults with spasticity – a condition that causes increased muscle tightness and difficulty with movement – change their treatment. Botulinum toxin type-A (BoNT-A) injections are well established treatments for patients with spasticity. To better understand real-world treatment decisions and outcomes, researchers reviewed the medical records of 88 adult patients treated at three centers in the US. All of these patients had switched from onabotulinumtoxinA (onaBoNT-A) to abobotulinumtoxinA (aboBoNT-A). The study aimed to find out why patients were switched and what happened after the change in treatment. What were the results? Most patients (95.5%) were switched because their previous treatment (onaBoNT-A) was not effective enough. After switching to aboBoNT-A, no side effects were reported. Additionally, the estimated cost per treatment visit dropped by approximately 47%. What do the results mean? These findings suggest that switching to aboBoNT-A may benefit patients who are not getting enough relief from their current onaBoNT-A treatment. The switch was well-tolerated, and patients needed fewer spasticity-related doctor visits and less rehabilitation therapy afterward. The change in treatment also helped reduce healthcare costs. These real-world results may help doctors and healthcare decision-makers choose the most effective and affordable treatment options for managing spasticity.
PMID: 42065337

**26.Causal subgroups and declining rates of cerebral palsy in Victoria, Australia**

Susan M Reid, Gina L Hinwood, Angela T Guzys, Rod W Hunt, Dinah S Reddihough

*Developmental Medicine & Child Neurology. 2026 Apr 29. Online ahead of print.*

Aim: To determine the extent to which specific patho-aetiological subgroups contributed to declines in prevalence of cerebral palsy (CP) observed in many high-income countries over this millennium. Method: This epidemiological study used data from the Victorian CP Register on 2303 children born in Victoria between 2000 and 2019. Joinpoint regression analysis was used to assess trends in birth cohort prevalence of CP per 100 000 live births for well-defined subgroups based on likely causal pathway, birth condition, and neonatal course. Results: Linear rate decreases were seen for two subgroups: (1) children born before 35 weeks' gestation with perinatal insults (annual percent change -3.12 [95% confidence interval - 4.63, -1.58]) and (2) children born from 35 weeks with perinatal, non-focal hypoxic-ischaemic insults and encephalopathy (annual percent change -5.98 [95% confidence interval - 8.46, -3.44]). Evidence was lacking for sustained decreases in CP rates for subgroups of children with early developmental causes, perinatal arterial ischaemic strokes, predominant white matter injury patterns in association with birth from 35 weeks, and postneonatal causes. Interpretation: The steepest declines in rates of CP in Victoria were for causal subgroups involving perinatal cerebral insults and significant neonatal complications, suggesting that advances in perinatal care may be driving the decreasing CP rates.
PMID: 42057380

**27.Prenatal computed tomography (CT) and risk of congenital heart disease and cerebral palsy: A nationwide mother-child paired cohort study**

Tae Wook Kang, Jihye Heo, Taegyun Park, Juhee Cho, Soo-Young Oh, Jae Seung Shin, Jeong Ah Hwang, Kyoung Doo Song, Min Woo Lee, Woo Jin Yang, Insung Kim, Danbee Kang

*BMC Medicine. 2026 Apr 27. Online ahead of print.*

No abstract available
PMID: 42045952

**28.Prevalence of Malnutrition Among School-Aged Children With and Without Intellectual and Developmental Disabilities in Saudi Arabia: A Cross-Sectional Study**

Lujain A Almousa, Naseem M Alshwaiyat, Jozaa Z ALTamimi, Reham I Alagal, Malak A Alsemari, Nora A AlFaris

*Food Science & Nutrition. 2026 Apr 25. eCollection 2026 May.*

Abstract
Globally, millions of children live with intellectual and developmental disabilities (IDD), which can raise the risk of malnutrition in children. Data from Saudi Arabia on school-aged children with IDD remain limited. Therefore, this study aimed to determine the prevalence of malnutrition among school-aged children with and without IDD in Saudi Arabia. This cross-sectional study was conducted during August–December of 2024 at the Child Development Center at University Hospital, Riyadh, Saudi Arabia. School-aged children (5–17 years) with clinician-diagnosed autism spectrum disorder (ASD), Down syndrome (DS), attention deficit/hyperactivity disorder (ADHD), or cerebral palsy (CP) and age-matched children without IDD were recruited. Weight and height were measured, and body mass index (BMI) was calculated. WHO Growth Reference 2007 (5–19 years) was used to generate BMI-for-age z-scores (BAZ) and height-for-age z-scores (HAZ) using WHO AnthroPlus; weight-for-age z-scores (WAZ) were computed only for children aged ≤10 years. Malnutrition was defined as undernutrition (thinness and/or stunting and/or underweight) and/or overnutrition (overweight and/or obesity). A total of 168 children participated (IDD, n = 68; non-IDD, n = 100). Overall malnutrition prevalence was similar in children with and without IDD (47% vs. 48%; risk ratio [RR] 0.98, 95% CI 0.71–1.36; p = 0.905). Overnutrition was more common than undernutrition in both groups (IDD: 29% overnutrition vs. 25% undernutrition; non-IDD: 32% vs. 28%). Although overall prevalence was comparable, marked heterogeneity was observed across IDD subtypes (malnutrition: DS 90%, ADHD 50%, CP 48%, ASD 24%; $\chi^2(3) = 12.02$, p = 0.007; FDR-adjusted q = 0.022). Concurrent stunting and overweight/obesity (individual-level double burden) was observed in 12% of non-IDD children and 7% of children with IDD. In conclusion, nearly half of this hospital-based sample of Saudi school-aged children had evidence of malnutrition, with overnutrition exceeding undernutrition. While overall malnutrition prevalence did not differ between children with and without IDD, the distribution across IDD subtypes was clinically meaningful. Routine growth monitoring and targeted nutrition support are needed in both clinical and school settings.
PMID: 42040738

**29.Auditory and short-term memory abilities in right- and left-hemiparetic children with cerebral palsy**

Banu Baş, Hilal Mecit Karaca, Zehra Aydoğan, Lütfiye Çilkol Bayram, Nesrin Ceylan

*International Journal of Pediatric Otorhinolaryngology. 2026 Apr 9. Online ahead of print.*

Objectives: This study aims to explore the auditory abilities and auditory short-term memory of right- and left-hemiplegic children with cerebral palsy.
Material and methods: The study included 26 children aged 8 to 10 years, all native Turkish speakers, divided into three groups: 8 right-hemiparetic, 8 left-hemiparetic, and 10 typically developing children. Hearing thresholds were evaluated before the children were included in the study. The children were assessed with the Test for Auditory Processing Disorders in children (SCAN-C) and the Auditory Digit Span Test.
Results: For the SCAN Test, there was a significant difference only between the right-hemiparetic group and the typically developing group on the Auditory Figure-Ground Test. No significant difference was found between the groups for the Filtering Words Test and for the two dichotic listening tests. Regarding the Auditory Short-Term Memory Span Test, results revealed a significant difference between the right-hemiparetic group and the two other groups for the verbal response condition and between the right-hemiparetic group and the typically developing group for the written condition.
Conclusion: This study provides new insights into how asymmetry in hemiparetic children affects auditory performance during childhood. It emphasizes the importance of individualized auditory-interventions in the rehabilitation of children with hemiparetic cerebral palsy. The distinct characteristics of right and left hemispheric involvement suggest that therapies should be designed with these differences in mind.
PMID: 42035747

**30.Survey of AAC knowledge of practitioners in special schools in Tianjin area in China**

Mengxuan Wu, Jie Wu, Rajinder Koul

*Augmentative and Alternative Communication. 2026 Apr 25. Online ahead of print.*

Abstract
Augmentative and alternative communication (AAC) systems support individuals with significant communication challenges. In mainland China, AAC implementation remains limited, particularly within school settings due to a shortage of certified speech-language pathologists (SLPs). This study surveyed AAC-related knowledge, practices, and training needs among special education personnel in Tianjin, China, where educators often serve as de facto AAC providers. A 10-item questionnaire was administered to 383 teaching and non-teaching staff across ten special schools (response rate: 64.6%). The survey explored self-reported AAC competence, populations served, preferred training formats, and reading materials. Respondents reported limited knowledge of AAC, especially in low- and high-tech modalities. Most participants expressed a strong desire for training, favoring mentorship and workshops. Those with experience supporting students with autism, intellectual disabilities, and cerebral palsy showed stronger preferences for evidence-based materials and structured training. Principal component analysis (PCA) revealed a uniformly high interest across training topics, indicating broad foundational needs. Findings highlight the urgent need for accessible, entry-level AAC training tailored to the educational context in China. Results can inform national policy, curriculum development, and cross-sector collaboration to build sustainable AAC capacity.
PMID: 42033455

**31.Cost-effectiveness analysis of intensive and emerging rehabilitation therapies in children with cerebral palsy: an observational cohort study using real-world evidence and microsimulation modelling**

Diana Marcela Nova-Díaz, Sergio Aguilera-Albesa, Eduardo Sánchez-Iriso

*Health Economics Review. 2026 May 1. Online ahead of print.*

Objective: To evaluate the short- and long-term cost-effectiveness of integrating Intensive and Emerging Rehabilitation Therapies into standard care for children with cerebral palsy (CP), compared to standard care alone, through a hybrid approach combining prospective real-world data analysis and individual-level microsimulation over a lifetime horizon.
Methods: A prospective observational cohort of 148 children with CP, stratified by Gross Motor Function Classification System levels, was followed over 12 months. Short-term incremental costs and quality-adjusted life years (QALYs) were estimated using seemingly unrelated regression equations (SURE) based on EQ-5D-Y scores. Costs were assessed from the Spanish public healthcare system perspective. To extrapolate long-term outcomes, an individual-level microsimulation model projected costs and QALYs over a 30-year horizon, applying a 3% annual discount rate.
Results: Compared with standard treatment, Therasuit and intensive physiotherapy demonstrated the most favourable cost-effectiveness profiles. Therasuit generated 0.222 additional QALYs at an incremental cost-effectiveness ratio (ICER) of €18,830/QALY, while intensive physiotherapy generated 0.216 additional QALYs at €31,772/QALY. Other therapies, including occupational therapy and hippotherapy, were dominated by standard care. Long-term microsimulation provided additional insights beyond short-term findings by capturing delayed benefits, which in some cases led to different cost-effectiveness rankings among therapies. Therasuit produced 5.49 additional QALYs at an ICER of €12,922/QALY compared to standard care, and intensive physiotherapy produced 4.92 additional QALYs at €25,789/QALY. Homeopathy and the Petö Method were cost-effective under broader willingness-to-pay thresholds but were less efficient.
Conclusions: Therasuit and intensive physiotherapy are high-value options when added to standard care for children with CP. Findings support prioritising Intensive and Emerging Rehabilitation Therapies using real-world evidence and modelling to guide sustainable healthcare decision-making.
PMID: 42062688

**32.Intellectual Profiles in Children with Unilateral and Bilateral Cerebral Palsy: A Multilevel Analysis of the Wisc-Iv Scale**

Maria Chiara Di Lieto, Costanza Rufini, Elisa Matteucci, Benedetta Del Lucchese, Elena Beani, Veronica Barzacchi, Antea Scrocco, Chiara Pecini, Giuseppina Sgandurra

*Clinical Neuropsychiatry. 2026 Apr;23(2):154–164.*

Objective: Cerebral palsy (CP) is a neurodevelopmental disorder primarily affecting motor functioning and often accompanied by cognitive impairments. Although intellectual profiles in children with CP are known to be heterogeneous, standard intelligence assessments often rely on a single global IQ score, which may obscure important intra-individual differences and limit clinical usefulness. This study aimed to explore intellectual functioning in children with unilateral and bilateral spastic cerebral palsy using a detailed multi-level analysis to examine how motor impairments may influence performance on WISC-IV indices and subtests.
Method: A cross-sectional study was conducted on 48 children aged 6–15 years with spastic cerebral palsy (24 unilateral, 24 bilateral). Inclusion required at least one WISC-IV index score above 80. Intellectual functioning was assessed through Full Scale IQ, four cognitive indices (verbal comprehension, perceptual reasoning, working memory, processing speed), and individual subtests. Participants were classified by cerebral palsy type and gross motor function level. Descriptive and comparative statistics identified significant group differences.
Results: Intellectual profiles showed marked heterogeneity. Over half of the children showed marked discrepancies among WISC-IV index scores, making the Full Scale IQ difficult to interpret as a representation of their overall cognitive functioning. Working Memory and Processing Speed were the most frequently impaired indices. Processing Speed deficits were consistent across CP types and motor levels, while Working Memory impairments were more pronounced in children with bilateral CP. Perceptual and verbal reasoning differences were more evident in bilateral cases. Greater motor impairment correlated with lower Perceptual Reasoning and Processing Speed scores, highlighting the influence of motor functioning on performance.
Conclusions: Detailed, multi-level assessments of WISC-IV performance provides a clearer understanding of cognitive functioning in children with CP. Considering indices and subtests in relation to motor constraints helps distinguish true cognitive abilities from motor-related limitations, supporting accurate diagnosis and targeted interventions.
PMID: 42052220

**33.'Do You Tell Them Not to Kiss Their Child?' Implementing Congenital Cytomegalovirus Prevention Guidelines in General Practice: A Qualitative Study**

Natalia Rode, Hayley Smithers-Sheedy, Kath Swinburn, Tanya Tripathi, Emma Waight, Lisa Hui

*Australian and New Zealand Journal of Obstetrics and Gynaecology. 2026 Jun;66(3):e70141.*

Abstract
Congenital cytomegalovirus (CMV) is a known cause of childhood-onset disability. Australian guidelines recommend all pregnant women be informed about CMV risk-reduction strategies. We conducted semi-structured interviews with six Australian General Practitioners (GPs) who had completed a CMV eLearning module to explore their education experience and identify barriers and facilitators to including CMV in routine antenatal counselling. Data were analysed inductively. GPs found the module "engaging" and "relevant" to their practice. Barriers to routine CMV antenatal counselling included system, practitioner and patient factors, with GPs identifying measures to address these issues and facilitate routine counselling in line with national recommendations.
PMID: 42047490

# Prevention and Cure

**34.Identification of risk factors of cystic periventricular leukomalacia in preterm infants**

Renée Lampe, Irina Sidorenko, Eva Lück, Andrey Kovtanyuk, Ursula Felderhoff-Müser, Marcus Krüger, Christian Brickmann

*Frontiers in Pediatrics. 2026 Apr 15.*

Introduction: The neonatal period in very preterm born infants is characterized by high vulnerability of the developing brain. Diffuse or cystic white matter injury-cystic periventricular leukomalacia (cPVL)-is one of the most serious complications leading to brain injury in preterm infants, associated with an increased risk of neurological impairments such as cerebral palsy. Methods: In the present study, parameters that may potentially influence the occurrence of cPVL are analyzed. The study is based on retrospective clinical data of 46 preterm infants with and without cPVL, including prenatal factors, birth-related information, neonatal diagnoses and routinely measured clinical monitoring data. The novelty of this work lies in the inclusion in analyses of cerebral blood flow (CBF), CBF fluctuations and partial pressure of oxygen in brain tissue ($PtO_2$), calculated from routinely measured parameters using a mathematical model. Results: Statistical analyses revealed significant association between cPVL and a group of 5 clinical and 23 regularly measured parameters including mathematically calculated CBF, CBF fluctuations and $PtO_2$. The obtained results may be useful for future risk assessment of cPVL at an early stage.
PMID: 42063437

**35.Can Spasticity Be Prevented? Insights from Preclinical and Clinical Evidence**

Radha Korupolu, Argyrios Stampas

*Physical Medicine and Rehabilitation Clinics of North America. 2026 May;37(2).*

Abstract
Spasticity is a common and disabling consequence of central nervous system injury that evolves progressively over time. Although traditionally viewed as an unavoidable sequela, emerging preclinical and clinical evidence suggests that spasticity may be preventable or mitigated through early, targeted interventions. This article explores the pathophysiology and natural history of spasticity across multiple conditions (stroke, spinal cord injury, traumatic brain injury, cerebral palsy, and multiple sclerosis), reviews early identification strategies, and critically examines preclinical and clinical data supporting spasticity prevention.
PMID: 42062023

**36.The relationship between sonographically assessed volumetric brain development in VLBW preterm infants and neurodevelopmental outcome at 2 years of age-data from the NeoNEVS project**

Christian Brickmann, Renée Lampe, Irina Sidorenko, Nina Gauger, Julia Hauer, Marcus Krüger, Sven Loth

*Frontiers in Pediatrics. 2026 Apr 13. eCollection 2026.*

Background: Very low birth weight (VLBW) preterm infants are at increased risk for long-term neurodevelopmental impairment. Early identification of infants at risk remains challenging, particularly with regard to dynamic brain development during neonatal intensive care. Cranial ultrasound (CUS) allows safe and repeated bedside assessment of cerebral growth over time.
Methods: In this retrospective cohort study, 79 VLBW infants (<1,500 g, <32 weeks gestation) treated at two tertiary neonatal intensive care units between 2019 and 2021 were included. Serial cranial ultrasound examinations were performed from birth to discharge. Total brain volume was estimated using a validated ellipsoid model, and individual cerebral growth rates were derived from longitudinal measurements. Neurodevelopmental outcome at 24 months corrected age was assessed using the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley-III), reporting percentile ranks for cognitive, language, motor, and a combined developmental score. Associations were evaluated using Spearman correlation and multivariable linear regression.
Results: The median cerebral brain growth rate was 2.4 cm3/day (95% CI: 1.5–3.1). Cerebral growth rate demonstrated a modest but statistically significant positive correlation with Bayley-III motor percentile rank ($r = 0.25$, $p < 0.05$). Associations with cognitive, language, and combined Bayley outcomes were positive but did not reach statistical significance. Total brain volume at discharge was not associated with neurodevelopmental outcomes in any domain. Cerebral growth rate was modestly correlated with the decline in head circumference percentile from birth to discharge.
Conclusion: Longitudinal ultrasound-derived cerebral brain growth is associated with motor development at two years corrected age in VLBW infants, whereas single time-point brain volume measurements are not. Serial cranial ultrasound represents a feasible bedside approach to complement clinical risk assessment and may contribute to early neurodevelopmental risk stratification.
PMID: 42051944

**37.Prevalence of methemoglobinemia after lidocaine as add-on therapy in neonatal seizures**

Bregje O van Oldenmark, Mathies Rondagh, Kirsten J M Schimmel, Arjan B Te Pas, Enrico Lopriore, Linda S de Vries, Sylke J Steggerda

*European Journal of Pediatrics. 2026 Apr 28;185(5):314.*

Abstract
Methemoglobinemia is a rare but potentially serious complication of lidocaine (LDC) use for local anesthesia in infants and young children, yet its prevalence during continuous systemic infusion for neonatal seizures remains unclear. Given the increasing use of LDC as add-on therapy for neonatal seizures, this retrospective cohort study evaluated methemoglobin (MetHb) levels in 51 neonates with (serial) measurements within 96 h before and after LDC infusion. Methemoglobinemia was defined as MetHb > 2% in arterial or capillary blood gas samples. Prevalence increased from 6% (3/51) before LDC to 47% (24/51) after administration ($p < 0.001$). Most neonates had mildly elevated MetHb levels (< 5%); three had a MetHb level > 5%, with a highest peak of 9.5%. In one neonate LDC was discontinued due to hypoxemia, the others were asymptomatic. In neonates who developed methemoglobinemia after LDC, the mean time to peak MetHb was 29.1 h (95% CI 11.1–73.3), and mean time to recover to < 2% after the peak was 27.5 h (95% CI 8.4–75.5). Over half of neonates receiving regimen III (> 36 weeks without therapeutic hypothermia [TH]) developed methemoglobinemia, compared to none on regimen IV (with TH). This suggests an association with a higher cumulative dose and longer infusion duration. Conclusion: In conclusion, methemoglobinemia occurred in nearly half of neonates receiving continuous LDC for seizures and was associated with the dosing regimen. It is important to be aware of this complication, especially in infants who develop respiratory deterioration and oxygenation problems following continuous LDC administration.
PMID: 42050163

**38.Four-year neurodevelopmental outcomes in infants with symptomatic congenital cytomegalovirus disease treated with oral valganciclovir: A prospective follow-up study in Japan**

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Background: Congenital cytomegalovirus (CMV) infection is a leading cause of neurodevelopmental disabilities. Although oral valganciclovir (VGCV) treatment has shown short-term benefits, long-term outcomes beyond 3 years remain unclear.
Objective: To evaluate 4-year neurodevelopmental outcomes in infants with symptomatic congenital CMV (SCCMV) disease treated with VGCV and identify predictors of adverse outcomes.
Methods: This prospective follow-up study (VGCV-2) included 24 infants with SCCMV disease who received oral VGCV (16 mg/kg, twice daily for 6 months). Neurodevelopmental assessments were performed at 1, 2, 3, and 4 years of age using the Kyoto Scale of Psychological Development (KSPD). The primary outcome was developmental delay (developmental quotient [DQ] < 70) at 4 years. Secondary outcomes included diagnoses of neurodevelopmental disorders and results of autism spectrum disorder (ASD) screening.
Results: Twenty-one participants (87.5%) completed the 4-year follow-up. Developmental delay was evident in 28.6% (6/21) of patients at 4 years. Neurodevelopmental disorders, including intellectual disability (28.6%), ASD (19.0%), and cerebral palsy (14.3%), were diagnosed in 42.9% (9/21) of patients. A poorer best-ear hearing assessment at baseline was a significant predictor of developmental delay. Shorter body length, smaller head circumference at birth, and poorer baseline hearing were significantly associated with the diagnosis of neurodevelopmental disorders. Early positive Modified Checklist for Autism in Toddlers screening at 2 and 3 years strongly predicted the diagnosis of neurodevelopmental disorders.
Conclusion: Despite VGCV treatment, substantial neurodevelopmental impairment persisted for 4 years in children with SCCMV disease. Early clinical markers can help identify high-risk infants who require intensive developmental support. (Clinical trial registration: jRCT2051190075).
PMID: 42044599

**39.Maternal Inflammation Alters Nuclear and Mitochondrial DNA Methylation Patterns in Neonatal Brain Monocytes**

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Abstract
Neonatal hypoxic ischemic encephalopathy (HIE) is a common birth complication that can cause death or lifelong disabling conditions like cerebral palsy, epilepsy, and autism. It is well established that maternal infection and inflammation are significant risk factors for HIE but reasons for this increase in neurological risk to the offspring remain unknown. Inflammation or infection are associated with epigenetic changes and may contribute to the increased risk of neurodevelopmental disability in exposed offspring. Here, we analyzed and compared DNA methylation patterns in brain monocytes isolated from control, maternal immune activation (MIA), and an inflammation sensitized HIE (IS-HIE) CF-1 mouse model at postnatal day 7. We found that maternal inflammation induced significant methylation differences in neonates relative to control samples in both MIA and IS-HIE samples with no significant differences identified between the MIA and IS-HIE groups. MIA samples showed hypermethylation at loci involving craniofacial development and transcription factors important for regulating neurodevelopment and immune function. MIA samples also demonstrated significant hypermethylation at multiple mitochondrial genome CpGs. These findings suggest that maternal inflammation induces epigenetic alterations in fetal brain immune cells that are detectable in neonates. These changes may contribute to heightened neurodevelopmental risk in offspring following hypoxic injury, highlighting potential molecular pathways for future therapeutic targeting.
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