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Interventions and Management

1. Unilateral versus bilateral reconstructive hip surgery in children with cerebral palsy: A survey of pediatric orthopedic surgery practice and decision-making

Stacey D Miller, Maria Juricic, Njalalle Baraza, Nandy Fajardo, Judy So, Emily K Schaeffer, Benjamin J Shore, Unni Narayanan, Kishore Mulpuri

J Child Orthop. 2022 Oct;16(5):325-332. doi: 10.1177/18632521221121846. Epub 2022 Sep 6.

Purpose: This study explored whether surgeons favor unilateral or bilateral reconstructive hip surgery in children with cerebral palsy who have unilateral hip displacement. **Methods:** An invitation to participate in an anonymous, online survey was sent to 44 pediatric orthopedic surgeons. The case of an 8 year old at Gross Motor Function Classification System level IV with migration percentages of 76% and 22% was described. Surgeons selected their surgical treatment of choice and provided their rationale. Respondents were also asked to list and rank radiographic parameters used for decision-making and multidisciplinary team members involved in decision-making. **Results:** Twenty-eight orthopedic surgeons from nine countries with a mean 21.3 years (range, 5-40 years) of experience completed the survey. A "bilateral VDROs with a right pelvic osteotomy (PO) was selected by 68% (19/28) of respondents; risk of contralateral subluxation (9/19; 47%) and maintaining symmetry (7/19; 37%) were the most common rationales for bilateral surgery. The remaining 32% (9/28) chose a 'right VDRO with a right PO'" with most of these (8/9; 89%) stating the left hip was sufficiently covered. Of 31 radiographic parameters identified, migration percentage, acetabular angle/index, Shenton line, neck shaft angle, and presence of open/closed triradiate growth plates were the most common. Physical therapists (68%) and physiatrists (43%) were most likely to be involved in pre-operative surgical consultation. **Conclusion:** There is a lack of agreement on management of the contralateral hip in children with unilateral hip displacement. Further studies comparing patient important outcomes following unilateral and bilateral surgery are required. Level of evidence: V.

PMID: [36238143](https://pubmed.ncbi.nlm.nih.gov/36238143/)

2. Multi-level personalization of neuromusculoskeletal models to estimate physiologically plausible knee joint contact forces in children

Giorgio Davico, David G Lloyd, Christopher P Carty, Bryce A Killen, Daniel Devaprakash, Claudio Pizzolato

Biomech Model Mechanobiol. 2022 Oct 13. doi: 10.1007/s10237-022-01626-w. Online ahead of print.

Neuromusculoskeletal models are a powerful tool to investigate the internal biomechanics of an individual. However, commonly used neuromusculoskeletal models are generated via linear scaling of generic templates derived from elderly adult anatomies and poorly represent a child, let alone children with a neuromuscular disorder whose musculoskeletal structures and muscle activation patterns are profoundly altered. Model personalization can capture abnormalities and appropriately describe

the underlying (altered) biomechanics of an individual. In this work, we explored the effect of six different levels of neuromusculoskeletal model personalization on estimates of muscle forces and knee joint contact forces to tease out the importance of model personalization for normal and abnormal musculoskeletal structures and muscle activation patterns. For six children, with and without cerebral palsy, generic scaled models were developed and progressively personalized by (1) tuning and calibrating musculotendon units' parameters, (2) implementing an electromyogram-assisted approach to synthesize muscle activations, and (3) replacing generic anatomies with image-based bony geometries, and physiologically and physically plausible muscle kinematics. Biomechanical simulations of gait were performed in the OpenSim and CEINMS software on ten overground walking trials per participant. A mixed-ANOVA test, with Bonferroni corrections, was conducted to compare all models' estimates. The model with the highest level of personalization produced the most physiologically plausible estimates. Model personalization is crucial to produce physiologically plausible estimates of internal biomechanical quantities. In particular, personalization of musculoskeletal anatomy and muscle activation patterns had the largest effect overall. Increased research efforts are needed to ease the creation of personalized neuromusculoskeletal models.

PMID: [36229699](#)

3. Impaired sit-to-stand is perceived by caregivers to affect mobility and self-care in children with cerebral palsy who had moderate to severe mobility limitations: A mixed methods analysis

Sirawee Chaovalit, Karen J Dodd, Nicholas F Taylor

Dev Neurorehabil. 2022 Oct 12;1-8. doi: 10.1080/17518423.2022.2133186. Online ahead of print.

Objective: To explore the effects that impaired ability to sit-to-stand has on upright mobility and self-care in children with cerebral palsy and how this in turn may affect their caregivers. **Methods:** A mixed methods research design was conducted with 25 children who had cerebral palsy with moderate to high mobility limitations (GMFCS levels III and IV) and their caregivers. Caregivers were interviewed about their child's mobility and self-care. The independence of each child's activities was rated using the mobility and self-care domains of the Functional Independence Measure for Children (WeeFIM). **Results:** Two themes were identified from qualitative analyses: Difficulty in sit-to-stand was perceived by caregivers to reduce their child's ability to independently and safely perform mobility and some self-care tasks; and negatively impacted the caregivers physically and psychologically. Mobility and self-care WeeFIM scores showed that these children required moderate assistance, and that self-care tasks involving sit-to-stand (toileting and bathing) required more assistance than self-care tasks that would not be expected to involve sit-to-stand (eating and grooming). Qualitative and quantitative findings were convergent. **Conclusions:** The ability to sit-to-stand independently may be an important precursor skill for independence in upright mobility and self-care for children with moderate to severe mobility limitations.

PMID: [36222399](#)

4. Is Standing Function Improved After Orthopaedic Surgery in Children With Cerebral Palsy at GMFCS Levels III/IV?

Nancy Lennon, Chris Church, Theresa Chua, Jose J Salazar-Torres, John Henley, Elizabeth Gillooly, M Wade Shrader, Faithe Kalisperis, Freeman Miller, Jason J Howard

J Pediatr Orthop. 2022 Oct 14. doi: 10.1097/BPO.0000000000002276. Online ahead of print.

Background: Children with cerebral palsy (CP) at Gross Motor Function Classification System (GMFCS) levels III/IV are at risk for losses in standing function during adolescence and transition to adulthood. Multilevel surgery (MLS) is an effective treatment to improve gait, but its effects on standing function are not well documented. The objectives of our study were to describe standing function in children with CP classified as GMFCS levels III/IV and evaluate change after MLS. **Methods:** This retrospective study included children with CP (GMFCS III/IV) ages 6 to 20 years who underwent instrumented gait analysis. A subset who underwent MLS were evaluated for change. Primary outcome measures were Gross Motor Function Measure dimension D, gait velocity, functional mobility scale, and the Pediatric Outcomes Data Collection Instrument (PODCI). Additional impairment level measures included foot pressure, knee extension during stance phase of gait, and knee extension passive range of motion. **Results:** Four hundred thirty-seven instrumented gait analysis sessions from 321 children with CP (ages 13.7±4.8 y; GMFCS III-81%/IV-19%) were included. The GMFCS III group had higher Gross Motor Function Measure dimension D, gait velocity, PODCI scores, and better knee extension compared with the GMFCS IV group (P<0.05); 94 MLS were evaluated for postoperative change 15.3±4.2 months after MLS. Children at GMFCS level III had improved PODCI scores (P<0.05), better knee extension passive range of motion (P<0.01), and improved coronal plane foot pressure

($P < 0.05$) post MLS. Maximum knee extension during stance and heel impulse improved significantly in both groups ($P < 0.01$). Conclusions: Standing function of children with CP at GMFCS IV was significantly more limited than at GMFCS III. After MLS, both groups (III/IV) showed improvement in impairment level outcomes (knee extension and foot position), whereas only those functioning at GMFCS III had improvement in activity/participation outcomes according to the PODCI. For children with CP at GMFCS levels IV, MLS may improve standing function, but appropriate goals related to assisted standing and measurement protocols sensitive to limited functional mobility should be adopted. Level of evidence: Level III-retrospective comparative study.

PMID: [36240672](#)

5. Surgical management of pes planus in children with cerebral palsy: A systematic review

Poppy MacInnes, Thomas L Lewis, Cora Griffin, Michela Martinuzzi, Karen L Shepherd, Michail Kokkinakis

Review J Child Orthop. 2022 Oct;16(5):333-346. doi: 10.1177/18632521221112496. Epub 2022 Sep 2.

Purpose: Pes planus (or flatfoot) is the most common deformity in children with cerebral palsy. There are several surgical interventions used to treat it: single calcaneal osteotomies, extra-articular arthrodesis, double calcaneal osteotomy, calcaneo-cuboid-cuneiform osteotomy, intra-articular arthrodesis, and arthroereisis. There is currently no evidence on optimal treatment for flatfoot in children with cerebral palsy. Our purpose is to systematically review studies reporting complications, recurrence rates, and radiological outcomes of the surgical management of flatfoot in children with cerebral palsy. Methods: Five databases were searched to identify studies published from inception until July 2021, with keywords relating to flatfoot, cerebral palsy, and surgical interventions. We included prospective, retrospective, and comparative study designs in the English language. Data was extracted and tabulated in duplicate into Excel, and analysis was conducted using Python SciPy. Results: In total, 1220 studies were identified of which 44 met the inclusion criteria, comprising 2234 feet in 1364 patients with a mean age of 10.3 years and mean follow-up of 55.9 months. Radiographic outcomes showed improvement with all procedures; complications and recurrence rates were too poorly reported to compare. Only 6 (14%) studies were assessed as a low risk of bias. There was substantial heterogeneity of outcome measures. Conclusion: There is a lack of high-quality, comparative studies assessing the radiological outcomes, complications, and recurrence rates of surgical alternatives to treat flatfoot in children with cerebral palsy. There is currently no clear evidence on optimal surgical treatment. Level of evidence: IIa based on Oxford Centre for Evidence-based Medicine.

PMID: [36238147](#)

6. A deep-learning approach for automatically detecting gait-events based on foot-marker kinematics in children with cerebral palsy-Which markers work best for which gait patterns?

Yong Kuk Kim, Rosa M S Visscher, Elke Viehweger, Navrag B Singh, William R Taylor, Florian Vogl

PLoS One. 2022 Oct 13;17(10):e0275878. doi: 10.1371/journal.pone.0275878. eCollection 2022.

Neuromotor pathologies often cause motor deficits and deviations from typical locomotion, reducing the quality of life. Clinical gait analysis is used to effectively classify these motor deficits to gain deeper insights into resulting walking behaviours. To allow the ensemble averaging of spatio-temporal metrics across individuals during walking, gait events, such as initial contact (IC) or toe-off (TO), are extracted through either manual annotation based on video data, or through force thresholds using force plates. This study developed a deep-learning long short-term memory (LSTM) approach to detect IC and TO automatically based on foot-marker kinematics of 363 cerebral palsy subjects (age: 11.8 ± 3.2). These foot-marker kinematics, including 3D positions and velocities of the markers located on the hallux (HLX), calcaneus (HEE), distal second metatarsal (TOE), and proximal fifth metatarsal (PMT5), were extracted retrospectively from standard barefoot gait analysis sessions. Different input combinations of these four foot-markers were evaluated across three gait subgroups (IC with the heel, midfoot, or forefoot). For the overall group, our approach detected 89.7% of ICs within 16ms of the true event with a 18.5% false alarm rate. For TOs, only 71.6% of events were detected with a 33.8% false alarm rate. While the TOE|HEE marker combination performed well across all subgroups for IC detection, optimal performance for TO detection required different input markers per subgroup with performance differences of 5-10%. Thus, deep-learning LSTM based detection of IC events using the TOE|HEE markers offers an automated alternative to avoid operator-dependent and laborious manual annotation, as well as the limited step coverage and inability to measure assisted walking for force plate-based detection of IC events.

PMID: [36227847](#)

7. Effect of Functional Electrical Stimulation on Gait Parameters in Children with Cerebral Palsy: A Meta-Analysis

Qiantao Zhu, Guanchen Gao, Kaijiang Wang, Jingjing Lin

Meta-Analysis Comput Math Methods Med. 2022 Sep 22;2022:3972958. doi: 10.1155/2022/3972958. eCollection 2022.

Objective: At present, there are controversies on the effectiveness of functional electrical stimulation devices in gait improvement in the clinic, and the results reported in limited literature are contradictory. This paper summarizes and analyzes the relationship between functional electrical stimulation treatment and gait parameter changes in children with cerebral palsy, thus exploring the above controversies' results. **Methods:** Two researchers conducted a detailed search of the literature from the establishment of the database to June 2022. Literature retrieved from databases, including PubMed, Embase, Ovid, Cochrane Library, and Web of Science and the search process followed the principles of Cochrane. The search keywords were "cerebral palsy", "functional electrical stimulation", "gait", or "walk". Gait and balance parameters were extracted from the literature. Gait parameters, such as walking speed and step length, were included in the meta-analysis. The study used standard mean difference (STD) and 95% confidence interval (CI) to calculate the mean difference between the two groups. The statistic I² was used to evaluate the heterogeneity between the evaluation studies. Begg's test detected publication bias and the funnel chart was used for visual analysis. Furthermore, Review Manager software was used to make a risk bias map for literature publication bias analysis. **Results:** 9 literatures were included in the analysis, with a total of 282 children with cerebral palsy, including 142 patients in the functional electrical stimulation treatment group and 140 patients in the comfort treatment, general nursing, or other physical therapy. The randomization scheme and result report used in most studies were low risk, which was important for the credibility of this study. Most studies have limitations in the blinding method of participants and subjects, and most of them were single-blind studies, which might have a high risk. The results showed that functional electrical stimulation could increase the walking speed of children with cerebral palsy (SMD = 0.82, P < 0.0001) and increase the walking step length of children with cerebral palsy (SMD = 1.34, 95%CI = 1.07, 1.60, Z = 9.91, P < 0.0001). Funnel plot analysis showed that the literature distribution was uniform and symmetrical, and Begg's test showed no publication bias in included literature. **Conclusion:** This study compared the effects of the functional nerve stimulation treatment group and control group on improving gait parameters of children with cerebral palsy. The results indicated that functional nerve stimulation treatment could increase the gait speed and step length of children with cerebral palsy, which could improve the walking of children with cerebral palsy. Furthermore, this study needs more research data to support our findings. The results of this study might better guide the clinical practice and better use of health as well as financial resources.

PMID: [36238472](#)

8. What can we learn from the relationship between gait deviations and clinical impairments when comparing two databases?

Annie Pouliot-Laforte, Louise Iterbeke, Anne Tabard-Fougère, Alice Bonnefoy-Mazure, Geraldo De Coulon, Kaat Desloovere, Stéphane Armand

Gait Posture. 2022 Sep 15;98:261-265. doi: 10.1016/j.gaitpost.2022.09.072. Online ahead of print.

Background: Several previous studies have tried to determine the relationship between gait and clinical impairments in children with Cerebral Palsy (CP). The heterogeneity of the population and the methodology used could explain the discrepancy within the results. Recently, Papageorgiou et al. (2019) used a Statistical Parametric Mapping (SPM) analysis to investigate this relationship, allowing to test across the kinematic waveforms parameters. **Research question:** Are we able to replicate the results of Papageorgiou et al. (2019) on a population of children with CP from another center? **Methods:** Retrospectively, youth with spastic unilateral (uCP) or bilateral (bCP) CP (3-18 years of age) who underwent a clinical gait analysis at the Geneva University Hospitals (HUG) were screened. Following Papageorgiou et al. 2019, the same inclusion and exclusion criteria as well as the same methodology were applied. Mann-Whitney-U test was used to compare the impairments score between the two centers. A Student T-Test using SPM was applied to compare the kinematic waveforms from the two centers. A canonical correlation analysis using SPM was realized to assess the relationship between clinical impairments and the combined sagittal motion of the pelvis, hip, knee and ankle. **Results and significance:** A total of 211 patients were included with 131 uCP (10 [8-14] years old) and 80 bCP (11 [7-14] years old). The distribution of the Gross Motor Function Classification System levels and the proportion of previous treatment differs between centers. In both CP groups, significant differences were observed in the composite score and lower limb kinematics, reflecting less impaired patients with CP at HUG compared to Papageorgiou et al. (2019). While similar associations between spasticity and kinematic were observed in both centers, the association with muscle weakness, selectivity, and range of motion differed.

PMID: [36209688](#)

9. Relationship between spatiotemporal parameters and clinical outcomes in children with bilateral spastic cerebral palsy: Clinical interpretation proposal

Cristina Gómez-Pérez, Joan Vidal Samsó, Albert Puig Diví, Josep Medina Casanovas, Josep M Font-Llagunes, Joan Carles Martori

J Orthop Sci. 2022 Oct 7;S0949-2658(22)00247-0. doi: 10.1016/j.jos.2022.08.011. Online ahead of print.

Background: Understanding the links between gait disorders, impairments, and activity limitations is essential for correctly interpreting the instrumented gait analysis. We aimed to evaluate the relationships between spatiotemporal parameters and clinical outcomes in children with bilateral spastic cerebral palsy, and find out whether spatiotemporal parameters provide clinical information regarding gait pattern and walking. **Methods:** Data from 19 children with bilateral spastic cerebral palsy (nine males, ten females, 9.6 ± 2.8 years old) were collected retrospectively. All children underwent an instrumented gait analysis and a standardized clinical assessment. Seven spatiotemporal parameters were calculated: non-dimensional cadence, stride length, step width, gait speed, first double support, single support, and time of toe off. Clinical outcomes included measures of two different components of the International Classification of Functioning, Disability and Health - Children and Youth version: body functions and structures (spasticity, contractures and range of motion, and deformities), and activities and participation (gross motor function, and walking capacity). Pearson correlation, ANOVA, Student's t, Mann-Whitney U, and Kruskal-Wallis tests were used to analyze relationships. Spatiotemporal parameters related to clinical outcomes of body functions and structures were interpreted as outcome measures of gait pattern, while those related to clinical outcomes of activities and participation were interpreted as outcome measures of walking. **Results:** Non-dimensional cadence, stride length, and gait speed showed relationships ($p < 0.05$) with hip flexors spasticity and hindfoot deformity, ankle plantar flexors spasticity, and hindfoot deformity, respectively. All spatiotemporal parameters except non-dimensional cadence showed correlation ($p < 0.05$) with gross motor function and walking capacity. **Conclusions:** Spatiotemporal parameters provide clinical information regarding both gait pattern and walking.

PMID: [36216726](#)

10. External walking environment differentially affects muscle synergies in children with cerebral palsy and typical development

Yushin Kim, Thomas C Bulea, Diane L Damiano

Front Hum Neurosci. 2022 Sep 23;16:976100. doi: 10.3389/fnhum.2022.976100. eCollection 2022.

Despite external environmental changes in walking, such as manipulating gait speed, previous studies have shown that the underlying muscle synergy structures (synergy weights or vectors) rarely vary. The purpose of this study is to examine if external environmental changes to the walking task influence muscle synergies in children with cerebral palsy (CP) and/or typical development (TD). To identify muscle synergies, we extracted muscle synergies from eight children with CP and eight age-matched TD in three treadmill walking conditions, e.g., baseline (adjusted to individual comfortable walking speed), variable speed (VS), or restricted foot width (RW). Then, we grouped similar muscle synergies using k-mean clustering and discriminant analyses from all datasets of individual synergy structures. Proportion tests exhibited six clusters of muscle synergies predominantly arising from children with CP and four clusters from children with TD. Also, the proportion of muscle synergies was significantly different in four of the CP-preferred clusters across conditions. Specifically, the proportion of the baseline condition was significantly different from VS and RW conditions in one and two clusters, respectively. The proportion was significantly different between VS and RW conditions in four clusters. Cadence and step lengths differed across conditions but not groups which makes the group differences in proportion even more notable. In contrast, step width, while significantly lower in CP, did not differ across conditions. Our findings demonstrate that muscle synergies in children with CP are more sensitive to changes in the external walking environment than in typically developing children.

PMID: [36211124](#)

11. A comparison of the kinematics and kinetics of barefoot and shod running in children with cerebral palsy

M Tinker, A Betten, S Morris, N Gibson, G Allison, L Ng, G Williams, A Chappell

Gait Posture. 2022 Sep 26;98:271-278. doi: 10.1016/j.gaitpost.2022.09.084. Online ahead of print.

Background: The biomechanics of barefoot and shod running are different for typically developing children but unknown for children with cerebral palsy (CP). Such differences may have implications for injury and performance. **Aims:** The primary aims of this study were to compare the lower limb biomechanics of barefoot and shod running in children with CP, and to determine whether any differences were the same in GMFCS levels I and II. **Methods:** This cross-sectional study examined 38 children with CP (n = 24 (GMFCS) level I; n = 14 GMFCS II), running overground at 3 speeds (jog, run, sprint) in barefoot and shod conditions. Marker trajectories and force plate data were recorded, and lower limb kinematics, kinetics and spatiotemporal variables were derived. Differences between barefoot and shod running were analysed using linear mixed models. **Results:** For both GMFCS levels, barefoot running resulted in higher loading rates, but smaller impact peaks at all speeds. Barefoot running was associated with greater hip and knee power; less ankle dorsiflexion and hip flexion at initial contact, and less ankle and knee range of motion during stance, compared to shod running, at all speeds. Barefoot stride length was shortened, and cadence increased compared to shod during jogging and running but not sprinting. For GMFCS level I only, barefoot running involved a higher incidence of forefoot strike, greater ankle power generation and less hip range of motion during stance. **Significance:** Running barefoot may facilitate running performance by increasing power generation at the ankle in children with CP, GMFCS level I. Higher barefoot loading rates may have implications for performance and injury.

PMID: [36215856](#)

12. Effectiveness of functional intensive therapy on mobility and self-care activities in children and adolescents with cerebral palsy - a prospective clinical study

Yvonne J M Janssen-Potten, Lars Roks, Ruud Roijen, R Jeroen Vermeulen, Adelante Study Group; Eugène E A Rameckers

Disabil Rehabil. 2022 Oct 13;1-10. doi: 10.1080/09638288.2022.2130445. Online ahead of print.

Purpose: Cerebral palsy (CP) is a major cause of childhood disability. Children with CP often lack motor skills to effectively perform activities of daily living. The aim is to assess the effectiveness of a functional intensive therapy program focused on improving individual goals in the domain of mobility and self-care in children and adolescents with CP. **Material and methods:** Thirty-five CP patients, aged 11-19 years, GMFCS I-IV, received daily 6-7 h of functional therapy for 15 days. Outcomes were assessed at baseline, immediately after the program and at three months follow-up. **Results:** Significant post-intervention improvement was seen on all primary and secondary outcome measures; personal goals (GAS score; COPM performance and COPM satisfaction), daily activities (ACTIVLIM), hand function (ABILHAND-Kids), mobility (ABILOCO-Kids; GMFM-66-IS score). There was no loss to follow up during the program and after three months. At follow-up, improvements were retained except for ABILOCO and GMFM-66-IS. **Conclusions:** Functional intensive therapy appears feasible and seems to be effective in improving treatment goals focused on mobility and self-care, even in older and more severely affected children and adolescents with CP. After three months, these possible effects were still present. **Implications for rehabilitation:** Short intensive functional training is feasible and showing no loss to follow up in the older and more severely affected children and adolescents with cerebral palsy (CP). Short intensive functional training appears effective in improving individual goals in children and adolescents with CP and improvements endorse three months. Short intensive functional training seems to be effective on both mobility and self-care domains of the ICF-CY.

PMID: [36226733](#)

13. Post-Fracture Inpatient and Outpatient Physical/Occupational Therapy and Its Association with Survival among Adults with Cerebral Palsy

Daniel G Whitney, Tao Xu, Daniel Whibley, Dayna Ryan, Michelle S Caird, Edward A Hurvitz, Heidi Haapala

J Clin Med. 2022 Sep 22;11(19):5561. doi: 10.3390/jcm11195561.

Physical and/or occupational therapy (PT/OT) may improve post-fracture health and survival among adults with cerebral palsy (CP), but this has not been studied in the inpatient setting. The objective was to quantify the association between acute inpatient and outpatient PT/OT use with 1-year mortality among adults with CP. This was a retrospective cohort study of adults with CP with an incident fragility fracture admitted to an acute care or rehabilitation facility using a random 20% Medicare fee-for-service dataset. Acute care/rehabilitation PT/OT was measured as the average PT/OT cost/day for the length of stay (LOS). Weekly exposure to outpatient PT/OT was examined up to 6 months post-fracture. Cox regression examined the adjusted association between the interaction of acute care/rehabilitation average PT/OT cost/day and LOS with 1-year mortality. A separate Cox model added time-varying outpatient PT/OT. Of 649 adults with CP, average PT/OT cost/day was associated with lower mortality rate for LOS < 17 days (HR range = 0.78-0.93), and increased mortality rate for LOS > 27 days (HR ≥

1.08) (all, $p < 0.05$). After acute care/rehabilitation, 44.5% initiated outpatient PT/OT, which was associated with lower mortality rate (HR = 0.52; 95% CI = 0.27-1.01). Post-fracture inpatient and outpatient PT/OT were associated with improved 1-year survival among adults with CP admitted to acute care/rehabilitation facilities.

PMID: [36233436](#)

14. Time cost associated with sports participation for athletes with high support needs: a time-motion analysis of tasks required for para swimming

Iain Dutia, Declan Curran, Adam Donohoe, Emma Beckman, Sean Michael Tweedy

BMJ Open Sport Exerc Med. 2022 Oct 5;8(4):e001418. doi: 10.1136/bmjsem-2022-001418. eCollection 2022.

Objectives: People with cerebral palsy and high support needs (CP&HSN) are profoundly inactive but also under-represented in studies evaluating physical activity interventions. Reasons for their exclusion have not been evaluated. We hypothesised that CP&HSN would be associated with high time costs of preparatory activities (eg, getting dressed/undressed), possibly contributing to low participation and under-representation. Accordingly, this pilot study aimed to: (1) evaluate whether the time required for preparatory activities was extremely different (≥ 3 SD) between swimmers with and without CP&HSN; and (2) provide a qualitative indication of the preparatory tasks undertaken by swimmers with CP&HSN. **Methods:** Each of three experienced (5 years) para swimmers with CP&HSN and 20 non-disabled swimmers were timed entering and then exiting the pool on three occasions. Mean entry and exit time for each para swimmer was compared with the group mean for non-disabled swimmers, and differences of greater than 3.0 SD were considered extreme. A qualitative description of the tasks completed by the para swimmers was recorded. **Results:** The differences in time costs between para and non-disabled swimmers met the criterion of extreme. Pool entry times for para swimmers were 8-13 times greater (Effect size = 4.1-8.7). Pool exit times were 6-10 times greater (ES=7.0-9.5). 90% of tasks completed by para swimmers required personal assistance or wheeled mobility. **Conclusions:** This pilot study suggests that, compared with non-disabled swimmers, time costs for preparation to commence or depart training are extremely high for swimmers with CP&HSN. Further research is required to evaluate the veracity of these findings.

PMID: [36213760](#)

15. Communication and Social Interaction Experiences of Youths With Congenital Motor Speech Disorders

Kathryn P Connaghan, Carolyn Baylor, Megan Romanczyk, Jessica Rickwood, Gary Bedell

Am J Speech Lang Pathol. 2022 Oct 10;1-19. doi: 10.1044/2022_AJSLP-22-00034. Online ahead of print.

Purpose: The purpose of this study was to explore the communication and social interaction experiences of adolescents with congenital motor speech disorders due to cerebral palsy or Down syndrome, with the aim of identifying clinical and research needs to support the development and implementation of speech-language interventions. **Method:** Five male youths (ages 14-18 years) with congenital motor speech disorders and one of their parents participated in face-to-face, semistructured interviews designed to understand communication and social experiences in daily life. Interviews were audio-recorded and orthographically transcribed offline. Content was coded according to topic areas emerging in the data. Themes were developed to illustrate the most salient and representative aspects of participants' experiences according to the phenomenological tradition that recognizes that participants are experts in their "lived experience." **Results:** Participants described the youths' day-to-day communication experiences, including facilitators and barriers to successful social interactions. Thematic analysis revealed three main themes: (a) strong core relationships amidst sparse, superficial interactions in daily life; (b) the complicated picture of why; and (c) how speech-language pathologists can help. **Conclusions:** Participants reported that the impact of congenital motor speech disorders on social interactions and experiences became more apparent in adolescence than in earlier childhood. Addressing communication challenges to meet the unique social demands of this period requires tailored interventions that target multiple contributing factors beyond speech impairment, such as social communication skills, negative communication partner attitudes, and participation opportunities. Shifting practice toward a life participation approach to communication intervention stands to substantially improve the long-term social outcomes of adolescents with motor speech disorders.

PMID: [36215658](#)

16. The effects of fatigue, gross motor function, and gender on participation in life situations of school-aged children with cerebral palsy: A parental perspective

Kübra Seyhan-Bıyık, Umut Ece Arslan, Cemil Özal, Özge Çankaya, Ayşe Numanoğlu-Akbaş, Sefa Üneş, Merve Tunçdemir, Mintaze Kerem-Günel, Lütfiye Hilal Özcebe

Arch Pediatr.2022 Oct 6;S0929-693X(22)00205-6. doi: 10.1016/j.arcped.2022.08.020. Online ahead of print.

Objective: To investigate the effects of fatigue, gross motor function, and gender on participation in life situations of school-aged children with cerebral palsy (CP) from a parental perspective. Methods: The study included 209 children with CP aged between 5 and 13 years (mean age, 8.06 ± 2.41 years; girls, 45.5%) and their parents. Fatigue, gross motor function, and participation status were evaluated with the Pediatric Quality of Life (PedsQL), Gross Motor Function Classification System (GMFCS), and the Assessment of Life Habits (Life-H) questionnaire, respectively. The effects of fatigue, gross motor function, and gender on participation were investigated with linear regression analysis. Results: According to parental reports, 79.9% of the children had fatigue. Children in all GMFCS levels experienced fatigue. Fatigue and GMFCS levels were dependent variables, and therefore only simple linear regression analyses were performed. Fatigue explained 38-43% of the variances in daily activities, social roles, and total Life-H scores, while gross motor function explained 48-65% of the variances in scores ($p < 0.001$). Gender had no effect on participation scores ($p > 0.05$). Conclusion: More than two thirds of the school-aged children with CP had fatigue. Fatigue and poor gross motor function had a negative effect on participation in daily activities and social roles.

PMID: [36210237](https://pubmed.ncbi.nlm.nih.gov/36210237/)

17. Nintendo® Wii Therapy Improves Upper Extremity Motor Function in Children with Cerebral Palsy: A Systematic Review with Meta-Analysis

Desirée Montoro-Cárdenas, Irene Cortés-Pérez, María Del Rocío Ibancos-Losada, Noelia Zagalaz-Anula, Esteban Obrero-Gaitán, María Catalina Osuna-Pérez

Review Int J Environ Res Public Health. 2022 Sep 28;19(19):12343. doi: 10.3390/ijerph191912343.

Background: Nintendo® Wii-based therapy (NWT) is a non-immersive virtual reality therapy used to recover upper extremity (UE) motor function in children with cerebral palsy (CP). We aimed primarily to elucidate the effectiveness of NWT in improving UE motor and functional impaired abilities in children with CP, compared to conventional therapy or no intervention. The secondary aim was to assess if NWT is more effective when used alone or combined with conventional therapy. Methods: A systematic review with meta-analysis was conducted from a bibliographic search in PubMed, Scopus, PEDro, Web of Science, and CINHALL, ending in October 2021, in accordance with PRISMA guidelines. We included randomized controlled trials that compared NWT vs. conventional therapy or no intervention in terms of their impact on different UE impaired abilities (grip strength, tip grip strength, UE dissociated movements, functional capacity in daily living activities, gross and fine motor dexterity, and grasping ability) in children with CP. Effect size was calculated with standardized mean difference (SMD) and its 95% confidence interval (95% CI). Results: Nine studies (276 participants) were included. NWT is more effective than conventional therapy at improving grip strength (SMD = 0.5, 95% CI 0.08, 0.91), tip grip strength (SMD = 0.95, 95% CI 0.3, 1.61), and grasping ability (SMD = 0.72, 95% CI 0.14, 1.3). NWT is more effective than conventional therapy at improving functional capacity in daily living activities (SMD = 0.83, 95% CI 0.07, 1.56). For fine manual dexterity, NWT was better than no intervention (SMD = 3.12, 95% CI 1.5, 4.7). Conclusions: Our results indicate that NWT is effective at improving various UE impaired motor skills in children with CP.

PMID: [36231643](https://pubmed.ncbi.nlm.nih.gov/36231643/)

18. Effect of an augmented reality active video game for gait training in children with cerebral palsy following single-event multilevel surgery: protocol for a randomised controlled trial

Anne-Laure Guinet, Michel Bams, Sandrine Payan-Terral, Néjib Khouri, Samir Otmane, Guillaume Bouyer, Eric Desailly

BMJ Open. 2022 Oct 10;12(10):e061580. doi: 10.1136/bmjopen-2022-061580.

Introduction: In paediatric rehabilitation, fun and motivation are also critical keys to successful therapy. A variety of

interventions have shown positive effects, high level of interest, compliance and engagement with active video game (AVG). This seems to be an interesting approach for the postoperative gait rehabilitation of children with cerebral palsy (CP). In this study, we will investigate if an overground gait training (GT) delivered through an AVG can improve walking capacity and anaerobic performance. Methods and analysis: This study is a randomised clinical controlled trial. A total of 14 children and adolescents in the age of 10-18 years with CP will be included. The minimum time between surgery and inclusion will be 7 weeks. The test group will participate in the GT programme with Augmented Reality Rehabilitation of Walking-Cerebral Palsy AVG, control group will receive GT on a treadmill. The primary outcome is the 6-Min Walk Test assessing walking capacity; secondary outcomes are the Muscle Power Sprint Test for anaerobic performance and Shuttle Run Test for physical fitness level. Satisfaction is tested with the Physical Activity Enjoyment Scale. Ethics and dissemination: The findings will be disseminated by publications in peer-reviewed journals and conferences. This study received agreement from French ethic committee (Comité de Protection des Personnes Sud-Est VI-Number 2020-A02959-30). Trial registration number: NCT04837105.

PMID: [36216413](#)

19. Exploring the Influence of a Community-Based Peer-Led Wheelchair Skills Training on Satisfaction with Participation in Children and Adolescents with Cerebral Palsy and Spina Bifida: A Pilot Study

Béatrice Ouellet, Krista L Best, Deb Wilson, William C Miller

Int J Environ Res Public Health. 2022 Sep 21;19(19):11908. doi: 10.3390/ijerph191911908.

Background: Peer-led approaches improve satisfaction with participation, wheelchair skills and wheelchair use self-efficacy in adults, but the evidence is limited in children. This pilot study aimed to explore the influence of community-based, peer-led, group wheelchair training program (i.e., Seating To Go) on satisfaction with participation (primary outcome), wheelchair skills, and wheelchair use self-efficacy in children and adolescents with cerebral palsy and spina bifida. Methods: A single group pre-post design was used. Invitations were shared online and diffused by clinicians and advocacy and provider groups to recruit a convenience sample of eight pediatric wheelchair users. Participants completed the Seating To Go program in groups that were facilitated by adult wheelchair users. Satisfaction with participation (Wheelchair Outcome Measure-Young People), wheelchair skills (Wheelchair Skills Test), wheelchair use self-efficacy (Wheelchair Use Confidence Scale), and perceived wheelchair skills capacity (Wheelchair Skills Test Questionnaire; proxy rating: parents) were evaluated before and after the Seating To Go program. Descriptive statistics and nonparametric longitudinal data analysis were conducted to explore changes in all outcomes from baseline to post-intervention. Results: Pediatric wheelchair users (ranging in age from 5 to 15 years) and their parents reported statistically significant improvements in satisfaction with participation. The improvements in wheelchair skills and wheelchair confidence were also statistically significant, but not the parents' perception of their children's wheelchair skills. Conclusions: A community-based peer-led approach to wheelchair skills training seems promising for improving wheelchair outcomes in pediatric wheelchair users. Further controlled studies with larger samples are warranted.

PMID: [36231211](#)

20. A validation and acceptability study of cognitive testing using switch and eye-gaze control technologies for children with motor and speech impairments: A protocol paper

Petra Karlsson, Ingrid Honan, Seth Warschausky, Jacqueline N Kaufman, Georgina Henry, Candice Stephenson, Annabel Webb, Alistair McEwan, Nadia Badawi

Front Psychol. 2022 Sep 26;13:991000. doi: 10.3389/fpsyg.2022.991000. eCollection 2022.

Despite the importance of knowing the cognitive capabilities of children with neurodevelopmental conditions, less than one-third of children with cerebral palsy participate in standardized assessments. Globally, approximately 50% of people with cerebral palsy have an intellectual disability and there is significant risk for domain-specific cognitive impairments for the majority of people with cerebral palsy. However, standardized cognitive assessment tools are not accessible to many children with cerebral palsy, as they require manual manipulation of objects, verbal response and/or speeded response. As such, standardised assessment may result in an underestimation of abilities for children with significant motor and/or speech impairment. The overall aim of the project is to examine and compare the psychometric properties of standardised cognitive assessment tools that have been accommodated for use with either a switch device or eye-gaze control technologies, with the specific aims to: (1) Examine the psychometric properties (measurement agreement and validity) of accommodated assessment tools by comparing the performance of typically developing children on six cognitive assessment tools administered via

standardised versus accommodated (switch or eye-gaze control) administration; (2) Describe and compare the performance and user experience of children with cerebral palsy on six accommodated cognitive assessments administered via switch or eye-gaze control technologies. Secondary aims are to: (1) Describe the completion rates and time to complete assessments of participants in each group; (2) Within the group with cerebral palsy, examine the effects of condition-specific characteristics (type of cerebral palsy, functional levels, and pain) and demographics (age, socio-demographic) on participation. This protocol paper describes a two-phase validation and acceptability study that utilizes a mixed-model design. This study will collect concurrent data from 80 typically developing children and 40 children with cerebral palsy, who use switch or eye-gaze control technology as alternate access communication methods. The set of instruments will measure receptive vocabulary, fluid reasoning, sustained attention, vision perception, visuospatial working memory and executive functions. Data analyses will be conducted using SPSS v. 25 and R v 4.1.0. SPSS Sample Power 3 was used for power computation and allows for a 10% drop out rate. Quantitative descriptive statistics, measurement agreement data plotting, bivariate and multiple regressions analysis will be conducted using appropriate methods.

PMID: [36225713](#)

21. Characterization of Infants' General Movements Using a Commercial RGB-Depth Sensor and a Deep Neural Network Tracking Processing Tool: An Exploratory Study

Diletta Balta, HsinHung Kuo, Jing Wang, Ilaria Giuseppina Porco, Olga Morozova, Manon Maitland Schladen, Andrea Cereatti, Peter Stanley Lum, Ugo Della Croce

Sensors (Basel). 2022 Sep 29;22(19):7426. doi: 10.3390/s22197426.

Cerebral palsy, the most common childhood neuromotor disorder, is often diagnosed through visual assessment of general movements (GM) in infancy. This skill requires extensive training and is thus difficult to implement on a large scale. Automated analysis of GM performed using low-cost instrumentation in the home may be used to estimate quantitative metrics predictive of movement disorders. This study explored if infants' GM may be successfully evaluated in a familiar environment by processing the 3D trajectories of points of interest (PoI) obtained from recordings of a single commercial RGB-D sensor. The RGB videos were processed using an open-source markerless motion tracking method which allowed the estimation of the 2D trajectories of the selected PoI and a purposely developed method which allowed the reconstruction of their 3D trajectories making use of the data recorded with the depth sensor. Eight infants' GM were recorded in the home at 3, 4, and 5 months of age. Eight GM metrics proposed in the literature in addition to a novel metric were estimated from the PoI trajectories at each timepoint. A pediatric neurologist and physiatrist provided an overall clinical evaluation from infants' video. Subsequently, a comparison between metrics and clinical evaluation was performed. The results demonstrated that GM metrics may be meaningfully estimated and potentially used for early identification of movement disorders.

PMID: [36236525](#)

22. Virtual Reality during Intrathecal Pump Refills in Children: A Case Series

Lisa Goudman, Julie Jansen, Ann De Smedt, Maxime Billot, Manuel Roulaud, Philippe Rigoard, Maarten Moens

J Clin Med. 2022 Oct 5;11(19):5877. doi: 10.3390/jcm11195877.

Virtual reality has proven to be an effective approach to decrease pain in acute settings, both in adults and children. The aim of this study is to evaluate whether virtual reality (VR) could reduce pain during an intrathecal pump refill procedure in children receiving intrathecal drug delivery, compared to a standard refill procedure. This is a three-arm crossover randomized controlled trial, evaluating the effect of VR on pain in children with cerebral palsy undergoing an intrathecal pump refill compared to a standard refill and a refill with distraction (watching a video). Pain was evaluated using the Wong-Baker Faces Scale. Secondary outcomes were procedural pain, fear, state anxiety, the incidence of adverse events and satisfaction. Six children participated in this study, whereby all children underwent the three conditions. Five children indicated an equal or lower pain score during VR, compared to a standard refill. This finding of an equal or lower pain intensity score for the VR condition compared to the control condition was also revealed by the ratings of the parents, physician and the researcher. The influence of VR on anxiety and fear seem to be in line with the influence of watching a video. In terms of satisfaction, all children and parents agreed with the statement that they would like to use VR again for a next refill. Due to the lack of adverse events, the high degree of satisfaction of children with VR and the decreased pain levels after a refill with VR, physicians may aim to explore the implementation of VR during intrathecal pump refill procedures in children in a daily clinical routine care setting.

PMID: [36233743](#)

23. Racial and Ethnic Inequities in Use of Preventive Services Among Privately Insured Adults With a Pediatric-Onset Disability

Lauren Groskaufmanis, Paul Lin, Neil Kamdar, Anam Khan, Mark D Peterson, Michelle Meade, Elham Mahmoudi

Ann Fam Med. 2022 Sep-Oct;20(5):430-437. doi: 10.1370/afm.2849.

Purpose: Cerebral palsy (CP) and spina bifida (SB) are pediatric-onset disabilities. Adults living with CP/SB are in a greater need of preventive care than the general population due to their increased risk for chronic diseases. Our objective was to compare White/Black and White/Hispanic inequities in the use of preventive services. **Methods:** Using 2007-2017 private claims data, we identified a total of 11,635 adults with CP/BS. Of these, 8,935 were White, 1,457 Black, and 1,243 Hispanic. We matched health-related variables (age, sex, comorbid conditions) between White adults and those in each minority subpopulation. Generalized estimating equations were used and all models were adjusted for age, sex, comorbidities, income, education, and US Census divisions. **Outcomes of interest were:** (1) any office visit; (2) any physical/occupational therapy; (3) wellness visit; (4) bone density screening; (5) cholesterol screening; and (6) diabetes screening. **Results:** The rate of recommended services for all subpopulations of adults with CP/SB was low. Compared with White adults, Hispanic adults had lower odds of wellness visits (odds ratio [OR] = 0.71, 95% CI, 0.53-0.96) but higher odds of diabetes screening (OR = 1.48, 95% CI, 1.13-1.93). Compared with White adults, Black adults had lower odds of wellness visits (OR = 0.50, 95% CI, 0.24-1.00) and bone density screening (OR = 0.54, 95% CI, 0.31-0.95). **Conclusions:** Preventive service use among adults with CP/SB was low. Large White-minority disparities in wellness visits were observed. Interventions to address physical accessibility, adoption of telehealth, and increased clinician education may mitigate these disparities, particularly if initiatives target minority populations.

PMID: [36228076](#)

24. Cystic Periventricular Leukomalacia Worsens Developmental Outcomes of Very-Low-Birth Weight Infants with Intraventricular Hemorrhage-A Nationwide Cohort Study

Jong Ho Cha, Nayeon Choi, Jiyeong Kim, Hyun Ju Lee, Jae Yoon Na, Hyun-Kyung Park

J Clin Med. 2022 Oct 5;11(19):5886. doi: 10.3390/jcm11195886.

Cystic periventricular leukomalacia (cPVL) is a major brain injury involving periventricular white matter that leads to neurodevelopmental impairment in very-low-birth weight (VLBW) infants. We investigated the neurodevelopmental outcomes (motor, cognition, visual, and hearing) of 5734 VLBW infants born between 2013 and 2019 and enrolled in the Korean Neonatal Network. Cranial ultrasound results were stratified by the presence of cPVL and severity of intraventricular hemorrhage (IVH) (no, low-grade [I/II], high-grade [III]). Neurodevelopmental impairment was evaluated using cerebral palsy for motor and Bayley Scales of Infant Development for cognition. cPVL was associated with motor, cognitive, and visual impairments in those without IVH and with low-grade IVH in pairwise comparisons (Cochran-Mantel-Haenszel $p < 0.001$). Conversely, cPVL was non-significantly correlated with cognitive impairment in high-grade IVH. In regression models adjusted for neonatal variables, isolated cPVL was strongly associated with motor (22.04; 11.39-42.63) and cognitive (3.10; 1.54-6.22) impairments. This study underlines the overall considerable significance of cPVL on NDI with divergent impacts depending on the severity of IVH and developmental indices.

PMID: [36233751](#)

25. Decompressive surgery in abusive head injury: Experience from a Singapore children's hospital and a review of literature

Tien Meng Cheong, Jia Xu Lim, Matthieu Vinchon, Lee Ping Ng, David C Y Low, Wan Tew Seow, Sharon Y Y Low

Childs Nerv Syst. 2022 Oct 14. doi: 10.1007/s00381-022-05669-3. Online ahead of print.

Purpose: Abusive head trauma (AHT) is a major cause of morbidity and mortality in children. Studies on pediatric head injury observe that AHT patients often have a higher incidence of malignant cerebral oedema and, overall, worse prognosis. There are

limited studies with a focus on the outcome of decompressive surgery in children with AHT. This is a study undertaken to review our institutional experience on the role of decompressive surgery in AHT patients and objectively assess its outcomes, in corroboration with current literature. Methods: This is an ethics-approved, retrospective study. Inclusion criteria consist of all children with a diagnosis of AHT managed by the Neurosurgical Service, KK Women's and Children's Hospital. Demographical and clinical variables are incorporated in the statistical analyses. Results: From 2011 to 2021, a total of 7 patients required decompressive surgery for AHT. Mean age of the cohort was 17.1 months (with the majority of patients being male (n = 5, 71.4%). During the follow-up period, there was 1 mortality (14.3%), 3 patients developed cerebral palsy (42.9%), and 3 patients had post-traumatic epilepsy (42.9%). With regards to functional outcome, 4 patients (57.1%) had a favorable KOSCHI score at 6 months follow-up. Conclusion: Decompressive surgery in children with AHT presents with its own unique challenges. We therein present our neurosurgical experience in decompressive surgery for this extremely vulnerable group of patients. Given the potential role of decompressive surgery in AHT, the development of an objective marker to select such patients who may benefit most from intervention should be the way forward.

PMID: [36239781](#)

26. Validity and test-retest reliability of the Ugandan version of the Pediatric Evaluation of Disability Inventory (PEDI-UG) in children and youth with cerebral palsy

A Amer, L Hermansson, G Jarl, S Kamusiime, H Forsberg, C Andrews, A Kakooza-Mwesige, A C Eliasson

Child Care Health Dev. 2022 Oct 7. doi: 10.1111/cch.13062. Online ahead of print.

Background: Validity of the Ugandan version of the Pediatric Evaluation of Disability Inventory (PEDI-UG) was previously investigated on typically developing children. This study aimed to investigate the validity, test-retest reliability and minimal detectable change (MDC) of the PEDI-UG in children and youth (C&Y) with cerebral palsy (CP). Method: A cross-sectional study design with 118 C&Y with CP (44.7% girls) aged 10 months-22.5 years were included in the study; 37 of them completed the PEDI-UG twice to investigate test-retest reliability, determined by calculating the intraclass correlation coefficient (ICC). Additionally, data from 249 typically developing children were used for differential item functioning (DIF) analysis. The validity of the PEDI-UG was investigated by Rasch analysis. The Kruskal-Wallis test and Spearman's correlation coefficient were calculated to investigate associations between PEDI-UG scores and external classification systems. Results: The principal component analysis of residuals indicated unidimensionality in all domains. The ICC values were excellent (0.98-0.99), and the MDCs were less than 6 and 13 (on a 0-100 scale) for the functional skills and caregiver assistance parts, respectively. The four-category caregiver assistance rating scale fulfilled the criteria for the analysis of rating scale functioning. In total, 78 of 189 items in the functional skills domain and two items in the caregiver assistance domain demonstrated DIF between C&Y with CP and TD children. The Kruskal-Wallis test ($p < 0.05$) and Spearman's correlation (coefficients of -0.93 to -0.78) supported the validity of PEDI-UG. Conclusion: The current diagnose-specific version of PEDI-UG demonstrates evidence for validity as a measure of ability in C&Y with CP in Uganda and other similar settings, being a promising tool for use in clinical practice and research. Conversion tables and MDC values are provided to facilitate clinical adoption of the measure.

PMID: [36207773](#)

27. Right of Reply

S Andronikou, J W Lotz, I Bhorat, E Buchmann, P Soma-Pillay, E Nicolaou, L Pistorius, I Smuts

Comment S Afr Med J. 2022 Aug 1;112(8):506-508. doi: 10.7196/SAMJ.2022.v112i8.16702.

To the Editor: The article by Bhorat et al. [1] in the SAMJ, entitled 'Cerebral palsy and criteria implicating intrapartum hypoxia in neonatal encephalopathy - an obstetric perspective for the South African setting', starts off by raising concerns about 'steep rises in insurance premiums, placing service delivery under serious threat'. It does not acknowledge any service delivery issues that already exist in the public sector obstetric services in South Africa (SA). According to Whittaker,[2] in 2019, there were 303 obstetricians and gynaecologists employed in the SA public sector and 579 in the private sector, and of those employed in the public sector, 190 were performing private sector work. That a large number of the children with cerebral palsy (CP) were delivered in the public sector service was not noted by Bhorat et al.,[1] nor was the fact that the overwhelming majority of court cases are against the state (not against individual doctors) in provinces and hospitals with significant medical staffing and resource issues. For example, the liabilities for Eastern Cape Province in the 2019/20 period were ZAR36 751 207 v. only ZAR33 155 in Western Cape Province for the same period.[2].

PMID: [36214404](#)

28. Long-term predictivity of early neurological assessment and developmental trajectories in low-risk preterm infants

Daniela Dicanio, Giulia Spoto, Angela Alibrandi, Roberta Minutoli, Antonio Gennaro Nicotera, Gabriella Di Rosa

Front Neurol. 2022 Sep 27;13:958682. doi: 10.3389/fneur.2022.958682. eCollection 2022.

Prematurity represents 10.6% of all births, and although preterm infants usually show adequate neurodevelopmental outcomes, some may develop significant and long-lasting neurological sequelae. Many studies have analyzed predictive factors for developing severe neurodevelopmental impairments (cerebral palsy, other motor and socio-relational disorders such as autism). In this study, 148 preterm infants were enrolled to investigate the neurodevelopmental trajectories in a population of low-risk premature infants using standardized assessment methods. Significant correlations were found between the general movements, the Hammersmith Infant Neurological Examination, and the Griffiths Mental and Development Scales. Moreover, this study showed their validity and predictivity for adverse neurodevelopmental outcomes even in low-risk infants.

PMID: [36237623](#)**29. Authors' reply to the letter to the editor on "Effect of extracorporeal shockwave therapy on muscle spasticity in patients with cerebral palsy: systematic review and meta-analysis"**

Kiyeun Nam

Eur J Phys Rehabil Med. 2022 Oct 14. doi: 10.23736/S1973-9087.22.07731-0. Online ahead of print.

No abstract available

PMID: [36239665](#)**30. The left-right side-specific endocrine signaling in the effects of brain lesions: questioning of the neurological dogma**

Georgy Bakalkin

Review Cell Mol Life Sci. 2022 Oct 11;79(11):545. doi: 10.1007/s00018-022-04576-9.

Each cerebral hemisphere is functionally connected to the contralateral side of the body through the decussating neural tracts. The crossed neural pathways set a basis for contralateral effects of brain injury such hemiparesis and hemiplegia as it has been already noted by Hippocrates. Recent studies demonstrated that, in addition to neural mechanisms, the contralateral effects of brain lesions are mediated through the humoral pathway by neurohormones that produce either the left or right side-specific effects. The side-specific humoral signaling defines whether the left or right limbs are affected after a unilateral brain injury. The hormonal signals are released by the pituitary gland and may operate through their receptors that are lateralized in the spinal cord and involved in the side-specific control of symmetric neurocircuits innervating the left and right limbs. Identification of features and a proportion of neurological deficits transmitted by neurohormonal signals vs. those mediated by neural pathways is essential for better understanding of mechanisms of brain trauma and stroke and development of new therapies. In a biological context, the left-right side-specific neuroendocrine signaling may be fundamental for the control of the left- and right-sided processes in bilaterally symmetric animals.

PMID: [36219330](#)**31. Christy Brown's 'My Left Foot': An insider's insights into growing up with cerebral palsy**

Peter L Rosenbaum

Child Care Health Dev. 2022 Oct 10. doi: 10.1111/cch.13067. Online ahead of print.

Importance: The field of childhood disability has undergone a sea-change in the past two decades. Remarkably, 70 years ago, the ideas now taking root were expressed with poignant clarity by Ireland's Christy Brown, providing lessons that were there to be learned, illustrating why 'My Left Foot' remains a singular contribution to the literature about child development and disability. **Objective of this essay:** The World Health Organization's 2001 reconsideration of 'disability' (the International Classification of Functioning, Disability and Health or ICF) has spawned considerable uptake and adaptation of contemporary concepts, notably with the 'F-Words for Childhood Disability' (now the 'F-words for Child Development'). Published in 1954, Christy Brown's ground-breaking poetic autobiography 'My Left Foot' resonates today with messages that bring the ICF to life vividly and memorably. **Review:** The author, a developmental paediatrician, has refracted the themes of 'My Left Foot' through an ICF lens to illustrate that concepts now considered modern have long been in plain sight, but sadly ignored. Christy Brown's first-person narrative animates ideas and messages for all who work in the field of childhood disability. **Findings:** This essay is a personal reflection that draws together both contemporary 21st century concepts and ideas from the time that Christy Brown was a young author reporting his perspectives and perceptions on living with 'disability'. **Conclusions and relevance:** The lessons Christy Brown generously shared 70 years ago should be heeded today. In the context of modern thinking and action regarding 'childhood disability', we need an approach to all we do that sees and respects children with 'disabilities' as whole people, that situates them in the context of family and community, that identifies and promotes their strengths and aspirations within both the health professional community and the community at large and enables them to 'become' and to 'belong'.

PMID: [36214034](#)

Prevention and Cure

32. Hyperbaric oxygen in children with cerebral palsy: A systematic review of effectiveness and safety

Justine Laureau, Christelle Pons, Guy Letellier, Raphaël Gross

PLoS One. 2022 Oct 14;17(10):e0276126. doi: 10.1371/journal.pone.0276126. eCollection 2022.

Purpose: To report current evidence regarding the effectiveness of hyperbaric oxygen therapy (HBOT) on the impairments presented by children with cerebral palsy (CP), and its safety. **Materials and methods:** PUBMED, The Cochrane Library, Google Scholar, and the Undersea and Hyperbaric Medical Society database were searched by two reviewers. Methodological quality was graded independently by 2 reviewers using the Physiotherapy Evidence Database assessment scale for randomized controlled trials (RCTs) and the modified Downs and Black (m-DB) evaluation tool for non RCTs. A meta-analysis was performed where applicable for RCTs. **Results:** Five RCTs were identified. Four had a high level of evidence. Seven other studies were observational studies of low quality. All RCTs used 100% O₂, 1.5 to 1.75 ATA, as the treatment intervention. Pressurized air was the control intervention in 3 RCTs, and physical therapy in 2. In all but one RCTs, similar improvements were observed regarding motor and/or cognitive functions, in the HBOT and control groups. Adverse events were mostly of mild severity, the most common being middle ear barotrauma (up to 50% of children). **Conclusion:** There is high-level evidence that HBOT is ineffective in improving motor and cognitive functions, in children with CP. There is moderate-level evidence that HBOT is associated with a higher rate of adverse events than pressurized air in children.

PMID: [36240157](#)