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Interventions and Management

1. Flexor Pronator Slide Under Local Anesthesia without a Tourniquet for Non-Ischemic Contractures of the Forearm

J Terrence Jose Jerome

JBJS Essent Surg Tech. 2024 Feb 12;14(1):e23.00048. doi: 10.2106/JBJS.ST.23.00048. eCollection 2024 Jan-Mar.

Background: The flexor pronator slide is an effective treatment option for ischemic contracture and contracture related to spastic cerebral palsy, but little is known about the use of the flexor pronator slide in other non-ischemic contractures. I propose a flexor pronator slide to simultaneously correct wrist and finger flexor contractures and preserve the muscle resting length. To avoid overcorrection of the deformity, I propose the use of a wide-awake local anesthesia with no tourniquet (WALANT) procedure, in which the patient is able to continually assist the surgeon in assessing the contracture release and improvement in finger movement. Additionally, the WALANT flexor pronator slide releases the specific muscles responsible for wrist and finger contractures (i.e., the flexor digitorum profundus, flexor carpi ulnaris, flexor carpi radialis, flexor digitorum superficialis, and pronator teres), sparing the intact finger functions. **Description:** The patient in the video received a WALANT injection of 1% lidocaine with 1:100,000 epinephrine and 8.4% sodium bicarbonate in the operating room, and surgery was started 30 minutes after the injection to obtain the maximum hemostatic effect¹. The injections were performed from proximal to distal along the volar-ulnar skin markings from the distal upper arm to the distal third of the forearm. The total volume utilized in this patient was <7 mg/kg (approximately 100 mL). A 25 or 27-gauge needle was infiltrated under the skin at the medial aspect of the elbow and in the distal and proximal forearm fascia. A total of 25 to 40 mL anesthetic was injected at each site, which serves to numb the ulnar nerve. over the volar-radial and volar side of the mid-forearm and distal forearm to numb the median nerve. For the WALANT procedure, an additional 8 mg of dexamethasone was added as an adjuvant to prolong the analgesia and the duration of the nerve block. The skin incision was made over the ulnar border of the forearm, extending proximally just posterior to the medial epicondyle up to the distal third of the upper arm. The origin of the flexor carpi ulnaris was elevated first, then the flexor digitorum profundus and flexor digitorum superficialis were mobilized from the ulna and the interosseous membrane. The release continued in an ulnar-to-radial direction. The patient was awake throughout the procedure, so that the improvement in the contracture could be better assessed. Further dissection around the ulnar nerve was done to release the arcade of Struthers, the Osborne ligament, and the triceps fascia in order to prevent ulnar nerve kinking during anterior transposition. The medial epicondyle was identified, and the flexor pronator was released meticulously without joint capsule perforation and medial collateral ligament injury. The muscles were finally examined for contracture in full wrist and finger extension, and further release was performed if remaining contracture was observed. All released muscles were tension-free, suspended on the trunks and branches of the median nerve, ulnar nerve, and radial and ulnar arteries. The ulnar nerve was transposed anteriorly to the medial epicondyle. The subcutaneous tissues were sutured with an absorbable suture, and the skin was closed with the same suture in a subcuticular fashion with a drain. **Alternatives:** Fractional or Z-lengthening of the flexor tendons is the alternative for finger and wrist flexion contractures. **Rationale:** This patient had previously undergone multiple flexor tendon surgeries in the hand and forearm. The patient developed tight ring, middle, and little finger contractures that could not be passively extended with the wrist in neutral or dorsiflexion. This patient could not extend the proximal or distal interphalangeal joints of the middle, ring, and little finger in wrist extension. Conversely, wrist flexion extended all fingers. When the surgeon tried to extend the fingers with the wrist in extension, excessive force was required and a jog in the movement was appreciated in all small joints. This denoted contractures of the long flexors and flexor tendons of the forearm. Fractional or Z-lengthening may release the flexion contracture in such cases, but leads to loss of active flexion, disrupts the muscle resting length, and causes loss of flexion strength. Because our patient

had very tight finger contractures, they were deemed not amenable to fractional or Z-lengthening. Therefore, we preferred the use of a flexor pronator slide to simultaneously correct wrist and finger flexor contractures while preserving the muscle resting length. To avoid overcorrection of the deformity, we preferred to perform a WALANT procedure, during which the patient could continually assist the surgeon in assessing the contracture release and improvement in finger movement. This patient returned to her computer job after the surgery. Expected outcomes: The flexor pronator slide is an effective treatment option for ischemic contracture and contracture related to spastic cerebral palsy. In 1923, Page described the flexor pronator slide as a surgical option for the late management of compartment syndrome^{2,3}. He noted that the procedure allowed extensive correction of the flexion contracture with less impact on the muscle resting length compared with alternative procedures. Sharma and Swamy noted good hand function in 14 (74%) of 19 patients and an average grip strength of 75% of the contralateral hand following a flexor pronator slide for the treatment of moderate Volkmann contracture³. A flexor pronator slide will simultaneously correct wrist and finger flexor contractures and preserve muscle resting length. To avoid overcorrection of the deformity, the flexor pronator slide can be performed as a WALANT procedure, during which the patient is able to continually assist the surgeon in assessing the contracture release and improvement in finger movement. Additionally, a WALANT flexor pronator slide releases the specific muscles responsible for wrist and finger contractures, sparing intact muscles. Good functional outcomes are expected, with a full return to work by 3 months postoperatively. Major complications, such as overcorrection of the deformity, anterior interosseous neurovascular bundle injury, ulnar nerve injury, and wound dehiscence, are unexpected for this procedure. Important tips: The treatment for a non-ischemic contracture of the wrist and fingers requires flexor pronator slide surgery to simultaneously correct the deformity without losing the resting muscle length and strength. Both fractional or Z-lengthening and flexor pronator slide surgery for such contractures yield straightforward contracture release. However, maximal preservation of the flexion power and muscle resting strength when releasing these contractures is possible only by shifting the flexor pronator muscles distally without affecting its resting length, which can be achieved by flexor pronator slide. A WALANT flexor pronator slide avoids overcorrection of the deformity because the patient is able to continually assist the surgeon in assessing the contracture release and improvement in finger movement.

PMID: [38348363](#)

2. Effectiveness of Virtual Reality for Upper Extremity Function and Motor Performance of Children With Cerebral Palsy: A Systematic Review

Juliana Bell, Bonnie Decker, Alicia Eichmann, Carly Palkovich, Chelsea Reji

Am J Occup Ther. 2024 Mar 1;78(2):7802180180. doi: 10.5014/ajot.2024.050374.

Importance: Research on the functional and motor performance impact of virtual reality (VR) as an intervention tool for children with cerebral palsy (CP) is limited. Objective: To understand whether VR is an effective intervention to improve upper extremity (UE) function and motor performance of children diagnosed with CP. Data sources: Databases used in the search were EBSCOhost, One Search, PubMed, Cloud Source, CINAHL, SPORTDiscus, and Google Scholar. Study selection and data collection: Studies published from 2006 to 2021 were included if children had a diagnosis of CP and were age 21 yr or younger, VR was used as an intervention, and measures of UE function and motor performance were used. Findings: Twenty-one studies were included, and the results provided promising evidence for improvements in areas of UE function, motor performance, and fine motor skills when VR is used as an intervention. To yield noticeable UE improvements in children with CP, VR should be implemented for 30 to 60 min/session and for at least 360 min over more than 3 wk. Additional areas of improvement include gross motor skills, functional mobility, occupational performance, and intrinsic factors. Conclusions and relevance: The use of VR as an intervention for children with CP to improve UE function and motor performance is supported. More randomized controlled trials with larger sample sizes focusing on similar outcomes and intervention frequencies are needed to determine the most effective type of VR for use in clinical occupational therapy. Plain-Language Summary: This systematic review explains how virtual reality (VR) has been used as an intervention with children with cerebral palsy (CP). The review synthesizes the results of 21 research studies of children who had a diagnosis of CP and who were 21 years old or younger. The findings support using VR to improve upper extremity performance, motor performance, and fine motor skills. The findings also show that occupational therapy practitioners should use a VR intervention at a minimum frequency of 30 to 60 minutes per session and for at least 360 minutes over more than 3 weeks to yield noticeable improvements in upper extremity, motor performance, and fine motor skills for children with CP.

PMID: [38350039](#)

3. Lesion mapping and functional characterization of hemiplegic children with different patterns of hand manipulation

Antonino Errante, Francesca Bozzetti, Alessandro Piras, Laura Beccani, Mariacristina Filippi, Stefania Costi, Adriano Ferrari, Leonardo Fogassi

Neuroimage Clin. 2024 Feb 10;41:103575. doi: 10.1016/j.nicl.2024.103575. Online ahead of print.

Brain damage in children with unilateral cerebral palsy (UCP) affects motor function, with varying severity, making it difficult the performance of daily actions. Recently, qualitative and semi-quantitative methods have been developed for lesion classification, but studies on mild to moderate hand impairment are lacking. The present study aimed to characterize lesion

topography and preserved brain areas in UCP children with specific patterns of hand manipulation. A homogeneous sample of 16 UCP children, aged 9 to 14 years, was enrolled in the study. Motor assessment included the characterization of the specific pattern of hand manipulation, by means of unimanual and bimanual measures (Kinematic Hand Classification, KHC; Manual Ability Classification System, MACS; House Functional Classification System, HFCS; Melbourne Unilateral Upper Limb Assessment, MUUL; Assisting Hand Assessment, AHA). The MRI morphological study included multiple methods: (a) qualitative lesion classification, (b) semi-quantitative classification (sq-MRI), (c) voxel-based morphometry comparing UCP and typically developed children (VBM-DARTEL), and (d) quantitative brain tissue segmentation (q-BTS). In addition, functional MRI was used to assess spared functional activations and cluster lateralization in the ipsilesional and contralesional hemispheres of UCP children during the execution of simple movements and grasping actions with the more affected hand. Lesions most frequently involved the periventricular white matter, corpus callosum, posterior limb of the internal capsule, thalamus, basal ganglia and brainstem. VBM-DARTEL analysis allowed to detect mainly white matter lesions. Both sq-MRI classification and q-BTS identified lesions of thalamus, brainstem, and basal ganglia. In particular, UCP patients with synergic hand pattern showed larger involvement of subcortical structures, as compared to those with semi-functional hand. Furthermore, sparing of gray matter in basal ganglia and thalamus was positively correlated with MUUL and AHA scores. Concerning white matter, q-BTS revealed a larger damage of fronto-striatal connections in patients with synergic hand, as compared to those with semi-functional hand. The volume of these connections was correlated to unimanual function (MUUL score). The fMRI results showed that all patients, but one, including those with cortical lesions, had activation in ipsilesional areas, regardless of lesion timing. Children with synergic hand showed more lateralized activation in the ipsilesional hemisphere both during grasping and simple movements, while children with semi-functional hand exhibited more bilateral activation during grasping. The study demonstrates that lesion localization, rather than lesion type based on the timing of their occurrence, is more associated with the functional level of hand manipulation. Overall, the preservation of subcortical structures and white matter can predict a better functional outcome. Future studies integrating different techniques (structural and functional imaging, TMS) could provide further evidence on the relation between brain reorganization and specific pattern of manipulation in UCP children.

PMID: [38354671](#)

4. Response to Commentary on "Failure of Hip Reconstruction in Children With Cerebral Palsy: What Are the Risk Factors?"

Pooya Hosseinzadeh

J Pediatr Orthop. 2024 Feb 13. doi: 10.1097/BPO.0000000000002637. Online ahead of print.

No abstract available

PMID: [38348898](#)

5. Does patella lowering as part of multilevel surgery improve knee kinematics in children with cerebral palsy and crouch gait? A meta-analysis of comparative studies

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Review J Child Orthop. 2023 Dec 14;18(1):13-25. doi: 10.1177/18632521231217542. eCollection 2024 Feb.

Purpose: To evaluate differences in knee kinematic outcomes of patellar-lowering surgery, specifically patellar tendon advancement or patellar tendon shortening, compared with no-patellar-lowering surgery in multilevel surgery for children with cerebral palsy and crouch gait. **Methods:** Four databases were searched to retrieve studies published from inception until 2023. Three reviewers independently screened for studies with observational or randomized control designs, comparing two groups of patients with cerebral palsy and crouch gait who underwent multilevel surgery (with patellar-lowering surgery versus no-patellar-lowering surgery), where various gait analysis outcomes were reported (CRD42023450692). The risk of bias was assessed with the Risk Of Bias In Non-randomised Studies - of Interventions (ROBINS-I) tool. **Results:** Seven studies (249 patients and 368 limbs) met the eligibility criteria. Patients undergoing patellar-lowering surgery demonstrated statistically significant improvements in knee flexion at initial contact (mean difference = -6.39; 95% confidence interval = [-10.4, -2.75]; $p = 0.0006$; $I^2 = 84\%$), minimum knee flexion in stance (mean difference = -14.27; 95% confidence interval = [-18.31, -10.23]; $p < 0.00001$; $I^2 = 89\%$), and clinical knee flexion contracture (mean difference = -5.6; 95% confidence interval = [-9.59, -1.6]; $p = 0.006$; $I^2 = 95\%$), with a significant increase in anterior pelvic tilt (mean difference = 2.97; 95% confidence interval = [0.58, 5.36]; $p = 0.01$; $I^2 = 15\%$). However, improvements in gait deviation index and decrease in peak knee flexion in swing did not reach statistical significance. Subgroup analysis reduced heterogeneity and revealed (1) greater improvement using patellar tendon shortening versus patellar tendon advancement techniques; (2) lack of knee flexion contracture improvement in high-quality or longer-term studies; (3) longer-term improvement only in minimum knee flexion in stance, with a decrease in peak knee flexion in swing; and (4) an inability to assess the potential benefit of rectus femoris procedure and hamstring preservation. **Conclusions:** Overall, the combination of patellar-lowering surgery with multilevel surgery demonstrated superior improvements in stance-phase knee kinematics compared with multilevel surgery alone, despite an increase in anterior pelvic

tilt and a longer-term knee flexion reduction during the swing phase. Level of evidence: Level III, Systematic review of level III studies.

PMID: [38348440](#)

6. Changes in foot posture evaluated with dynamic pedobarography over the course of childhood in ambulatory youth with cerebral palsy

Chris Church, Nancy Lennon, Madison Lennon, John D Henley, Thomas Shields, Tim Niiler, Daveda A Taylor, M Wade Shrader, Freeman Miller

J Child Orthop. 2024 Jan 19;18(1):3-12. doi: 10.1177/18632521231208746. eCollection 2024 Feb.

Purpose: Foot deformities are prevalent in children with cerebral palsy, but there is limited research on the progression of foot posture during growth. Our study aimed to evaluate the change in dynamic foot posture in children with cerebral palsy. **Methods:** Children with cerebral palsy, aged 17-40 months, were recruited to participate in this Institutional Review Board-approved prospective longitudinal study by having serial foot posture evaluations. The coronal plane index and foot segmental impulses were measured with dynamic pedobarography. Data were compared between children stratified by Gross Motor Function Classification System level and typically developing children using serial Welch's t-tests across time with Holm correction for multiple comparisons. **Results:** In total, 33 children (54 limbs) were included in the analysis (21 bilateral and 12 unilateral; Gross Motor Function Classification System: I-13, II-14, III-4, IV-2. Children completed 16.9 (\pm 4.4) evaluations (initial age 2.9 (\pm 0.7) and final age 18.6 (\pm 1.7) years)). Early valgus foot posture normalizes in children at Gross Motor Function Classification System levels I/II and persists in children at levels III/IV who do not have foot surgery. For most young children, foot posture development is variable. **Conclusion:** Foot posture in young children with cerebral palsy begins in valgus and tends to normalize in youth who walk without an assistive device. Conservative management of foot deformity is recommended in early childhood. Level of evidence: Level II, prognostic study.

PMID: [38348441](#)

7. Towards a diagnostic tool for neurological gait disorders in childhood combining 3D gait kinematics and deep learning

Zhengyang Lan, Mathieu Lempereur, Gwenael Gueret, Laetitia Houx, Marine Cacioppo, Christelle Pons, Johanne Mensah, Olivier Rémy-Néris, Abdeldjalil Aïssa-El-Bey, François Rousseau, Sylvain Brochard

Comput Biol Med. 2024 Feb 3;171:108095. doi: 10.1016/j.compbimed.2024.108095. Online ahead of print.

Gait abnormalities are frequent in children and can be caused by different pathologies, such as cerebral palsy, neuromuscular disease, toe walker syndrome, etc. Analysis of the "gait pattern" (i.e., the way the person walks) using 3D analysis provides highly relevant clinical information. This information is used to guide therapeutic choices; however, it is underused in diagnostic processes, probably because of the lack of standardization of data collection methods. Therefore, 3D gait analysis is currently used as an assessment rather than a diagnostic tool. In this work, we aimed to determine if deep learning could be combined with 3D gait analysis data to diagnose gait disorders in children. We tested the diagnostic accuracy of deep learning methods combined with 3D gait analysis data from 371 children (148 with unilateral cerebral palsy, 60 with neuromuscular disease, 19 toe walkers, 60 with bilateral cerebral palsy, 25 stroke, and 59 typically developing children), with a total of 6400 gait cycles. We evaluated the accuracy, sensitivity, specificity, F1 score, Area Under the Curve (AUC) score, and confusion matrix of the predictions by ResNet, LSTM, and InceptionTime deep learning architectures for time series data. The deep learning-based models had good to excellent diagnostic accuracy (ranging from 0.77 to 0.99) for discrimination between healthy and pathological gait, discrimination between different etiologies of pathological gait (binary and multi-classification); and determining stroke onset time. LSTM performed best overall. This study revealed that the gait pattern contains specific, pathology-related information. These results open the way for an extension of 3D gait analysis from evaluation to diagnosis. Furthermore, the method we propose is a data-driven diagnostic model that can be trained and used without human intervention or expert knowledge. Furthermore, the method could be used to distinguish gait-related pathologies and their onset times beyond those studied in this research.

PMID: [38350399](#)

8. Mice born preterm develop gait dystonia and reduced cortical parvalbumin immunoreactivity

Kat Gemperli, Femi Folorunso, Benjamin Norin, Rebecca Joshua, Clayton Hill, Rachel Rykowski, Rafael Galindo, Bhooma R Aravamuthan

bioRxiv. 2024 Feb 2:2024.02.01.578353. doi: 10.1101/2024.02.01.578353. Preprint

Preterm birth leading to cerebral palsy (CP) is the most common cause of childhood dystonia, a movement disorder that is

debilitating and often treatment refractory. Dystonia has been typically associated with dysfunction of striatal cholinergic interneurons, but clinical imaging data suggests that cortical injury may best predict dystonia following preterm birth. Furthermore, abnormal sensorimotor cortex inhibition has been found in many studies of non-CP dystonias. To assess the potential for a cortical etiology of dystonia following preterm birth, we developed a new model of preterm birth in mice. Noting that term delivery in mice on a C57BL/6J background is embryonic day 19.1 (E19.1), we induced preterm birth at the limits of pup viability at embryonic day (E) 18.3, equivalent to human 22 weeks gestation. Mice born preterm demonstrate clinically validated metrics of dystonia during gait (leg adduction amplitude and variability) and also demonstrate reduced parvalbumin immunoreactivity in the sensorimotor cortex, suggesting dysfunction of cortical parvalbumin-positive inhibitory interneurons. Notably, reduced parvalbumin immunoreactivity or changes in parvalbumin-positive neuronal number were not observed in the striatum. These data support the association between cortical dysfunction and dystonia following preterm birth. We propose that our mouse model of preterm birth can be used to study this association and potentially also study other sequelae of extreme prematurity.

PMID: [38352408](#)

9. The Relationship between Structure of the Corticoreticular Tract and Walking Capacity in Children with Cerebral Palsy

Shahla Azizi, Parmida Moradi Birgani, Meghdad Ashtiyani, Ashkan Irani, Amin Shahrokhi, Khadijeh Meydanloo, Mohammad Mehdi Mirbagheri

J Biomed Phys Eng. 2024 Feb 1;14(1):79-88. doi: 10.31661/jbpe.v0i0.2104-1302. eCollection 2024 Feb.

Background: Disruption in the descending pathways may lead to gait impairments in Cerebral Palsy (CP) children. Though, the mechanisms behind walking problems have not been completely understood. **Objective:** We aimed to define the relationship between the structure of the corticoreticular tract (CRT) and walking capacity in children with CP. **Material and methods:** This is a retrospective, observational, and cross-sectional study. Twenty-six children with CP between 4 to 15 years old participated. Also, we used existed data of healthy children aged 4 to 15 years old. CRT structure was characterized using diffusion tensor imaging (DTI). The DTI parameters extracted to quantify CRT structure included: fractional anisotropy (FA), mean (MD), axial (AD), and radial (RD) diffusivity. Balance and walking capacity was evaluated using popular clinical measures, including the Berg balance scale (BBS), Timed-Up-and-Go (TUG; balance and mobility), six-minute walk test (6 MWT; gait endurance), and 10-meter walk Test (10 MWT; gait speed). **Results:** There are significant differences between MD, AD, and RD in CP and healthy groups. Brain injury leads to various patterns of the CRT structure in children with CP. In the CP group with abnormal CRT patterns, DTI parameters of the more affected CRT are significantly correlated with walking balance, speed, and endurance measures. **Conclusion:** Considering the high inter-subject variability, the variability of CRT patterns is vital for determining the nature of changes in CRT structure, their relationship with gait impairment, and understanding the underlying mechanisms of movement disorders. This information is also important for the development or prescription of an effective rehabilitation target for individualizing treatment.

PMID: [38357607](#)

10. Therapeutic effect of the new multilevel brace orthosis on cerebral palsy gait: a case report

C Di Brina, G Rosellini, M Insogna, M Cerioli

Case Reports Clin Ter. 2024 Jan-Feb;175(1):11-16. doi: 10.7417/CT.2024.5027.

Background: Infantile spastic bilateral cerebral palsy (CP) is the most common form of CP. Diplegia (with ambulatory ability) is mostly a chronic condition that impairs the ability to walk. Standard orthotic management includes hip-knee-ankle-foot orthosis (HKAFO) as a primary conservative treatment option to contrast spasticity and stabilise gait through partial immobilisation of the body structure. Multilevel brace orthosis (MLB) (Registered Trademark) is a specific type of light HKAFO designed to improve functional alignment and dynamic gait stability without limb immobilisation. **Aim of the case report is to verify the effects of the MLB on the diplegic gait cycle.** **Case:** A child with a bilateral spastic gait due to CP diplegia is described. **Gait analyses** were performed to investigate the therapeutic effects of the MLB on walking. **Discussion:** The MLB improved the gross motor function measure of walking and gait temporal parameters (velocity), compared with barefoot condition. During the swing phase, we observed a reduction in plantar and knee flexion, and the orthosis increased the width and length of the step. **Conclusion:** Use of this specific type of HKAFO in children with diplegia improved gait symmetry and stability.

PMID: [38358471](#)

11. Validity and Reliability of a Telehealth Physical Fitness and Functional Assessment Battery for Ambulatory Youth With and Without Mobility Disabilities: Observational Measurement Study

Byron Lai, Danielle Wadsworth, Katherine Spring, Chloe S Jones, Madison Mintz, Laurie A Malone, Yumi Kim, Jereme Wilroy, Holim Lee

JMIR Rehabil Assist Technol. 2024 Feb 12;11:e50582. doi: 10.2196/50582.

Background: Youth (age 15-24 years) with and without disability are not adequately represented enough in exercise research due to a lack of time and transportation. These barriers can be overcome by including accessible web-based assessments that eliminate the need for on-site visitations. There is no simple, low-cost, and psychometrically sound compilation of measures for physical fitness and function that can be applied to youth with and without mobility disabilities. **Objective:** The first purpose was to determine the statistical level of agreement of 4 web-modified clinical assessments with how they are typically conducted in person at a laboratory (convergent validity). The second purpose was to determine the level of agreement between a novice and an expert rater (interrater reliability). The third purpose was to explore the feasibility of implementing the assessments via 2 metrics: safety and duration. **Methods:** The study enrolled 19 ambulatory youth: 9 (47%) with cerebral palsy with various mobility disabilities from a children's hospital and 10 (53%) without disabilities from a university student population. Participants performed a battery of tests via videoconferencing and in person. The test condition (teleassessment and in person) order was randomized. The battery consisted of the hand grip strength test with a dynamometer, the five times sit-to-stand test (FTST), the timed up-and-go (TUG) test, and the 6-minute walk test (6MWT) either around a standard circular track (in person) or around a smaller home-modified track (teleassessment version, home-modified 6-minute walk test [HM6MWT]). Statistical analyses included descriptive data, intraclass correlation coefficients (ICCs), and Bland-Altman plots. **Results:** The mean time to complete the in-person assessment was 16.9 (SD 4.8) minutes and the teleassessment was 21.1 (SD 5.9) minutes. No falls, injuries, or adverse events occurred. Excellent convergent validity was shown for telemeasured hand grip strength (right ICC=0.96, left ICC=0.98, $P<.001$) and the TUG test (ICC=0.92, $P=.01$). The FTST demonstrated good agreement (ICC=0.95, 95% CI 0.79-0.98; $P=.01$). The HM6MWT demonstrated poor absolute agreement with the 6MWT. However, further exploratory analysis revealed a strong positive correlation between the tests ($r=0.83$, $P<.001$). The interrater reliability was excellent for all tests (all ICCs>0.9, $P<.05$). **Conclusions:** This study suggests that videoconference assessments are convenient and useful measures of fitness and function among youth with and without disabilities. This paper presents operationalized teleassessment procedures that can be replicated by health professionals to produce valid and reliable measurements. This study is a first step toward developing teleassessments that can bypass the need for on-site data collection visitations for this age group. Further research is needed to identify psychometrically sound teleassessment procedures, particularly for measures of cardiorespiratory endurance or walking ability.

PMID: [38345838](#)

12. Corpus Callosum Functional Activities in Children with Cerebral Palsy

Meghdad Ashtiyani, Parmida Moradi Birgani, Maryam Soleimani, Seyed Behnamdin Jameie, Amin Shahrokhi, Mohammad Mehdi Mirbagheri, Mohammad Reza Deevband

J Biomed Phys Eng. 2024 Feb 1;14(1):21-30. doi: 10.31661/jbpe.v0i0.2106-1354. eCollection 2024 Feb.

Background: Since cerebral palsy (CP) is a corollary to brain damage, persistent treatment should accompany an alteration in brain functional activity in line with clinical improvements. In this regard, the corpus callosum (CC), as a connecting bridge between the two hemispheres, plays an essential role. **Objective:** This study aimed to investigate the therapeutic effects of occupational therapy (OT) on CC functional activity and walking capacity in children with cerebral palsy. **Material and methods:** In this clinical trial study, 4 children with CP (8.25 ± 1.71 years) received 45 min OT sessions 3 times weekly for 8 weeks. Functional magnetic resonance imaging (fMRI) was acquired while conducting passive motor tasks to quantify CC activation. The pre-post activation changes in CC following therapy were quantified in terms of activated voxels. Walking capacity was evaluated using the timed-up-and-go (TUG), 6-minute walk test (6 MWT), and 10-meter walk test (10 MWT) in pre- and post-treatment. **Results:** The number of activated voxels in CC indicated significant improvement in participants. Post-treatment activated voxels substantially exceeded pre-treatment active voxels. Clinical measures, including TUG, 6 MWT, and 10 MWT are improved by 11.9%, 12.6%, and 25.4%, respectively. **Conclusion:** Passive task-based fMRI can detect the effects of OT on CC functional activity in children with CP. According to the results, OT improves CC functional activity in addition to gait and balance performance.

PMID: [38357606](#)

13. The effects of a psycholinguistic training based on phonology and semantics on sentence production in an aphasic child with cerebral palsy

Adel F Aljadaan

Appl Neuropsychol Child. 2024 Feb 12;1-10. doi: 10.1080/21622965.2024.2311806. Online ahead of print.

In aphasia, damage to brain regions responsible for language processing disrupts access to words previously learned and consolidated in the mental lexicon, causing people with aphasia (PWA) to experience word finding difficulties that negatively impact their everyday communication. This study seeks to investigate the effects of a psycholinguistic training based on phonology and semantics on sentence production in an aphasic child with cerebral palsy. The study used a single-subject multiple-baseline research design across behaviors. A 13-year-old boy, named AE with expressive aphasia, admitted to Speech and Swallowing Disorders Clinic, College of Applied Medical Sciences, King Saud University was recruited to participate in this study. The aphasic child with cerebral palsy was found to be successful at the end of the training sessions, compared to the baseline. In other words, there was a positive difference between the data obtained in the first and last training sessions for each child.

PMID: [38346350](#)

14. Dental caries and mean values of DMFT among children with cerebral palsy: a systematic review and meta-analysis

Melkamu Aderajew Zemene, Anteneh Mengist Dessie, Denekew Tenaw Anley, Mengesha Assefa Ahunie, Natnael Atnafu Gebeyehu, Getachew Asmare Adella, Gizachew Ambaw Kassie, Misganaw Asmamaw Mengstie, Mohammed Abdu Seid, Endeshaw Chekol Abebe, Molalegn Mesele Gesese, Natnael Amare Tesfa, Yenealem Solomon Kebede, Natnael Moges, Berihun Bantie, Sefineh Fenta Feleke, Tadesse Asmamaw Dejenie, Wubet Alebachew Bayih, Ermias Sisay Chanie

Meta-Analysis BMC Oral Health. 2024 Feb 15;24(1):241. doi: 10.1186/s12903-024-03985-5.

Introduction: One of the most prevalent causes of physical disability in children is cerebral palsy (CP), which is a series of complicated neurological disorders. Children with cerebral palsy suffer from multiple problems and potential disabilities, including dental caries. Hence, this study aimed to determine the pooled prevalence of dental caries and mean DMFT (Decayed, Missed, and Filled Permanent Teeth) among children with cerebral palsy in Africa and Asia. **Methods:** A comprehensive search of the literature was made to locate relevant studies in PubMed/Medline, HINARI, Web of Science, Science Direct, the Cochrane Library, the Worldwide Science Database, and Google Scholar. The data were extracted in Microsoft Excel and transferred to Stata version 17 software for further analysis. A random-effect model was employed to estimate the pooled prevalence of dental caries and the pooled mean value of DMFT among children with cerebral palsy in Africa and Asia. Heterogeneity between studies was checked using the Cochrane Q test and I² test statistics. Sub-group analysis by continent was done, and sensitivity analysis was checked. A small study effect was checked using Egger's statistical test at the 5% level of significance. **Results:** In this study, 25 original studies conducted in 17 countries in Africa and Asia that fulfilled the eligibility criteria were included in the review. The overall pooled prevalence of dental caries in Africa and Asia among children with cerebral palsy was 55.6% (95% CI: 42.4, 68.8). The pooled prevalence of dental caries among children with cerebral palsy in Africa was 42.43% (95% CI: 30.39, 54.58), and it was slightly higher in Asia with 64% (95% CI: 48.32, 79.72). In the random effect model analysis, the pooled mean DMFT of dental caries in children with cerebral palsy was 2.25 (95% CI: 1.86, 2.64). The pooled mean DMFT in Africa was 1.47 (95% CI: 0.86, 2.09), and in Asia it was 3.01 (95% CI: 2.43, 3.60). **Conclusion:** In this study, we found that children with cerebral palsy experienced an alarming rate of dental caries. In these settings, dental caries affected roughly more than half of the children with cerebral palsy. Hence, oral health promotion initiatives should target children with CP, and this group of children must receive early preventive dental care.

PMID: [38360629](#)

15. Sleep problems in a population-based cohort of primary school age children with Cerebral Palsy

Koa Whittingham, Kath Benfer, Leanne Sakzewski, Jane Wotherspoon, Andrea Burgess, Tracy Comans, Syed Afoz Keramat, Robert S Ware, Roslyn N Boyd

Res Dev Disabil. 2024 Feb 15;147:104690. doi: 10.1016/j.ridd.2024.104690. Online ahead of print.

Aims: To examine sleep problems in a population-based sample of school-aged children (8-12yo) with Cerebral Palsy (CP) **METHOD:** Eighty-six children (mean 9 years, 5 months, SD = 1 year, 6 months; male = 60) with CP (Gross Motor Function Classification System; GMFCS I=46; II=21; III=9; IV=6; V=6) participated. Classifications/assessments included: Sleep Disturbance Scale for Children (SDSC), Gross Motor Function Measure (GMFM-66), Manual Ability Classification System (MACS), Communication Function Classification System (CFCS), Strengths and Difficulties Questionnaire (SDQ) and the Cerebral Palsy- Quality of Life (CP-QOL) Pain Impact subscale. Analysis included linear and logistic regression. **Results:** 38 (44 %) children were within the clinical range for sleep problems. Sleep problems were significantly associated with epilepsy, (95 % CI) = 14.48 (7.95 to 21.01), gross motor function, -0.13 (-0.26 to -0.01), manual ability, 7.26 (0.82 to 13.69), communication, 10.01 (2.21 to 17.80), child behaviour, 1.134 (0.74 to 1.53), and pain related QOL, 0.33 (0.12 to 0.53). For the multivariable model, sleep problems remained significantly associated with epilepsy, b (95 % CI) = 11.72 (4.88 to 18.57), child behaviour, 1.03 (0.65 to 1.41) and pain-related QOL, 0.21 (0.29 to 0.38). **Conclusions:** Sleep problems are common and associated with epilepsy, child behaviour and pain related QOL.

PMID: [38364615](#)

16. Effects of a full-body electrostimulation garment application in a cohort of subjects with cerebral palsy, multiple sclerosis, and stroke on upper motor neuron syndrome symptoms

Andreas Hahn, Susan Moeller, Arne Schlausch, Matilda Ekmann, Gautier de Chelle, Marie Westerlund, Frank Braatz, Winfried Mayr

Biomed Tech (Berl). 2023 Sep 12;69(1):49-59. doi: 10.1515/bmt-2023-0271. Print 2024 Feb 26.

Objectives: Dysfunction of the central nervous system may inflict spastic movement disorder (SMD). Electrical stimuli were identified as promising therapeutic option. Electrical stimulation provided by a 58-electrode full body garment was investigated based on data from regular trial fittings. Methods: Data from 72 testees were investigated. Age averages 36.6 (19.8) ys with 44 females. The cohort spans infantile cerebral palsy (CP) (n=29), multiple sclerosis (MS) (n=23) and stroke (n=20). Data were stratified by etiology and an entry BBS Score<45. Results: Effect sizes (Cohen's d) related BBS, TUG, FGA, 10mWT, WMFT, EQ5D5L and Pain. Significance levels are indicated by *: p<0.05, **: p<0.01, ***: p<0.001, (t): p<0.1: CP: 1.64***, 0.29*, 1.59***, 0.76(t), 1.00***, 0.5*, 1.28***; MS: 1.83***, 0.83***, 1.28**, 1.07***, 0.93*, 1.11**, 0.78*; Stroke: 1.28**, 0.78**, 0.89, 0.92**, 0.71, 1.26*, 0.78*. Conclusions: Multi-site transcutaneous electrical stimulation may increase ambulation related skills in subjects with SMD stemming from CP, MS and stroke. The results indicate effects on static and dynamic balance, fall risk, mobility, upper extremity improvement and an overall increase in health utility and a reduction in spasticity related pain. Effects are immediate as well as sustained. These results may inspire individual trial fittings and inform further controlled trials.

PMID: [38354212](#)

17. Design and fabrication of a novel 4D-printed customized hand orthosis to treat cerebral palsy

Mohsen Barmouz, Leire Viana Uribe, Qingfeng Ai, Bahman Azarhoushang

Med Eng Phys. 2024 Jan;123:104087. doi: 10.1016/j.medengphy.2023.104087. Epub 2023 Dec 12.

This research study is dedicated to additive manufacturing of the shape memory polymer hand orthosis to treat patients with cerebral palsy. The treatment process for cerebral palsy is a step-by-step process that needs different adjustments for the spastic hand to stretch it towards a normal posture, whereas meeting these requirements using conventional methods or complicated mechanisms is expensive, less flexible, time-consuming, and less practical. A comprehensive investigation was conducted to design and fabricate novel thermally actuated customized hand orthosis via digital light processing (DLP). The highly precise scanning device was used to derive the hand model, and subsequently, the Blender software was used to design the customized orthosis. The results showed that fabricated orthosis could represent a strong potential to become an alternative treatment for cerebral palsy. The shape memory actuation of the orthosis indicated that 100 % shape recovery is achievable in different actuating conditions with recovery temperatures higher than 55°C. Besides, it was found that the response time and shape recovery percentage could be tailored in the range of 5 to 40 s and 45 to 100%, respectively, by adjusting programming and actuation temperatures. Further, the repeatability of the shape memory effects in the printed orthosis was investigated as well, which proved that until 17 repetitions, 100 % shape recovery was achievable.

PMID: [38365340](#)

18. Evaluation of Informative Content on Cerebral Palsy in the Era of Artificial Intelligence: The Value of ChatGPT

Ayşe Merve Ata, Berke Aras, Özlem Yılmaz Taşdelen, Canan Çelik, Canan Çulha

Phys Occup Ther Pediatr. 2024 Feb 15:1-10. doi: 10.1080/01942638.2024.2316178. Online ahead of print.

Aims: In addition to the popular search engines on the Internet, ChatGPT may provide accurate and reliable health information. The aim of this study was to examine whether ChatGPT's responses to frequently asked questions concerning cerebral palsy (CP) by families were reliable and useful. Methods: Google trends were used to find the most frequently searched keywords for CP. Five independent physiatrists assessed ChatGPT responses to 10 questions. Seven-point Likert-type scales were used to rate information reliability and usefulness based on whether the answer can be validated and is understandable. Results: The median ratings for reliability of information for each question varied from 2 (very unsafe) to 5 (relatively very reliable). The median rating was 4 (reliable) for four questions. The median ratings for usefulness of information varied from 2 (very little useful) to 5 (moderately useful). The median rating was 4 (partly useful) for seven questions. Conclusion: Although ChatGPT appears promising as an additional tool for informing family members of individuals with CP about medical information, it should be emphasized that both consumers and health care providers should be aware of the limitations of artificial intelligence-generated information.

PMID: [38361368](#)

19. Perceptions and experiences of first mobility aid provision for young children with cerebral palsy in the United States: a mixed-methods study

Nicole L Zaino, Zahra McKee, Charlotte D Caskey, Katherine M Steele, Heather A Feldner

Disabil Rehabil Assist Technol. 2024 Feb 12:1-12. doi: 10.1080/17483107.2023.2301376. Online ahead of print.

Purpose: The purpose of this study was to establish and understand the provision process and impacts of first mobility aids for children with cerebral palsy (CP) in the United States - specifically orthoses, walkers and gait-trainers. **Methods:** We performed a mixed-methods study including surveys and semi-structured interviews of caregivers of young children with CP (n = 10) and clinicians who work with young children with CP (n = 29). We used content analysis for the surveys and inductive coding for the interviews. **Results:** Four themes emerged: (1) first mobility aids have mixed impacts and use patterns, (2) there is varied caregiver education and understanding about mobility aids, (3) clinician knowledge, consistency and connection impact care and (4) numerous access barriers exist for families, and there are still opportunities for improvement across all domains. **Conclusions:** This research provides insights into the lived experiences of clinicians and caregivers of young children with CP regarding the prescription, provision, use and impact of first mobility aids, specifically ankle foot orthoses and walkers/gait trainers. This study not only provides researchers and clinicians with an understanding of the current status of the prescription and provision process in the United States, but also offers suggestions for improvements of the process and mobility aids themselves. These results have implications for future research, mobility aid, design and the provision process of first mobility aids.

PMID: [38344906](#)

20. Prevalence and types of strabismus in cerebral palsy: A global and historical perspective based on a systematic review and meta-analysis

Michael S Herron, Lingchen Wang, Christopher S von Bartheld

medRxiv. 2024 Jan 24:2024.01.23.24301684. doi: 10.1101/2024.01.23.24301684. Preprint

Purpose: Strabismus is more frequent in cerebral palsy (CP) than in the normal population, but reports differ how much it is increased. We here examined the global prevalence and types of strabismus in CP, whether esotropia or exotropia is more frequent, and whether the prevalence differs between ethnicities and/or country income levels, and between generations. **Methods:** We compiled in a systematic review and meta-analysis the results of 147 CP studies that report the prevalence of strabismus or the ratio of esotropia to exotropia, and we conducted subgroup analyses for region (income level) and ethnicity. We performed a pooled analysis for the CP strabismus prevalence, and estimated the global number of CP cases with strabismus. **Results:** The pooled prevalence of strabismus in CP is 49.8% in high-income countries and 39.8% in lower-income countries. We estimate the global number of strabismus cases in CP as 12.2 million, with 7.6 million males and 4.6 million females, based on current estimates of 29.6 million global CP cases. Esotropia is more frequent than exotropia in Caucasians, while exotropia is more frequent than esotropia in Hispanic and in some Asian and African populations. The strabismus prevalence in CP increases with increasing country income levels. **Conclusion:** Generational changes in strabismus prevalence appear to reflect a transition of CP types and an increase in prevalence as countries attain higher income and more effective maternal health care. The distribution of esotropia and exotropia in CP patients largely reflects the horizontal strabismus type that is predominant in the subject's ethnicity.

PMID: [38343841](#)

21. Satisfaction with health care services in young people with cerebral palsy in the transition period: results from a European multicenter study

Holger Muehlan, Joaquim Alvarelhao, Catherine Arnaud, Chirine Cytera, Jerome Fauconnier, Kate Himmelmann, Marco Marcelli, Henriette Markwart, Marion Rapp, Silke Schmidt, Ute Thyen

Front Med (Lausanne). 2024 Jan 30:11:1306504. doi: 10.3389/fmed.2024.1306504. eCollection 2024.

Background: Young people with chronic health conditions and disabilities rely on the healthcare system to maintain their best possible health. The appropriate delivery and utilization of healthcare services are key to improve their autonomy, self-efficacy and employment outcomes. The research question of our study is directed toward investigating if poor availability and accessibility of healthcare services in general, as identified by unmet needs in healthcare, are associated with dissatisfaction with healthcare. **Methods:** Within a European multicenter observational study, 357 young adults with cerebral palsy aged 19-28 were included. We assessed special healthcare needs, utilization of healthcare services, and satisfaction with healthcare applying the short-form of the YHC-SUN-SF, environmental and social variables (EAEQ) as well as indicators for severity of condition and functionality (e.g., GMFCS) of these participants based on a self-, assisted self- or proxy-reports. We used correlation analyses to explore associations between satisfaction with healthcare and respective indicators related to availability and accessibility of healthcare services as well as severity of the condition. In addition, we included reference values for

satisfaction with health care from young adults with various chronic conditions assessed within population-based surveys from some of the European countries included in the study. Results: We identified several unmet healthcare needs, especially for widely used and established services (e.g., physical therapy). Satisfaction with healthcare (YHC-SUN-SF general and subscale scores) was moderate to high and almost consistently better for the sample of young adults with cerebral palsy as compared to reference values for young adults with various chronic conditions assessed within general population surveys). Correlation coefficients between satisfaction with healthcare and utilization of services and (unmet) healthcare needs were low, also with different indicators for severity of the condition or functionality. Conclusion: Young adults with cerebral palsy reports of unmet healthcare needs varied largely but showed substantial deficits in some aspects. This seems to have no impact on the satisfaction with healthcare those patients currently receive. We conclude that these are two different constructs and somewhat independent indicators to evaluate the quality of healthcare. Clinicians and other practitioners should consider this distinction when monitoring patient needs in their daily practice.

PMID: [38352143](#)

22. Cerebral palsy in African paediatric populations: A scoping review

Serini Murugasen, Priscilla Springer, Bolajoko O Olusanya, Melissa Gladstone, Charles Newton, Angelina Kakooza-Mwesige, Kirsten A Donald

Review Dev Med Child Neurol. 2024 Feb 13. doi: 10.1111/dmcn.15878. Online ahead of print.

Aim: To review the epidemiology and outcomes of African children with cerebral palsy (CP) over a 21-year period. Method: The PubMed, Scopus, and Web of Science online databases were searched for original research on African children with CP aged 18 years and younger published from 2000 to 2021. Results: A total of 1811 articles underwent review against explicit criteria; 93 articles were selected for inclusion in the scoping review. The reported prevalence of CP ranged from 0.8 to 10 per 1000 children. Almost half had perinatal risk factors, but up to 26% had no identifiable risk factor. At least one-third of children with CP had one or more comorbidities, most commonly epilepsy, intellectual disability, and malnutrition. African children with CP demonstrated excess premature mortality approximately 25 times that of the general population, predominantly from infections. Hospital-based and younger populations had larger proportions of children with severe impairments. African children with CP had inadequate access to care and education, yet showed functional improvements compared to controls for all evaluated interventions. Interpretation: The prevalence of CP in Africa remains uncertain. African children with CP have different risk profiles, greater premature mortality, and more severe functional impairments and comorbidities compared to the Global North. Several barriers prevent access to optimal care. Larger African studies on validated and effective interventions are needed.

PMID: [38351549](#)

23. Saudi Cerebral Palsy Register (SCPR): Protocol on the Methods and Technical Details

Sami Mukhdari Mushta, Riyadh Alghamdi, Hani Almalki, Saadia Waqas, Adel Alawwad, Osamah Barasheed, Mohammad Garnan, Sarah McIntyre, Harunor Rashid, Nadia Badawi, Gulam Khandaker

J Epidemiol Glob Health. 2024 Feb 15. doi: 10.1007/s44197-024-00198-5. Online ahead of print.

This protocol presents a comprehensive proposal for the establishment of the Saudi Cerebral Palsy Register (SCPR), a crucial project for investigating and addressing the prevalence, etiology, and management of cerebral palsy (CP) in Saudi Arabia. The SCPR will not only provide a robust database for ongoing research and analysis but will also serve as a platform for investigating the causes of CP, implementing preventative strategies, and improving the quality of care and outcomes for people with CP and their families in Saudi Arabia. Detailed case definitions, inclusion/exclusion criteria, and data collection protocols are discussed to ensure the integrity and comparability of the data. The plan also outlines strategic funding, institutional and government endorsement, sustainability considerations, potential challenges and proposed solutions, and expected outcomes and impact. These include creating research and educational opportunities, fostering regional and international collaborations, and significantly contributing to CP prevention strategies. Overcoming anticipated obstacles, such as stigma, institutional policies, and collaborations, and securing both necessary funding and endorsements are highlighted as critical for the success of the SCPR. The project is not only aligned with promote prevention of health risks, a target of Vision 2030 in Saudi Arabia, but is also expected to have a substantial impact on the health and quality of life of people with CP and their families in Saudi Arabia, serving as inspiration for similar efforts worldwide.

PMID: [38358616](#)

24. Can RESPIratory hospital Admissions in children with cerebral palsy be reduced? A feasibility randomised Controlled Trial pilot study protocol (RESP-ACT)

Rachael Marpole, A Marie Blackmore, Andrew C Wilson, Monica S Cooper, Julie Depiazzi, Katherine Langdon, Lisa

Moshovis, Elizabeth Geelhoed, Asha Bowen, Noula Gibson

BMJ Open. 2024 Feb 15;14(2):e076730. doi: 10.1136/bmjopen-2023-076730.

Introduction: The most common cause of morbidity and mortality in children with severe cerebral palsy (CP) is respiratory disease. BREATHE-CP (Better REspiratory and Airway Treatment and HEalth in Cerebral Palsy) is a multidisciplinary research team who have conducted research on the risk factors associated with CP respiratory disease, a systematic review on management and a Delphi study on the development of a consensus for the prevention and management of respiratory disease in CP. These strategies have not been investigated; therefore, it is not known if implementation is feasible, if they improve patient outcomes or if they are acceptable for families. **Methods and analysis:** Mixed-method feasibility pilot randomised controlled trial with economic analysis. Twenty children with CP aged 0-12 years who are at risk of respiratory disease will be followed up for 1 year. All children will receive baseline assessments for comparison. The control group will receive usual care from their treating teams. The intervention group will receive comprehensive assessments from physiotherapy, speech pathology and respiratory medicine. An individualised investigation and treatment plan will then be made. Participants in both groups will complete fortnightly patient-reported outcome surveys to assess symptoms and health service use. Analysis will include assessments of acceptability through qualitative interviews, implementation by ability to recruit, randomise and retain, practicality including costs of intervention and hospitalisation, and explore efficacy through quality-of-life surveys and decreased health service use for respiratory-related symptoms. **Ethics and dissemination:** Ethics and governance approvals have been obtained through Child and Adolescent Health Service Human Research Ethics Committee. At completion, this study will lead to the design of the definitive protocol to test intervention efficacy that maximises recruitment, retention and adherence to interventions. Trial registration number: Australian New Zealand Clinical Trials Registry (ACTRN12620000114943).

PMID: [38365293](#)

25. Late Neonatal Sepsis in Very-low-weight Premature Newborns Is Associated With Alterations in Neurodevelopment at Twenty-five Months of Age

Jose Uberos , Ana Nieto-Ruiz, Francisco Contreras Chova, Marta Carrasco-Solis, Aida Ruiz-López, Elisabeth Fernandez-Marín, Carolina Laynez-Rubio, Ana Campos-Martinez

Pediatr Infect Dis J. 2024 Feb 12. doi: 10.1097/INF.0000000000004262. Online ahead of print.

Aim: To evaluate the impact of late-onset sepsis (LOS) on the neurodevelopment of very-low-birth-weight (VLBW) premature infants. **Methods:** This is a retrospective cohort study of VLBW premature infants. The Mental Development Index (MDI) was determined for a population of 546 VLBW infants, at 14 and 25 months of age, and evaluated using the Bayley test. A history of meningitis or early neonatal sepsis was considered an exclusion criterion. The study parameters analyzed included perinatal variables, the development of neonatal comorbidities and a history of LOS. Multivariate linear regression and multinomial logistic regression analyses were performed. **Results:** LOS was observed in 115 newborns, among whom microbiological testing showed that 65.0% presented Gram-positive bacteria, with *Staphylococcus epidermidis* being responsible for 55.4%. There was a significant association between the 25-month MDI and a history of LOS. This represents a decrease of 7.9 points in the MDI evaluation of newborns with a history of LOS. The latter history is also associated with the following neurodevelopmental alternations: mild motor disorders [odds ratio (OR): 2.75; 95% confidence intervals (CI): 1.07-7.05], moderate cognitive delay (OR: 3.07; 95% CI: 1.17-8.00) and cerebral palsy (OR: 2.41; 95% CI: 1.09-5.35). **Conclusions:** In our study cohort, LOS was associated with alterations in neurodevelopment, including reduced MDI, together with motor and cognitive disorders and cerebral palsy. To improve neurodevelopmental outcomes in this group of newborns, neonatal intensive care unit personnel should focus attention on preventing hospital-acquired infections.

PMID: [38359341](#)

26. Characterization of environmental factors in children and adolescents with cerebral palsy in Minas Gerais: Participa Minas

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Rev Paul Pediatr. 2024 Feb 12;42:e2023043. doi: 10.1590/1984-0462/2024/42/2023043. eCollection 2024.

Objective: To characterize the environmental factors of children and adolescents with Cerebral Palsy (CP) in the state of Minas Gerais (MG), Brazil. **Methods:** This is a cross-sectional study involving 164 caregivers of children/adolescents with CP, aged 1-14 years. The Gross Motor Function Classification System (GMFCS) and the Manual Ability Classification System (MACS) were used to classify the participants' functioning, and environmental factors were evaluated by an on-line questionnaire that examined products and technologies, physical environment, services, and systems. A descriptive analysis was performed using percentage and frequency. **Results:** Most participants had bilateral CP (66.9%) and 45% of them were spastic. Levels II and V

of the GMFCS and MACS were the most frequent. About half (49.4%) used anticonvulsants, 27.4% underwent botulinum toxin application, and 29% went through orthopedic surgery in the lower limbs. Among the participants, 71.3% used orthoses in the lower limbs, and 51.8% used the public health care system. Most had access to physiotherapy (91.5%), but found difficulties to access interventions with other professionals, such as psychologists (28%) and nutritionists (37.8%). The school was the most frequently adapted environment (78%), and had the highest level of structural adaptation (42.7%). Conclusions: The results of this study suggest that the barriers to access health services and barriers to the physical environment may impact participation and social inclusion.

PMID: [38359317](#)

27. Physician Approaches to the Pharmacologic Treatment of Dystonia in Cerebral Palsy

Emma Lott, Darcy Fehlings, Rose Gelineau-Morel, Michael Krueer, Jonathan W Mink, Sruthi P Thomas, Steve Wisniewski, Bhooma Aravamathan

medRxiv. 2024 Feb 3:2024.02.01.24302121. doi: 10.1101/2024.02.01.24302121. Preprint

Objective: To determine how physicians approach pharmacologic dystonia treatment in people with CP and assess physician readiness to participate in a randomized trial comparing existing pharmacologic dystonia treatments. **Methods:** We administered a REDCap survey to physician members of the American Academy of Cerebral Palsy and Developmental Medicine and of the Child Neurology Society to assess which pharmacologic agents they use to treat dystonia in CP and their preferred indications and dosing. **Results:** Of 479 physicians surveyed, 240 (50%) responded. Respondents treated functionally limiting (95%) and generalized (57%) dystonia and most commonly used six medications: baclofen (95%), trihexyphenidyl (79%), gabapentin (67%), carbidopa/levodopa (55%), clonazepam (55%), and diazepam (54%). Baclofen was preferred in people with co-existing spasticity (81%), gabapentin was preferred in people with co-existing pain (49%), and trihexyphenidyl was avoided in people with constipation (34%) or urinary retention (42%). Preferred dosing regimens followed published regimens for dystonia, when available, but otherwise followed published regimens for other CP symptoms (spasticity and seizures). Baclofen was preferred by 64% of respondents as first line treatment, but there was no clear consensus on second or third-line medications. Most respondents (51%) were comfortable randomizing their patients to receive any of the six most commonly used medications used to treat dystonia in CP. **Conclusions:** This study summarizes current indications and dosing for the six most commonly used medications to treat dystonia in CP as per treating physicians in the US and Canada and also demonstrates physician support for a randomized trial comparing the effectiveness of these treatments.

PMID: [38352331](#)

28. Respiratory severity score and neurodevelopmental outcomes at age 3 years in extremely preterm infants

Kei Tamai, A Takeuchi, Makoto Nakamura, Naomi Matsumoto, Takashi Yorifuji, Misao Kageyama

Am J Perinatol. 2024 Feb 13. doi: 10.1055/a-2267-4719. Online ahead of print.

Objective: We aimed to examine the association between respiratory severity score (RSS, mean airway pressure \times fraction of inspired oxygen) and neurodevelopmental outcomes in extremely preterm infants. **Study design:** This was a single-center, retrospective cohort study. We analyzed data from extremely preterm infants who were admitted to the neonatal intensive care unit at Okayama Medical Center between 2010 and 2019. Infants without invasive respiratory management during the first day of life were excluded. The exposure variable was the highest RSS during the first day of life. RSS was categorized into two groups: low (<3.5) and high (≥ 3.5) RSS. The primary outcome was death or neurodevelopmental impairment at age 3 years, defined as cognitive impairment (developmental quotient <70) or the presence of cerebral palsy. Secondary outcomes were the components of the primary outcome. We conducted robust Poisson regression analyses to investigate the association between RSS category and primary and secondary outcomes, adjusting for perinatal confounders. **Results:** The cohort included 97 infants with neurodevelopmental data, of whom 34 and 63 infants were in the low- and high-RSS categories, respectively. The median (interquartile range) gestational age and birth weight were 26.0 (24.7-26.9) and 25.7 (24.6-26.7) weeks and 761 (584-866) and 806 (618-898) g for infants in the low- and high-RSS categories, respectively. Compared with infants in the low-RSS category, those in the high-RSS category had a greater risk of death or neurodevelopmental impairment at age 3 years (26.3% vs. 42.3%; adjusted risk ratio, 2.0; 95% confidence interval, 1.1-3.5) and neurodevelopmental impairment at age 3 years (17.6% vs. 28.6%; adjusted risk ratio, 2.7; 95% confidence interval, 1.3-5.9). **Conclusion:** High RSS (≥ 3.5) during the first day of life was associated with an increased risk of neurodevelopmental impairment at age 3 years in extremely preterm infants.

PMID: [38350642](#)

29. A reliable and cost-effective protocol for creating bilirubin cerebral palsy model in rhesus macaque

Yong Zhu, Yanan Xiong, Xiaoyan Xu, Jin Zhang, Haiyang Tong, Hongyi Yang, Xia Niu, Xiaming Shi, Jiulai Tang, Jinhua Li

J Med Primatol. 2024 Feb;53(1):e12691. doi: 10.1111/jmp.12691.

Background: Cerebral palsy is a severe motor disability in childhood that poses challenges for children, families, and society. Rhesus macaques are the preferred animals for cerebral palsy model, but surgical excision of motor cortex has low success rate and high cost. In this work, we created cerebral palsy rhesus macaque models by intrathecal injection of bilirubin. **Methods:** The puncture point for injection was identified as the intervertebral disc space two, located below the intersection of the iliac crest line and the posterior median line. **Results:** The models showed abnormal posture and increased muscle tension. Diffuse deposits of bilirubin were found in the basal ganglia from the magnetic resonance imaging. Pathological slides also revealed the presence of brain lesions, such as vacuole formation, contraction of neuronal nuclei, and deep staining of nuclei in the histopathological sections of the hippocampus and basal ganglia. **Conclusion:** The model's symptoms closely resemble those observed in humans with spastic cerebral palsy.

PMID: [38345330](#)