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Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

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Interventions and Management

1.Clinical Tools for Assessing One-Handed Skills in Children With Cerebral Palsy: An Umbrella Review

Samira Boroumand, Marzieh Pashmdarfard, Dorsa Hamedi, Afsoon Hassani Mehraban

Review Occup Ther Int . 2025 Jun 23:2025:8847527. doi: 10.1155/oti/8847527. eCollection 2025.

Abstract
Introduction: This study is aimed at identifying suitable tools capable of evaluating one-handed skills in children with cerebral palsy (CP). Methods: In this article, the systematic reviews on upper extremity assessment tools for children with CP from 2000 to 2024 were identified in databases, including Google Scholar, PubMed, Web of Knowledge, and Scopus. Then, the obtained tools were evaluated, among which only those capable of assessing one-handed skills in children aged 3 years and older in accordance with the activity level of the International Classification of Functioning, Disability, and Health were selected to evaluate the quality of evidence and psychometric properties in children with CP using CanChild Outcome Measure Rating Form. Results: A total of 13 systematic reviews were selected for further analysis. Subsequently, 149 tools were identified for initial evaluation, of which 18 were capable of assessing one-handed skills in children with CP. Among these, COPM, ACHES, and PMAL_R demonstrated excellent evidence for overall clinical utility. Conclusion: This study showed that among the numerous tools available for assessing one-handed skills in children with CP, only a limited number have excellent evidence for overall clinical utility. These findings can serve as a basis for selecting more precise, evidence-based tools in the assessment, and rehabilitation interventions for these children.
PMID: 40589571

2.Hand function after muscle transfer in spastic hemiparesis patients

Andrzej Grzegorzewski, Piotr Buchcic, Błażej Pruszczyński, Adam Kwapisz, Szymon Stec, Oliwer Sygacz, Julia Matuszewska, Łukasz Matuszewski

Ann Agric Environ Med . 2025 Jun 27;32(2):308-312. doi: 10.26444/aaem/206990. Epub 2025 Jun 17.

Introduction and objective: In spastic hemiparesis, upper extremity issues pose challenges for orthopaedic surgeons, neurologists, physiotherapists, and occupational therapists. Various interventions aim to decrease contractures, improve hand function, and enhance mobility. The aim of the study was evaluation of hand function after tendon transfer in spastic hemiparesis in cerebral palsy.
Material and methods: A retrospective review was performed of in- and outpatient charts (from 2006) across two centres: a referral facility for cerebral palsy and a paediatric orthopaedic clinic. Inclusion criteria was spastic hemiplegia of the upper limb, treated surgically with muscle transfer. Exclusion criteria were dystonia or other coordination disorders, bilateral involvement, or prior upper limb surgeries. Minimum follow-up - 2 years.
Results: Thirty patients (14 females, 16 males) met the criteria; mean surgery age - 11.5 years (range 10-15). All were GMFCS II or III and MACS 2 or 3, with extrinsic-type hands per Zancolli (14 group 1, 10 group 2a, 6 group 2b). All initially underwent ray plasty, FCU-to-ECRL transfer, and pronator teres release. Two had biceps lengthening; one had finger flexor myotomy. All reported self-perceived functional gains (e.g., improved grasp, pencil holding, self-feeding), verified by therapists. Hand and forearm alignment improved without MACS classification change; function according to Zancolli classification improved.
Conclusions: Muscle transfer surgery improved upper extremity position and function in spastic hemiplegic patients. The group for surgery has to be carefully selected. There is a need of standardization of reporting goals and outcomes in this selected population, as well as choosing the procedure required by an experienced team.
PMID: 40586512

3.Hip surveillance in children with cerebral palsy in the UK : history, challenges, and future directions

Katie Hughes, Stephen J Cooke, Daniel C Perry, Mark S Gaston

Review Bone Joint J . 2025 Jul 1;107-B(7):673-681. doi: 10.1302/0301-620X.107B7.BJJ-2025-0167.R1.

Abstract
Cerebral palsy (CP) is associated with musculoskeletal complications in children, notably hip migration, which can progress to hip dislocation and joint degeneration. Without regular radiological monitoring, early-stage hip migration can be missed, potentially leading to complex, high-risk operations later in life. Hip surveillance programmes, such as the Swedish Uppföljningsprogram för Cerebral Pares (CPUP) and UK-based Cerebral Palsy Integrated Pathway (CPIP) and CPIP Scotland (CPIPS), aim to identify and address hip pathology proactively through serial radiological and clinical assessments. This helps to standardize care, reduce the incidence of hip dislocation, and prevent the need for salvage procedures. In turn, this preserves hip function, reduces pain, and improves quality of life. These programmes are surveillance rather than screening, as they do not dictate treatment or alter the course of the disease, but have been shown to reduce the burden of hip pathology in population studies. Despite the proven benefits of hip surveillance, widespread adoption has been slow due to the challenges of funding, coordinating radiological assessments, ensuring timely radiological interpretation, and limited clinician resources. Challenges also persist in determining the optimal interventions for hip migration and in engaging patients, families, and clinicians in these processes. Recent advances in technology, including machine learning tools and smartphone applications, show promise in improving the efficiency and accuracy of hip surveillance. Additionally, prospective clinical research aims to improve our understanding of the optimal treatment strategies for hip migration. Overall, hip surveillance continues to evolve, with potential for ongoing improvements in care and long-term outcomes for children with CP.
PMID: 40588239

4.Validity and Reliability of Arch Height Index Measurement in Children With Spastic Diplegic Cerebral Palsy

Levent Karataş, Ayça Utkan Karasu, Murat Zinnuroğlu

Pediatr Phys Ther . 2025 Jun 30. doi: 10.1097/PEP.0000000000001218. Online ahead of print.

Purpose: To evaluate the validity and reliability of the Arch Height Index (AHI) in assessing the medial longitudinal arch (MLA) structure in children with spastic diplegic cerebral palsy (CP).
Methods: Twenty children with spastic diplegic cerebral palsy (CP), aged 5-18 years, were assessed. AHI measurements were taken in sitting and standing positions. Arch flexibility index (AFI) was calculated. Reliability was analyzed using intraclass correlation coefficients (ICC), and validity was evaluated by correlating AHI with clinical parameters.
Results: AHI measurements showed high interobserver reliability. AHI was significantly correlated with calcaneal pitch, navicular index, and Meary's angle. A lower AHI was associated with decreased gross motor function, greater hip adductor spasticity, and ankle eversion range of motion.
Conclusions: The AHI is a valid and reliable tool for assessing MLA in children with spastic diplegic CP. Lower arch height is associated with greater functional impairments.
PMID: 40608525

5.Knee functional calibration strengthens the relationship between lower limb bone morphology and hip rotation during gait

Morgan Sangeux, Rodolphe Bailly, Sylvain Brochard, Mathieu Lempereur

J Biomech . 2025 Jun 26:189:112833. doi: 10.1016/j.jbiomech.2025.112833. Online ahead of print.

Abstract
The position of the femur's greater trochanter is crucial to produce the required hip abduction moment during gait. Clinical parameters describing the shape of the femur, such as femoral neck anteversion and neck shaft angles, influence the lever-arm of abductor muscles. In children with cerebral palsy, abnormal lower limb bone shapes may impair function, highlighting the importance of clinical gait analysis for surgical decision. Here, we re-examined a dataset on the correlation between 3D lower limb bony morphology and hip rotation kinematics during gait. This study was a secondary analysis of a dataset from 121 children with cerebral palsy. 3D bony morphology was determined by a bi-planar, low dose, digital x-ray system and gait analysis utilised the conventional gait model with or without two functional knee calibration algorithms. The results indicated that functional calibration improved the variance explained by linear regression models between 3D bony morphology and the mean hip rotation during gait. Furthermore, femoral neck anteversion and neck shaft angles were now identified as significant predictors in the models. Despite differences between the functional algorithms, results of the associated regression models were similar. However, bony morphology alone did not fully explain hip rotation, suggesting other factors are involved. We noted limitations in functional calibration due to soft tissue artifacts and insufficient knee range of movement. Previous results on the relationship between bony morphology and gait may be revisited considering the findings of this study.
PMID: 40602165

6.Postoperative foot drop after gastrocsoleus lengthening in children with unilateral and bilateral cerebral palsy

Leonie P Bartsch, Axel Horsch, Marco Götze, Lara Petzinger, Sebastian I Wolf, Cornelia M Putz

Foot (Edinb) . 2025 Jun 27:64:102188. doi: 10.1016/j.foot.2025.102188. Online ahead of print.

Background: Equinus foot is a frequent deformity in children with cerebral palsy (CP). After calf-muscle lengthening surgery, foot drop is frequent and seems to occur mainly in unilateral CP cases. It remains unclear if this complication can be prevented with same-procedure transfer or shortening of dorsiflexor tendons.
Methods: Retrospective analysis of 167 ambulant children with unilateral and bilateral CP, GMFCS levels I to III, who received surgical calf-muscle lengthening. Pre- and postoperative 3D instrumented gait analysis and clinical examination data were reviewed.
Results: Stance and swing phase dorsiflexion improved in both groups. Postoperative mean swing phase dorsiflexion was significantly lower in unilaterally affected than in bilaterally affected children (median -6° vs. +1°, P < .001). The incidence of postoperative foot drop in unilaterally and bilaterally affected patients was 50 % and 16 %, respectively, with a significant group difference (P < .001). Tendon transfers did not lead to a lower rate of postoperative foot drop, but were performed in children with more severe preoperative findings.
Conclusion: Children with unilateral CP are at a higher risk of postoperative foot drop after calf muscle lengthening than the bilaterally affected. Although the range of motion improved postoperatively, tendon transfers did not improve active dorsiflexion in children with unilateral CP and could thus not prevent foot drop effectively. Due to these findings, prospective research with preoperative assessment of tendon-muscle function is needed in this field.
PMID: 40592203

7.Influence of crouch angle on lower-extremity kinetic gait profile and walk distance in children with cerebral palsy: a cross-sectional study

Rajani Mullerpatan, Triveni Shetty, Sailakshmi Ganesan, Ashok Johari

BMC Biomed Eng . 2025 Jul 1;7(1):7. doi: 10.1186/s42490-025-00093-5.

Background: Gait kinetics explains dynamics of gait deviations, which inform surgical and non-surgical clinical-decision-making to enhance walking performance of children with cerebral palsy. Kinetic gait profile of children with lesser crouch angle is known; however lower-extremity gait kinetics of ambulatory children at a further continuum of the spectrum with greater crouch angle is unclear. Therefore, present cross-sectional study evaluated influence of varying crouch angle on gait kinetics and walk distance.
Method: Following ethical approval and signed informed consent of parents, 3-D gait of 33 ambulatory children with CP(10.4 year) and 31 age-matched typically-developing children was studied to compute the magnitude and timing of lower-extremity external net joint moments and power during stance phase. An average of 3gait trials walked bare-feet at self-selected pace was considered for analyses. Walk distance was measured with 2-min walk test. Typically developing children were classified as Group I, children with mild crouch-angle (mean knee flexion angle during stance)[Formula: see text]16.80and ≤ 250 were classified as Group II(n = 17), whereas children with severe crouch-angle i.e.[Formula: see text] 250 throughout stance phase were classified as Group III(n = 16). Three groups were compared with one-way-ANOVA($p \leq 0.05$). Bonferroni adjustment was made for post-hoc analyses ($p \leq 0.01$).
Results: Gait speed, cadence and 2-minute walk distance decreased from Group I to II to III($p \leq 0.01$). Hip flexion, extension and adduction; knee flexion and ankle dorsiflexion moments were significantly different between three groups($p \leq 0.01$)). Rise in crouch-angle was associated with an increase in peak hip flexion moment and increase in power generated at hip and decrease in power generated at knee and ankle ($p \leq 0.01$). The timing of peak hip and knee moments during stance phase also differed across the 3 groups ($p \leq 0.01$) indicating a delay in the occurrence of peak hip flexion-extension; abduction-adduction and knee flexion moment with a rise in crouch angle.
Conclusion: Present findings inform lower-extremity joint kinetics during gait across the spectrum of mild to severe crouch angle with reference to typically-developing children. Precise knowledge of magnitude and pattern of net joint moments and power along with the timing of moments and decline in walking distance in children with severe crouch, can guide therapeutic interventions to restore the optimum dynamic lever arm function for improved walking performance.
Trial registration: CTRI registration no. CTRI/22/12/048524/27/12/2022. Trial registry: CTRI/22/12.
Trial registration number: 048524. Trial registration date: 27th December 2022.
PMID: 40588747

8.Transcranial direct current stimulation and motor function in children with cerebral palsy: A systematic review and meta-analysis

No authors listed

Dev Med Child Neurol . 2025 Jul 3. doi: 10.1111/dmcn.16407. Online ahead of print.

No abstract available
PMID: 40610218

9.Aquatic exercise for adolescents and adults with cerebral palsy: a mixed methods scoping review

Isabel Huf, Sze-Ee Soh, Prue Morgan

Review Disabil Rehabil . 2025 Jul 3:1-12. doi: 10.1080/09638288.2025.2523973. Online ahead of print.

Purpose: To identify characteristics of participants, intervention features and outcomes in studies examining aquatic exercise for adolescents and adults with cerebral palsy (CP).
Materials and methods: Four electronic databases were systematically searched on 15 August 2024. Studies that included people with a diagnosis of CP (mean age ≥15 years), and an intervention that involved an aquatic based activity were considered for inclusion. Quantitative and qualitative results were reported using narrative syntheses.
Results: Database searches yielded 299 studies of which 11 met inclusion criteria with 66 participants in total. Eight studies used a non-experimental quantitative design. Three studies included participants with greater disability (Gross Motor Function Classification System Level V); four studies included participants older than 30 years. Aquatic program components were variable. Reporting of parameters such as intensity, adverse events, and safety measures was generally poor. Participation outcomes were included in only three studies. No study formally gathered participant experiential data.
Conclusions: Aquatic programs for individuals with CP appear predominantly focused on younger people and those with mild to moderate disability. Poor reporting of program design has led to non-reproducible studies and inconsistent approaches to aquatic exercise for adolescents and adults with CP. Participant, carer, and clinician perspectives on aquatic programs remain unknown.
Plain language summary
Aquatic therapy, comprising a variety of exercise components, may be safe for adolescents and adults with cerebral palsy (CP).Few aquatic exercise programs including older adolescents and adults with CP, as well as those with more complex disability have been rigorously evaluated. Improved consistency in reporting of safety measures, adverse events, and program parameters (especially intensity) is required to build the evidence base for aquatic exercise in a CP population. Rehabilitation professionals should consider the use of participation outcomes, and evaluate participant, carer and clinician experiences to embrace a whole-of-person approach.
PMID: 40607697

10.Modified sports intervention for improving participation goals and activity competence in ambulant children with cerebral palsy: A randomized controlled trial

Ricardo R Sousa Junior, Georgina L Clutterbuck, Rafaela F Guimaraes, Mariane G Souza, Luana C Silva, F Virginia Wright, Ana Cristina R Camargos, Hércules R Leite

Dev Med Child Neurol . 2025 Jul 3. doi: 10.1111/dmcn.16393. Online ahead of print.

Aim: To evaluate the effectiveness of a modified sports intervention (Sports Stars Brazil) on leisure-time physical activity participation goals, motor skill performance and capacity, body functions, physical activity levels, physical literacy, and overall participation in ambulant children with cerebral palsy (CP).
Method: In this randomized controlled trial, 38 ambulant children with CP (21 males, 17 females; ages 6-12 years) were randomly assigned to either the intervention or control group. The intervention group participated in eight weekly 1-hour sessions of modified sports, focused on group-based motor skill training and introduction to popular Brazilian sports. The control group received their usual physical therapy. Outcomes were assessed at baseline, postintervention, and after 12 weeks. Linear mixed models were used for analysis.
Results: Sports Stars Brazil was more effective than usual care in improving leisure-time physical activity participation and motor performance, both postintervention and at follow-up. Groups showed similar outcomes in motor capacity, physical literacy, body functions, physical activity levels, and overall participation immediately postintervention. At 12-week follow-up, the Sports Stars group showed greater improvements in motor capacity and moderate to vigorous physical activity.
Interpretation: Sports Stars Brazil is a promising, low-cost intervention for promoting participation and motor skills in children with CP, particularly in low-resource settings.
PMID: 40605736

11.Pragmatic single center longitudinal study assessing radial extracorporeal shock wave therapy for patients with severe mental and physical disabilities

Tomoko Sakai, Masanobu Hirao, Yusuke Takashina, Akiko Yamamoto, Tsutomu Oishi

Sci Rep . 2025 Jul 2;15(1):22968. doi: 10.1038/s41598-025-06414-x.

Abstract
Patients with severe motor and intellectual disability (SMID) experience persistent spastic pain and severe malpositioning of the limbs, exacerbated by the lack of effective treatment for severe spastic palsy. This study (UMIN-CTR, UMIN000048842) aimed to evaluate the efficacy and safety of radial extracorporeal shock wave therapy (rESWT) for spastic palsy in these patients. rESWT was applied to the biceps brachii of 15 elbow joints with flexion pattern spastic palsy of Modified Ashworth Scale (MAS) grade 1+ or greater in 11 patients with SMID. The MAS score, elbow range of motion (ROM) and adverse events were monitored for up to 10 weeks. Electromyography signals at rest were recorded on 8 elbow joints. Following a single rESWT session, the spasticity of the elbow joint immediately decreased, the MAS score significantly decreased from 2 (range, 2-3) to 1 (range, 1-2), and the elbow ROM significantly increased by 10° (range, 0°-15°). Moreover, muscle activity decreased by 24% (range, 11-37%), being clinically meaningful in SMID. rESWT resulted in an immediate and clear improvement in the MAS score for approximately 8 weeks and in the elbow ROM, continuing even at 10 weeks. Our findings highlight rESWT as a non-invasive therapy for spastic palsy in patients with SMID.
PMID: 40594947

12.Lived Experiences of Individuals With Cerebral Palsy in "Inclusive" Physical Education

T N Kirk, Steven K Holland

Adapt Phys Activ Q . 2025 Jun 27:1-25. doi: 10.1123/apaq.2024-0197. Online ahead of print.

Abstract
This study sought to examine the lived experiences and subjective feelings of inclusion (i.e., feelings of belonging, acceptance, and value) among individuals with cerebral palsy in general physical education (PE) settings. Multimodal interviews were conducted to gather insights from speaking and nonspeaking participants. Three themes were constructed: (a) "A lot of the time I was left to figure out how to adapt things for myself": finding a role in PE; (b) "I float in between both worlds": ability and acceptance in PE; and (c) "If I had solely relied on K-12 experiences, I probably wouldn't be very active today": lost opportunities for physical literacy. Findings highlight the physical, mobility, and interpersonal negotiations that individuals with cerebral palsy undertake to participate meaningfully in PE and lifelong physical activity. Finally, the use of multimodal interviews resulted in a greater variety of participants and richer experiential accounts that may have been excluded by a traditional interview format.
PMID: 40581353

13.Higher Than Expected Residual Volumes of Intrathecal Baclofen - A Brief Report

Ingrid Sutherland, Giuliana Antolovich, Lillian Stagoll, Alison Wray, Sarah Loveday, Monica S Cooper

Dev Neurorehabil . 2025 Jul 4:1-4. doi: 10.1080/17518423.2025.2526355. Online ahead of print.

Abstract
Intrathecal baclofen (ITB) pumps deliver baclofen effectively, but pump or catheter failures can have severe consequences. Early identification of dysfunction is crucial. In our retrospective single-site study, we evaluated whether the calculated residual baclofen volume discrepancies of -15% to -25% at routine ITB pump refills may indicate catheter dysfunction. We assessed 14 patients (11 males) undergoing 56 ITB pump refills over 12 months. One patient averaged errors of -17% over six refills and subsequently presented in acute baclofen withdrawal. Our findings suggest that volume discrepancies greater than -15% could warrant a high index of suspicion for ITB catheter or pump issues.
PMID: 40613698

14.Pain in adults with cerebral palsy: A systematic review
No authors listed

Dev Med Child Neurol . 2025 Jul 3. doi: 10.1111/dmcn.16404. Online ahead of print.

No abstract available
PMID: 40610039

15.The Impact of Parafunctional Habits on Orthodontic Malocclusions in Children With Cerebral Palsy

Esra Tunalı, Şeniz Karaçay, Arda Tabancalı, Büşra Seda İmamoğlu, Ersin Yıldırım, Turgay Arık

Child Care Health Dev . 2025 Jul;51(4):e70131. doi: 10.1111/cch.70131.

Background: This study aimed to investigate the correlation between orthodontic malocclusion and parafunctional habits, including atypical swallowing, mouth breathing and drooling, in children with cerebral palsy (CP).
Methods: Fifty-one children with CP (ages 6-14) from the Spastic Children Foundation were assessed. Drooling, lip incompetence and malocclusion were evaluated using the Balasco and Ballard methods, Angle Classification and WHO standards. Soft tissue relations, facial type, profile and face ratios were examined via extraoral assessment and photo analysis. Fisher's exact test was used for statistical analysis.
Results: Among the children, 47% had lip incompetence, 57% exhibited mouth breathing, 63% had atypical swallowing and 66% showed increased overjet. Malocclusion findings included 45% with Class II molar relationships and 66% with parafunctional habits. A significant relationship was found between parafunctional habits and orthodontic malocclusion ($p < 0.05$).
Conclusion: A high prevalence of parafunctional habits was observed in children with CP, significantly correlating with orthodontic issues. Early preventive and interceptive orthodontic treatment before the growth phase is essential to improve swallowing, chewing, respiratory function and nutritional intake, ultimately enhancing overall quality of life.
Summary: Parafunctional habits are highly prevalent in children with cerebral palsy. These habits are significantly associated with the development of malocclusion and craniofacial morphology. Complex tongue thrust, mouth breathing and severe drooling are strongly linked to skeletal and dental anomalies. Early multidisciplinary follow-up and preventive orthodontic approaches can reduce long-term complications. Swallowing patterns, respiratory types and oral motor functions should be evaluated together in clinical assessment and treatment planning.
PMID: 40592466

16.Computer-assisted rehabilitation system in the use of motor function recovery: A protocol for scoping review

Jun Fan, Xuqiang Wei, Yue Yao, Yibang Jiang, Cankun Xin, Ling Feng

PLoS One . 2025 Jul 1;20(7):e0326865. doi: 10.1371/journal.pone.0326865. eCollection 2025.

Backgrounds: Motor dysfunction, a prevalent sequela of neurological disorders such as stroke, Parkinson's disease, and cerebral palsy, profoundly compromises patients' capacity to perform daily activities and participate in social interactions. To address this challenge, computer-assisted rehabilitation systems (CARS) have emerged as innovative tools for facilitating motor function recovery. However, the rapid proliferation of diverse CARS modalities-encompassing novel technical approaches, interdisciplinary integrations, and heterogeneous clinical applications-has resulted in a fragmented and poorly delineated research landscape. This scoping review protocol aims to systematically map the current evidence, clarify conceptual boundaries, identify key research themes, and highlight critical knowledge gaps within the CARS field.
Methods: Following PRISMA-ScR guidelines, a comprehensive search across English (PubMed, Embase, Web of Science) and Chinese (CNKI, Wanfang, VIP, SinoMed) databases (inception to May 2025) will retrieve peer-reviewed studies using controlled vocabulary (MeSH: Rehabilitation/methods) and keywords ("computer-assisted rehabilitation system*"). After deduplication (EndNote X9) and manual verification, two reviewers will independently screen titles/abstracts and full texts, resolving discrepancies via third-party arbitration. Data extraction will categorize studies into study characteristics (design, population), technical specifications (sensors, AI), and clinical contexts (outcome measures, motor domains). Quantitative synthesis will map publication trends, geographic distributions, and methodological profiles using PRISMA diagrams and heatmaps. Thematic analysis will identify dominant research clusters (e.g., robotics, VR) and interdisciplinary linkages. Results will be disseminated via interactive evidence maps and narrative summaries emphasizing clinical translation. Any protocol deviations will be explicitly documented to ensure methodological transparency.
Discussion: This review will synthesize the heterogeneous CARS field into a structured framework, guiding future research prioritization and clinical implementation. By delineating technical innovations, clinical efficacy, and knowledge gaps, findings aim to optimize rehabilitation strategies for neurological populations. Detail of this review project can be found in Open Science Framework: https://doi.org/10.17605/OSF.IO/HXDT8.
PMID: 40591567

17.Fully automated measurement of paediatric cerebral palsy pelvic radiographs with BoneFinder : external validation using a national surveillance database

Katie Hughes, Jessenka Luzar, Jonathan Lang, Daniel C Perry, Mark S Gaston

Bone Joint J . 2025 Jul 1;107-B(7):752-760. doi: 10.1302/0301-620X.107B7.BJJ-2024-1575.R1.

Aims: BoneFinder is a machine-learning tool that can automatically calculate Reimers migration percentage (RMP) and head-shaft angle (HSA) from paediatric cerebral palsy (CP) pelvic radiographs. This study's primary aim was to compare BoneFinder's fully automated measurements to manual measurements made by clinicians and HipScreen-assisted measurements made by clinicians.
Methods: Using the radiological database within Cerebral Palsy Integrated Care Pathway Scotland (CPIPS), BoneFinder's automatic RMP and HSA measurements were compared across the same set of radiographs to: routine manual measurements performed by clinical experts from the CPIPS database; additional manual measurements performed by two clinicians; and measurements performed by the same two clinicians using the smartphone application HipScreen.
Results: A total of 509 anteroposterior pelvic radiographs (1,018 hips; mean age 7.4 years (1 to 17)) were selected at random from the CPIPS database. Gross Motor Function Classification System levels were I (n = 69), II (n = 37), III (n = 97), IV (n = 120), and V (n = 186). The mean absolute difference (MAD) in RMP between BoneFinder and CPIPS measurements, manual measurements, and HipScreen was 7.6% (SD 10.0%), 5.5% (SD 9.1%), and 5.8% (SD 9.2%), respectively. Interobserver reliability of RMP measurement across all methods was excellent (intraclass correlation coefficient (ICC) 0.89 (95% CI 0.87 to 0.91); $p < 0.001$). Good ICC was found between BoneFinder and CPIPS measurements (ICC 0.80 (95% CI 0.65 to 0.87); $p < 0.001$). The area under the receiver operating characteristic curve for BoneFinder's ability to detect a hip with a RMP ≥ 30%/40%/50% was 0.95/0.97/0.98, respectively. ICC of HSA measurement across all raters was moderate (ICC 0.72 (95% CI 0.67 to 0.76); $p < 0.001$). Image artefact was present in 138 of 1,018 hips (14%). In these images, MAD increased and ICC decreased for both RMP and HSA measurement between BoneFinder and CPIPS, indicating a decline in agreement.
Conclusion: Fully automated RMP and HSA measurements using BoneFinder were highly reliable with clinically acceptable measurement error. Further refinement of BoneFinder is required for analysis of radiographs with artefact.
PMID: 40588249

18.Joystick-Operated Ride-On Toys as a Therapy Adjunct for a Child With Hemiplegia: A Case Report

Sudha Srinivasan, Vaishnavi Shahane, Patrick Kumavor, Kristin Morgan, Kathleen Friel

Case Reports Pediatr Phys Ther . 2025 Jul 1;37(3):371-379. doi: 10.1097/PEP.0000000000001209. Epub 2025 Jun 27.

Purpose: This case report describes the feasibility, acceptance, and satisfaction associated with community-based implementation of a novel upper extremity (UE) training program using a joystick-operated powered ride-on toy with an 8-year -old male child with unilateral cerebral palsy(UCP).
Summary of key points: The 8-session, 1 month training program was feasible to implement in collaboration with the child's caregiver, was enjoyable and well-accepted by the child and his caregiver and associated with improvements in the child's affected UE motor function on participant-report and video-based measures.
Conclusion and recommendations for clinical practice: Ride-on toys are versatile, easy-to-operate, family-friendly tools that can be used across a variety of naturalistic settings. Intervention programs using joystick-operated ride-on toys may be used to create intrinsically motivating training opportunities to encourage children with UCP to spontaneously use their affected UE for task-oriented sensorimotor exploration of their physical environment and improve movement control in the affected UE.
PMID: 40587602

19.Implementation Fidelity of a Smartphone Application for Population-Based General Movement Assessment: the Early Moves Study

Caroline F Alexander, Sarah E Hall, Alison Salt, Alicia Spittle, Catherine Morgan, Tiffany Grisbrook, Alishum Ali, Natasha Amery, Sue-Anne Davidson, Ashleigh Thornton, Mary Sharp, Emily Young, Robert S Ware, Desiree Silva, Roslyn Ward, Nadia Badawi, Samudragupta Bora, Roslyn N Boyd, Susan Woolfenden, Catherine Elliott, Jane Valentine

J Pediatr . 2025 Jun 26:114710. doi: 10.1016/j.jpeds.2025.114710. Online ahead of print.

Objectives: To describe the infant and maternal characteristics of the Early Moves cohort and to assess representativeness to the general population, and to evaluate the implementation fidelity of an application-based collection of General Movement Assessment (GMA) videos at writhing and fidgety age.
Study design: Prospective observational study. Mothers who had recently delivered or were enrolled to deliver at maternity hospitals in Perth, Western Australia, were recruited from November 2019 to December 2023. Sociodemographic and infant clinical characteristics were extracted from hospital records. Parents were invited to record GMA videos using the Baby Moves smartphone app, which were assessed for scorability by certified GM assessors.
Results: 3,002 infants (mean gestation, 38.9 ± 1.7 weeks; 46.6% female) were recruited. Infants were representative of the local population with respect to key infant risk factors, although mothers were more likely to be Caucasian and reside in higher socioeconomic suburbs compared with Perth metropolitan births. Overall adherence was 76%, with 2,272 families returning at least one scorable GMA video, with the majority (>69%) requiring personalized reminders to upload. Risk factors for nonengagement were infant prematurity, special care nursery stay, low maternal age, low socioeconomic status, minority ethnicity, and single caregiver mothers.
Conclusions: Inclusive recruitment strategies and broad inclusion criteria supported participation from diverse sociodemographic groups and infants representative of the local population on key medical risk factors. Parent-recorded GMA can be implemented in a large population-based cohort, though app-based notifications alone may be insufficient to facilitate engagement. Population-based applications should ensure targeted implementation strategies to support priority families.
PMID: 40581097

20.Impact of the Akwenda Intervention Program for cerebral palsy on caregiver-perceived burden, stress, and psychosocial functioning: A cluster-randomized trial in Uganda

No authors listed

Dev Med Child Neurol . 2025 Jul 3. doi: 10.1111/dmcn.16406. Online ahead of print.
No abstract available
PMID: 40610200

21.Incidence, subtypes and severity of cerebral palsy in infants born extremely preterm in Switzerland: A retrospective study comparing two time periods

Lara Quinten, Giancarlo Natalucci, Mark Adams, Cristina Borradori-Tolsa, Myriam Bickle-Graz, Sebastian Grunt; Swiss Neonatal Network and Follow-up Group

Early Hum Dev . 2025 Jun 26:209:106328. doi: 10.1016/j.earlhumdev.2025.106328. Online ahead of print.

Background: In 2011, the Swiss Society of Neonatology issued new guidelines for the care of preterm infants at the limit of viability leading to higher survival of infants born <28 weeks of gestation. It is unclear whether and how these recommendations affected the prevalence and severity of cerebral palsy (CP).
Objective: To investigate whether the prevalence, severity, and subtypes of CP in extremely preterm infants differ in two successive birth cohorts.
Methods: Retrospective, population-based analysis of prospectively collected data on infants born <28 weeks of gestation. CP prevalence, subtypes (Surveillance of cerebral palsy in Europe - SCPE classification), and severity (Gross Motor Function Classification System - GMFCS) assessed at 2 years corrected were compared between the two birth cohorts (2006-2011 and 2012-2017).
Results: Of 3244 registered infants, 2090 survived, of whom 1764 were followed up (84 %). Mortality was 38 % for the first period and 33 % for the second (p = 0.003) and 112 were diagnosed with CP. CP prevalence was 34.5 per 1000 live births (37.0 for 2006-2011 and 32.4 for birth-years 2012-2017, p = 0.476). A trend towards more bilateral spastic CP (2006-2011: 32 % and 2012-2017: 50 %, p = 0.055) and more severe cases (2006-2011: 14.3 % and 2012-2017: 24.9 %, p = 0.154) was observed in the second period. CP severity was associated with cystic periventricular leukomalacia (PVL) (OR 3.4, 95 %-CI 1.1-10.3, p = 0.033) and necrotizing enterocolitis (NEC) (OR 5.5, 95 % CI 1.2-25.1, p = 0.028) but not with other neonatal morbidities.
Conclusion: These results suggest that the greater number of bilateral forms and severe cases of CP could be due to the higher number of surviving infants in the 2011-2017 cohort. PVL and NEC are the factors mostly associated with severe cases of CP in Switzerland.
PMID: 40609377

22.Trying to be an Early BIRD: An exploration of factors impacting British Columbia's intervention referral and diagnosis of cerebral palsy

Taylor McIntosh, Vivian Wong, Akshdeep Sandhu, Mor Cohen-Eilig, Ram Mishaal

Paediatr Child Health . 2024 Nov 15;30(3):134-139. doi: 10.1093/pch/pxae076. eCollection 2025 Jun.

Objectives: To identify the average age of cerebral palsy (CP) diagnosis and referral for intervention services in British Columbia (BC) and explore key factors that may impact these outcomes.
Methods: This study is a retrospective analysis of the Canadian CP Registry in BC between 2012 and 2021 (n = 187). Chart review recovered additional data on the ages of diagnosis and referral for intervention. The influence of clinical and demographic variables on the two outcomes were explored: Gross Motor Function Classification System (GMFCS) level, presence of non-motor disability, hallmark risk factors for CP, and ethnicity.
Results: The mean age of CP diagnosis in the cohort was 25 months (standard deviation [SD]: 18), and the mean age of referral for intervention services was 3.8 months (SD: 4.6). A child at GMFCS level V was, on average, diagnosed 25.6 months earlier than a child with GMFCS level I (confidence interval [CI]: -39.625, -11.588, P = 0.001). GMFCS was not found to have a similarly high level of association with the age of referral for intervention. Ethnicity and the presence of non-motor disability did not have notable associations for either outcome. Children with hallmark risk factors were referred 7.5 months earlier than those without (CI: -11.4, -3.61, P < 0.005).
Conclusions: GMFCS level is the most significant predictor of an early or late CP diagnosis. This may encourage increased education and resource efforts being placed towards early diagnosis of children with lower GMFCS levels. This project hopes to act as a starting point for further research efforts into facilitating early diagnosis within BC and Canada.
PMID: 40599660

23.Caregiver quality of life and perceptions on feeding children with cerebral palsy: experience from Sri Lanka

Sac Dalpatadu, A A Rodrigo, Kcs Dalpatadu

BMC Pediatr . 2025 Jul 1;25(1):481. doi: 10.1186/s12887-025-05852-w.

Abstract
Undernutrition is a common consequence of feeding difficulties in children with Cerebral Palsy (CP). Parental perceptions and their Quality-of-Life (QoL) play a role in above concerns. Understanding this link is crucial for designing effective family-centered interventions, in order to overcome the challenges in nutritional and developmental outcomes and to improve emotional and psychological well-being of the caregivers. This study explores the linkage between the nutritional status of children with CP, caregiver perceptions of feeding concerns, and caregiver QoL. An analytical cross-sectional study was conducted in a Sri Lankan tertiary care setting, using an interviewer-administered questionnaire including clinical diagnoses, PedsQL tool and caregiver perceptions. Convenience sampling method was used. Statistical analysis included Pearson chi-square tests and ANOVA. Among 226 participants, 50% of children under 5 had Severe or Moderate Acute Malnutrition (SAM + MAM), and 41.2% aged 5–19 were underweight. Children with severe CP showed higher undernutrition rates. Most caregivers of undernourished children did not find feeding challenging and believed their children consumed adequate calories. Caregivers did not approve of non-oral feeding methods. Caregiver QoL was impacted by severity of CP ($F = 10.4$, $p < 0.05$), but not the child's nutritional status ($F = 0.58$, $p > 0.05$). Caregiver education and support appear fundamental in improving the nutritional status of children with cerebral palsy.
PMID: 40598004

24.Rationale and protocol for a longitudinal cohort study of children with cerebral palsy in China assessing functional developmental trends, genetic aetiology and imaging

Tingting Peng Sr, Tingting Peng Jr, Jinling Li, Zhaoyao He, Jie Luo, Yuan Zhang, Qingfen Hou, Danxia Fan, Mengru Zhong, Yage Zhang, Rongji Liao, Jingbo Zhang, Hongyu Zhou, Liru Liu, Yun Zheng, Ting Gao, Lu He, Hongmei Tang, Jing Zhang, Fan Wu, Lei Pi, Jinhua Lu, Hongsheng Liu, Wenhao Zhou, Kaishou Xu

BMJ Open . 2025 Jul 1;15(7):e086833. doi: 10.1136/bmjopen-2024-086833.

Introduction: Cerebral palsy (CP), the most common physical disability in children, imposes substantial economic and psychological burdens on families and society. The clinical management of CP remains challenging due to the limited efficacy of current treatments and the heterogeneity of its aetiologies and clinical presentations. This study aims to investigate the functional changes and identify influencing factors in Chinese children with CP. Through analysis of neuroimaging and genetic data, this study seeks to inform the development of preventive and therapeutic strategies and guide healthcare decision-making for this population.
Methods and analysis: This prospective cohort study aims to recruit 2051 children with CP across China. Baseline data will include demographic and clinical characteristics. Participants will undergo comprehensive assessments, including motor, cognitive, language, social, behavioural, nutritional, pain, sleep and quality-of-life domains, with regular follow-up evaluations. Trio whole-exome sequencing and detailed neuroimaging and musculoskeletal imaging will also be performed. This study will also assess caregivers' quality of life and emotional burden. Mendelian randomisation will be adopted to evaluate genetic contributions to functional outcomes and their causal relationship with health metrics. Analytical methods will include correlation analysis, logistic regression (binary and multivariate), linear and non-linear mixed-effects models and structural equation modelling.
Ethics and dissemination: Ethics approval was granted by the Research Ethics Committee of Guangzhou Women and Children's Medical Center (No.2023-346A01). All study procedures will adhere to the approved protocol. Study findings will be disseminated through peer-reviewed publications and conference presentations.
Trial registration number: ChiCTR2300079017.
PMID: 40592745

25.Facilitators and barriers to the adherence of physiotherapy clinic attendance and home programme by caregivers of children with cerebral palsy in Blantyre, Malawi

Promise Mtima-Jere, Shadreck Msowoya, Violet Chinyamu, Triza Kanduku, Rebecca Turkel, Anderson Mughogho

Dev Neurorehabil . 2025 Jun 30:1-8. doi: 10.1080/17518423.2025.2526356. Online ahead of print.

Introduction: Impairments caused by cerebral palsy (CP) restrict participation and function in activities of daily living (ADL) that leave children with CP vulnerable and dependent on others to perform basic daily needs.
Method: The study explored caregivers' perceived barriers and facilitators to attending CP clinic sessions at Queen Elizabeth Central Hospital (QECH) and Feed the Children and completing a home exercise programme in Blantyre, Malawi, using qualitative descriptive research.
Results: Facilitators included issues relating to (1) religious factors, (2) positive change in the child's condition, and (3) the support that the therapist provided. The major themes perceived as barriers included (1) poor economic status, (2) lack of time, (3) lack of family support, and (4) discrimination.
Conclusion: We have identified several strategies to improve physiotherapy support for caregivers of children with cerebral palsy in Blantyre, Malawi. Therapists should establish rapport and motivate caregivers, and the government should expand the rehabilitation workforce and implement community advocacy programmes that reduce stigma.
PMID: 40588440

26.Attitudes of parents of children with rare neurological disorders towards clinical genetic testing

Kamran Salayev, Ulviyya Guliyeva, Sugra Guliyeva, Rauan Kaiyrzhanov, Ulviyya Aslanova, Narmin Hajiyeva, Henry Houlden, Kerim Munir

J Community Genet . 2025 Jul 4. doi: 10.1007/s12687-025-00815-1. Online ahead of print.

Abstract
To study attitudes among parents of probands with rare pediatric-onset neurological and neurodevelopmental disorders on Clinical Genetic Testing (CGT). We administered an 8-item direct structured questionnaire comprising statements regarding attitudes on CGT to 101 consenting parents of probands enrolled in the University College London (UCL) Central Asia and Transcaucasia Disease Diversity Project. The probands comprised pediatric-onset diseases that included cerebral palsy, epilepsy, severe physical, language, and intellectual developmental delays, and autism spectrum symptoms in children with rare neurological disorders. We studied correlations between parents' opinions and demographic and clinical characteristics. The majority of parents (82.1-91.9%) agreed on statements reflecting the positive effects of CGT (causal explanation, research support, treatment relevance, recurrence prevention, and family planning). The opinions on the negative effects (discrimination, parental concern, and family conflicts) were less uniform. A higher educational level of parents was negatively correlated with agreement on statements about causal explanation, research support, and family planning ($p < 0.05$). Individual concurrent symptoms (severe language delay, epilepsy, autism, and microcephaly) correlated with several statements ($p < 0.05$). Parents showed positive attitudes toward clinical genetic testing. Parents' educational level was the most significant factor influencing their opinions. The spectrum and severity of clinical symptoms may shape the attitudes of the parents toward individual aspects of CGT.
PMID: 40613954

27.Life expectancy in cerebral palsy: Has the improvement continued?

Tom Zhang, Jordan C Brooks, Robert M Shavelle, David J Strauss

Dev Med Child Neurol . 2025 Jul 3. doi: 10.1111/dmcn.16410. Online ahead of print.

No abstract available
PMID: 40610043

28.Socio-Emotional Development in Young Children With Cerebral Palsy: A Scoping Review

Julie Enkebølle Hansen, Laura Lærkegård Støve, Mette Skovgaard Væver, Katrine Røhder

Review Child Care Health Dev . 2025 Jul;51(4):e70130. doi: 10.1111/cch.70130.

Background: Cerebral palsy (CP) is the most common physical disability in childhood, yet research on the socio-emotional development of young children with or at high risk of CP remains limited. The aim of the study is to describe how socio-emotional development has been investigated in young children diagnosed with or at high risk of CP and identify knowledge gaps and areas for future research.
Methods: A scoping review based on a systematic search of PsycInfo, PubMed and Web of Science including studies on children aged 0-6:11 years diagnosed with or at high risk of CP, examining socio-emotional development. No restrictions on publication year or language were applied. Data were extracted following PRISMA guidelines for scoping reviews.
Results: Twenty-five studies, representing 1914 toddlers and preschool children, were included. No studies exclusively examined infants. Most studies were cross-sectional (68%) and used parent-reported data (76%). The most commonly investigated areas of socio-emotional development were expressing negative emotionality, engagement in peer relationships and exploratory behaviour. Less optimal socio-emotional development was frequently reported, with prevalence estimates ranging from 14% to 65%. Socio-emotional difficulties were associated with severity of child motor disability, child delayed language abilities and parenting difficulties.
Conclusion: This review identifies conceptual and methodological limitations in studies of socio-emotional development in young children with CP. Future research should include infants from a diverse range of geographical and cultural contexts, utilize observational or multi-informant methods, investigate positive emotionality and parent-child relationships and adopt longitudinal designs to better capture if and how CP may impact socio-emotional development in early childhood.
PMID: 40605235

29.The relationship between emotion regulation and activity performance and quality of life in adolescents with cerebral palsy

Ayşe Göktaş, Esma Özkan

Dev Neurorehabil . 2025 Jul 2:1-12. doi: 10.1080/17518423.2025.2526358. Online ahead of print.

Purpose: Emotional and activity difficulties may affect adolescents' daily lives with cerebral palsy (CP). Therefore, it is important to evaluate factors associated with emotion regulation in adolescents with CP. This study aims to determine how adolescents with CP use emotion regulation strategies during their interactions and to examine the relationship between emotion regulation, activity performance, and quality of life.
Methods: The data was obtained using the Regulation of Emotions Questionnaire (REQ), The Pediatric Quality of Life Inventory (PedsQL), and the Canadian Occupational Performance Measure (COPM). The relationship between the scale scores was tested using the Spearman correlation coefficient.
Results: A significant relationship was found between internal functional emotion regulation and activity performance ($p < .05$), as well as between emotion regulation and quality of life ($p < .05$).
Conclusions: These results indicated that adolescents' activity performance and quality of life with CP were associated with emotion regulation skills. It is very beneficial for occupational therapists to consider emotion regulation skills to improve activity performance and adolescents' quality of life with CP.
PMID: 40600573

30.The functional near infrared spectroscopy applications in children with developmental diseases: a review

Jing Wang, Zhuo Zou, Haoyu Huang, Jinting Wu, Xianzhao Wei, Shuyue Yin, Yingjuan Chen, Yun Liu

Review Front Neurol . 2025 Jun 17:16:1495138. doi: 10.3389/fneur.2025.1495138. eCollection 2025.

Abstract
This review provides a comprehensive synthesis of the application of functional near-infrared spectroscopy (fNIRS) in pediatric developmental disorders, with a particular emphasis on its potential for clinical translation. fNIRS is a portable and non-invasive brain imaging technique that detects the relative concentration changes of oxyhemoglobin (HbO2), deoxyhemoglobin (HbR), and total hemoglobin in the cerebral cortex. These measurements effectively reflect cortical activation, making fNIRS a valuable tool in the field of pediatric neurodevelopmental research. The inherent resistance of fNIRS to interference, coupled with its adaptability to naturalistic settings, renders it particularly well-suited for pediatric populations. In this context, we undertook a meticulous and comprehensive literature search, employing predefined strategies and stringent inclusion/exclusion criteria (which are elaborated upon in the text). Our aim was to identify and review fNIRS studies across a wide range of developmental disorders. These disorders encompass cerebral palsy (CP), autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), conditions related to preterm infants, hypoxic-ischemic encephalopathy (HIE), and idiopathic language disorders. Our synthesis uncovers distinct hemodynamic patterns associated with specific developmental disorders. For example, autism spectrum disorder (ASD) is marked by atypical activation within social brain networks, whereas attention deficit hyperactivity disorder (ADHD) is characterized by diminished activation in the prefrontal cortex. These findings not only shed light on the neurophysiological foundations of these disorders but also highlight the potential of fNIRS as a diagnostic biomarker. This review aims to inform the clinical application of fNIRS by providing a critical evaluation of its mechanistic insights and potential clinical pathways, thereby advancing its role in the diagnosis and management of developmental disorders.
PMID: 40599736

31.Metabolomics analysis of children with spastic cerebral palsy: a case-control study

Özlem Tezol, Sıddika Songül Yalçın, Tuba Reçber, Anıl Yirün, Aylin Balcı Özyurt, Çetin Okuyaz, Pınar Erkekoğlu, Emirhan Nemutlu

BMC Pediatr. 2025 Jul 2;25(1):494. doi: 10.1186/s12887-025-05828-w.

Background: Spasticity, pain, fatigue and other secondary consequences of spastic CP may lead to metabolic alterations. The aim of this study was to analyze the plasma metabolomic profiles of children with spastic CP and compare these with typically developing controls.
Methods: This case-control study (n = 50 for CP and n = 55 for control) was conducted between September 2020 and November 2020 at Mersin University Hospital. Three to ten year old patients with spastic CP and age- and sex-matched typically developing controls were included in the study. Data on anthropometric measurements and clinical profiles were collected. Plasma samples were obtained for non-targeted metabolomics. The GC-MS based metabolomics analysis was performed. Metaboanalyst software was used for multivariate analyses, principal component analysis and pathway analyses.
Results: Spastic quadriplegia, spastic diplegia and spastic hemiplegia were found in 26 (52%), 14 (28%) and 10 (20%) patients, respectively, and 31 patients (62%) were non-ambulant. Twenty-two patients (44%) had epilepsy and antiepileptic use. Mean weight-for-age, height-for- age, and body mass index z-scores were significantly lower in the CP group ($p < 0.05$). Total 224 metabolites were detected in all subjects. Of these metabolites, 14 were detected at higher and 37 at lower levels in the CP group compared to the control group. The most significant changes in the CP group were found in aminoacyl-tRNA biosynthesis, tyrosine metabolism, valine, leucine and isoleucine biosynthesis, alanine, aspartate and glutamate metabolism, arginine and proline metabolism, citrate cycle (TCA cycle), galactose metabolism and glutathione metabolism. Forty-five metabolites were statistically significant between control, CP with epilepsy and CP without epilepsy groups. Thirty-four metabolites were statistically significant between control, ambulant CP and non-ambulant CP groups.
Conclusion: Plasma of spastic CP children was associated with alterations in energy metabolism and protein synthesis and amino acid metabolism compared to typically developing children. Gross motor functional level and accompanying epilepsy may also alter the metabolite profiles.
PMID: 40596988

32.Genetic susceptibility to cerebral palsy involves complement system-mediated neuronal development and plasticity pathway

Huang Kun, Qi Zhou, Hao Wu, Dejiang Yang, Chongyu Xiong, Xiaowei Zhang

Sci Rep . 2025 Jul 2;15(1):23088. Doi: 10.1038/s41598-025-07178-0.

Abstract
Cerebral palsy (CP) is a complex neurological disorder characterized by motor and postural impairments, often stemming from prenatal or perinatal brain injury. Despite extensive research, the precise genetic mechanisms underlying CP remain elusive. Here, we employed genome-wide Summary-data based MR (SMR) and Mendelian randomization (MR) analysis to investigate the potential causal role of genes within the complement system in neuronal development and plasticity (CSNDP) pathway in CP pathogenesis. Leveraging summary-level data from large-scale GWAS and quantitative trait locus (QTL) studies, we assessed the associations of CSNDP-related gene expression, DNA methylation, and protein abundance with CP susceptibility. Our analysis identified several putatively causal genes associated with CP risk, including CX3CL1 and TYRO3, both implicated in neuroinflammation and synaptic modulation. Colocalization analysis provided strong evidence for shared genetic variants driving the association of CX3CL1 and TYRO3 with CP risk. Furthermore, druggability assessment revealed the potential therapeutic targets of CX3CL1 and TYRO3, supporting their relevance in CP treatment strategies. Phenome-wide association studies demonstrated no significant adverse effects of drugs targeting CX3CL1 and TYRO3 on other disease traits, suggesting their safety profile. Our findings shed light on the molecular underpinnings of CP and highlight the potential of targeted interventions within the CSNDP pathway.
PMID: 40594558

Prevention and Cure

33.Early Neurodevelopment of Extremely Preterm Infants Administered Autologous Cord Blood Cell Therapy: Secondary Analysis of a Nonrandomized Clinical Trial

Lindsay Zhou, Abdul Razak, Courtney A McDonald, Tamara Yawno, David T McHugh, Gillian Whiteley, Kristyn Connelly, Vathana Sackett, Suzanne L Miller, Graham Jenkin, Iona Novak, Rod W Hunt, Atul Malhotra

Clinical Trial JAMA Netw Open . 2025 Jul 1;8(7):e2521158. doi: 10.1001/jamanetworkopen.2025.21158.

Importance: Umbilical cord blood-derived cells (UCBCs) are increasingly being evaluated for neuroprotective properties in perinatal brain injury.
Objective: To report early neurodevelopmental outcomes of extremely preterm infants who received autologous UCBCs in the CORD-SaFe study.
Design, setting, and participants: This study reports early follow-up on the preplanned secondary aims of a phase 1 safety and feasibility nonrandomized clinical trial conducted between May 2021 and November 2023, with early follow-up completed in August 2024. Participants were infants born at less than 28 weeks' completed gestation who received autologous UCBCs in the CORD-SaFe study at Monash Children's Hospital, Australia. A contemporaneous cohort of noninfused infants born during the study period was included for comparison. Data were analyzed from October to December 2024.
Intervention: Autologous UCBC administered intravenously in the second postnatal week of life.
Main outcomes and measures: Infants underwent brain magnetic resonance imaging to assess structure and injury (Kidokoro score) at term-equivalent age. Assessments at 52 to 54 weeks postmenstrual age included General Movements Assessment, Hammersmith Infant Neurological Examination score, and clinical examination to diagnose risk of cerebral palsy.
Results: A total of 23 infants (median [IQR] gestation, 26 [25-27] weeks; median [IQR] birth weight, 748 [645-981] grams; 17 [73.9%] male) were administered UCBCs at a median (IQR) dose of 42.3 (31.1-63.2) million cells/kg. The contemporaneous cohort included 93 infants (median [IQR] gestation, 26 (24-27) weeks; median [IQR] birth weight, 769 [660-1017] grams; 39 [41.9%] male). Median (IQR) Kidokoro score was 2 (1-3) for the UCBCs group and 3 (2-5) for the contemporaneous cohort, with no statistically significant difference observed between the groups (adjusted median difference, 0 [95% CI, -1.78 to 1.78]). No infants in the UCBC group were assessed as high risk for cerebral palsy compared with 6 of 87 assessed infants (6.8%) in the contemporaneous group; however, the difference was not statistically significant (adjusted log odds, 0.31 [95% CI, -0.76 to 1.38]). No differences in Hammersmith Infant Neurological Examination score (adjusted log odds, -1.50 [95% CI, -5.78 to 2.78]) and absent fidgety movements (adjusted odds ratio, 0.24 [95% CI, 0.20 to 3.04]) were observed between groups.
Conclusions and relevance: This phase 1 nonrandomized clinical trial assessing the safety and feasibility of autologous UCBCs in extremely preterm infants did not find significant differences in brain imaging parameters and early neurodevelopmental outcomes between the cell therapy and contemporaneous untreated groups. It was encouraging to note no infants who received UCBCs were assessed as high risk for cerebral palsy at 52 to 54 weeks postmenstrual age, and the absence of high risk for CP merits further study.
Trial registration: ANZCTR.org.au Identifier: ACTRN12619001637134.
PMID: 40608334

34.Treatment strategies for intra-amniotic infection and/or inflammation in preterm labor cases

Satoshi Yoneda, Noriko Yoneda, Hideki Niimi, Shigeru Saito

Eur J Obstet Gynecol Reprod Biol X . 2025 Jun 8:27:100408. doi: 10.1016/j.eurox.2025.100408. eCollection 2025 Sep.

Abstract
Spontaneous preterm birth (sPTB) is caused by multiple factors; however, the main cause is intra-amniotic infection and/or inflammation. The frequency of intra-amniotic infection/inflammation is higher in extremely sPTB (<28 weeks) and causes long-term cognitive impairments, such as cerebral palsy and mental retardation. The rate of intra-amniotic superinfections, such as Ureaplasma/Mycoplasma and bacteria, is high in sPTB < 27 weeks of gestation. Obstetrical strategies based on accurate information on intra-amniotic infection/inflammation are needed to prevent sPTB (particularly extremely sPTB) and improve the long-term prognosis of preterm infants. Our PCR method, which is sensitive and free from false positives, accurately identifies whether intra-amniotic infection is present. Appropriate antibiotic therapy against intra-amniotic infection (macrolides against Ureaplasma/Mycoplasma and beta-lactams against bacteria) in preterm labor (PTL) cases effectively prolongs the gestational period by 4 weeks. In contrast, the use of antibiotics shortens the gestational period in cases without intra-amniotic infection. We previously reported that 17-alpha-hydroxyprogesterone caproate (17OHP-C) effectively prolonged pregnancy by 4 weeks in PTL cases with mild intra-amniotic inflammation, but not in those with severe intra-amniotic inflammation. Treatment strategies based on accurate intra-amniotic information is expected to prolong pregnancy. However, obstetrical interventions are limited once severe clinical symptoms appear. In addition to the use of drugs to control uterine contractions, antibiotics and/or 17OHP-C may be necessary in the treatment of PTL cases following the accurate assessment of intrauterine infection and/or inflammation is confirmed.
PMID: 40607307

35.Clinical characteristics influencing timing of cerebral palsy diagnosis in neonatal follow-up

Marina M Journault, Lara M Leijser, Scott A McLeod, Selphee Tang, Elsa Fiedrich, Amanda M Moe, Amina A Benlamri

Paediatr Child Health . 2024 Sep 28;30(3):126-133. doi: 10.1093/pch/pxae068. eCollection 2025 Jun.

Objectives: To describe clinical characteristics influencing the timing of cerebral palsy (CP) diagnosis in a traditional neonatal follow-up clinic (NFC) setting.
Methods: Retrospective observational cohort study involving preterm infants, born <29 weeks gestation and/or birthweight <1000 g between January 2005 and December 2014, with CP and followed in Calgary's NFC. Infant data were collected, including demographics, perinatal and neonatal parameters, cranial ultrasound (cUS) results, co-occurring conditions, and CP characteristics (timing of suspicion and diagnosis, type, topography, distribution, and Gross Motor Function Classification System [GMFCS] level). This cohort was divided into two groups, early (diagnosed <19 months corrected age [CA]) and late (diagnosed ≥19 months CA), based on the median age of CP diagnosis, and characteristics were compared.
Results: A total of 99 infants met the inclusion criteria. Median age at first CP suspicion was 9 months CA (interquartile range [IQR] 14) and median age at diagnosis was 19 months CA (IQR 17), with median time lag from suspicion to diagnosis of 6 months (IQR 12). CP characteristics associated with diagnosis at an earlier age included higher GMFCS level, mixed type (compared to spastic only), and upper and lower extremities involvement. Infant characteristics, severity of cUS results, and co-occurring conditions were not different between early and late groups.
Conclusions: CP diagnosis timing is affected by GMFCS level, motor type, and distribution. Especially in infants with CP involving less motor impairment, there is a prolonged delay between CP suspicion and formal diagnosis. This gap may be amenable to quality improvement initiatives aimed at targeted implementation of early assessment tools.
PMID: 40599666

36.Should fetal blood sampling still be a part of monitoring during labor in the modern era ?

C Garabedian, A Girault 2

Review J Gynecol Obstet Hum Reprod . 2025 Jun 26;54(8):102991. doi: 10.1016/j.jogoh.2025.102991. Online ahead of print.

Abstract
Fetal monitoring during labor is crucial for detecting potential hypoxic situations that could lead to severe outcomes like cerebral palsy or peripartum death. The current standard, fetal heart rate (FHR) monitoring, is subjective and prone to variability, with limited accuracy in predicting neonatal acidosis or hypoxic ischemic encephalopathy. Secondary methods of foetal monitoring have been developed in an attempt to reduce unnecessary interventions due to continuous cardiotocography (CTG), and to better identify foetuses that are at risk of intrapartum acidosis. Very few studies directly compared CTG with foetal scalp blood (FBS) and CTG only. Only one randomised controlled trial (RCT) was published in the 1970s and had limited power to assess neonatal outcome. Direct and indirect comparisons conclude that FBS could reduce the number of caesarean deliveries associated with the use of continuous CTG. Recent randomized trials (FLAMINGO and FIRRST trial) examining the role of FBS in reducing cesarean sections and operative deliveries have yielded inconclusive results due to low recruitment. The main drawbacks of FBS are its invasive and discontinuous nature, the risk of contamination, and the need for a sufficient volume of foetal blood for analysis, especially for pH measurement. While FBS remains recommended in some guidelines, its use is declining in favor of improved FHR interpretation. The debate continues on its clinical utility, with a consensus emerging that FBS should be reserved for specific cases where its predictive value can guide decision-making, requiring ongoing research to better define its role in obstetric practice.
PMID: 40581336