Cerebral palsy research news

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Interventions and Management

1.Surgical Treatment of Wrist and Hand Deformity in Children with Cerebral Palsy

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Acta Chir Orthop Traumatol Cech. 2025 Aug;92(4):210-217

Abstract
Cerebral palsy (CP) is a complex disorder resulting from injury to developing brain. It involves multimodal and multidisciplinary approach that involves various disciplines of medical science. The entire focus of this approach is to provide patients with this disorder the best quality of life. Although CP can affect both upper and lower limbs, the functional expectation of upper limb is much higher and complex. This implies particularly to hand and wrist based on complex functional movements expected of them. This puts orthopaedic surgeons in a unique position in managing these patients. It is worth mentioning here that it is not about offering them a surgical intervention the emphasis should lie on the entire process of selection, evaluation, and intervention. All these steps need to be considered very thoroughly so that the best outcome is achieved based on patients' expectation at present and keeping the future consideration in mind as well. This paper focuses only on children with hand and wrist deformity. Although children have a great healing potential, but they have high functional demand and longer-life expectancy in general so getting things right for the first time should be of paramount importance. This paper tries to address this issue by reviewing the literature to help orthopaedic surgeons in developing an algorithm in their mind when offering intervention. The consideration of inclusion and exclusion criteria along with review of literature has been considered with this background in mind. This paper primarily addresses the surgical aspect of disease and steps that are critical in this regard. Follow up planning, long-term outcome, rehabilitation planning, use of conservative treatment has not been considered in this review.
PMID: 40878452

2.Test-Retest Reliability of Task-Oriented Strength and Object Position in a Box Lifting Task Using the Activities of Daily Living Test and Training Device (ADL-TTD) in Children with Unilateral Spastic Cerebral Palsy

Haowei Guo, Inge Heus, Bart Snijders, Nanne E Land, Menno van der Holst, Rob J E M Smeets, Caroline H G Bastiaenen, Eugene A A Rameckers

Children (Basel). 2025 Aug 5;12(8):1030

Purpose: This study investigates the test-retest reliability of maximal voluntary contraction (MVC) and integrated object positioning during bimanual box lifting tasks in children with unilateral spastic cerebral palsy (USCP), using the Activities of Daily Living Test and Training Device (ADL-TTD).
Materials and Methods: Utilizing an explorative cross-sectional design, the study recruited 47 children with USCP. The ADL-TTD, equipped with an Inertial Measurement Unit (IMU) for precise object positioning, measured MVC, and object position in 3D space in a cross-sectional measurement containing two measurements in a fixed time period.
Results: The findings demonstrated good test-retest reliability for MVC, with an ICCagreement of 0.95 for the mean MVC value. Additionally, good reliability was observed for object positioning in different directions measured with an IMU, with ICCagreement ranging from 0.82 to 0.86 degrees. Regarding the standard error of measurement (SEM), the SEMagreement for the mean MVC value was 5.94 kg, while the SEMagreement for object positioning was 1.48, 5.39, and 3.43 degrees, respectively.
Conclusions: These results indicate that the ADL-TTD demonstrates good test-retest reliability for both MVC and object positioning, making it a valuable tool for analyzing this population in cross-sectional research by providing reliable measures of task-oriented strength and object manipulation. However, the relatively high SEMagreement, particularly in MVC, suggests that caution is needed when using this tool for repeated testing over time. This pioneering approach could significantly contribute to tailored assessment and training for children with USCP, highlighting the importance of integrating task-specific strength and positional accuracy into therapeutic interventions.
PMID: 40868482

3.Assessment of Upper Limb Motor Control: Establishing Normative Benchmarks for Clinical Applications

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PeerJ. 2025 Aug 22;13:e19859

Background: This study presents and validates a methodology for assessing upper limb motor control using quantitative metrics derived from biomechanics and surface electromyography (sEMG). By combining kinematic and neurophysiological measurements, the study establishes normative benchmarks in healthy adults, which can offer a foundation for future clinical applications in populations with neuromotor impairments, which are commonly characterized by spasticity, involuntary coactivation, and restricted range of motion (ROM). A combination of clinical functional scales with the quantitative metrics presented here is expected to enable better evaluation of motor control.
Materials and methods: Twenty healthy adults performed elbow flexion-extension (FE) movements at three controlled speeds (42, 60, and 78 beats per minute (bpm)). The protocol involved recording sEMG signals of the biceps brachii and triceps brachii, with an inertial measurement unit (IMU) sensor, to compute four metrics: the range of motion (ROM), a derived angular velocity, the coactivation coefficient (CC), and muscle synergy. Movements were segmented into acceleration and deceleration phases to enable a phase-specific analysis, with a focus on both agonist and antagonist muscle activity during flexion and extension.
Results: The results established normative values for each metric, showing alignment with previous results in the literature for healthy motor patterns. ROM values were consistent with the expected ranges for healthy adults ranging between normative values, with the angular velocity increasing proportionally to the speed of movement but showing greater variability at higher speeds. The CC analysis demonstrated distinct phase-dependent activation patterns, with higher values during flexion deceleration due to antagonist muscle stabilization requirements. The muscle synergy metric highlighted a balanced activation of the biceps and triceps, with minor secondary activation of the triceps during flexion to counteract gravitational forces.
Discussion: The results validate the feasibility of this approach for quantifying motor control based on the quantitative metrics presented here. Normative values and the ability to detect changes in ROM, CC, and muscle synergy enhance the diagnostic potential of this approach in terms of identifying spasticity, coordination deficits, or abnormal neuromuscular patterns in clinical populations. This study establishes a comprehensive methodology for evaluating upper limb motor control, based on a combination of kinematic and neurophysiological data. These findings offer a solid foundation for developing advanced diagnostic tools and personalized rehabilitation strategies, with potential applications to conditions such as stroke, cerebral palsy, and other neuromotor impairments.
PMID: 40860663

4.Low Bone Mineral Density of the Spine in Adolescents with Cerebral Palsy Relates to Reduced Correction of Scoliosis After Surgery

Konstantinos Tsaknakis, Charlotte Scheulen, Katja A Lüders, Heide Siggelkow, Heiko M Lorenz, Lena Braunschweig, Anna K Hell

Sci Rep. 2025 Aug 27;15(1):31567

Abstract
Adolescents with cerebral palsy (CP) often require scoliosis surgery. Low bone mass may counteract benefits of surgical treatment. This study compares volumetric bone mineral density (vBMD) in adolescents with CP to age and sex matched healthy controls and evaluates its effect on scoliosis treatment. Computed tomograms (CT) of 51 adolescents with CP (15.0 ± 2.6 years) were performed for scoliosis surgery and also used for vBMD calculation. Reference control vBMD values were calculated from 62 CT examinations of patients (15.1 ± 2.3 years) after trauma or conditions not related to bone mass. Z-scores were calculated based on the reference values. Correction of scoliosis in relation to vBMD was evaluated on perioperative spinal radiographs of operated adolescents with CP. Adolescents with CP had lower vBMD (123.3 ± 46.3 mg/cm³) than healthy controls (166.9 ± 31.4 mg/cm³). The lowest vBMD (97.3 ± 49.8 mg/cm³) had patients with CP and pathological fractures (n = 8). Male CP Z-scores (-2.2 ± 1.6, n = 22) (16.2 ± 2.5 years) were significantly lower than female CP Z-scores (-1.0 ± 1.3, n = 29) (14.1 ± 2.3 years). Higher vBMD (179.2 ± 45.4 mg/cm³, n = 41) correlated to scoliosis correction > 50% (average 67.0 ± 12%), while lower vBMD (134.9 ± 30.9 mg/cm³, n = 7) related to correction ≤ 50% (average 36.8 ± 14%). Non-ambulant adolescents with CP have lower vBMD values compared to a healthy population, which negatively affects surgical correction of scoliosis.
PMID: 40866515

5.Bipolar Spinal Correction Reduces Transfusion Rate and Hospital Stay Compared with Traditional Posterior Spinal Fusion in Children with Scoliosis Secondary to Cerebral Palsy

Kristopher Lundine, Matthias Lu, Timothy C Borden, Samuel Yoon, Mia Percival, Michael B Johnson

Eur Spine J. 2025 Aug 26. Online ahead of print

Abstract
Purpose: Patients with neuromuscular scoliosis due to Cerebral Palsy (CP) are complex due to their curve severity and associated medical comorbidities. Spinal fusion is associated with high risk of peri-operative complications and large blood loss requiring allogenic red blood cell (RBC) transfusion. In June 2017, our tertiary paediatric institution implemented a new minimally-invasive approach for the treatment of neuromuscular scoliosis, Bipolar Spinal Correction (Bipolar), a technique first published by Miladi et al. in 2018. This study represents an analysis of the initial experience of this technique to see if it achieves the goal of minimally invasive surgery by decreasing surgical stress in this high-risk population.
Methods: We identified patients with an underlying diagnosis of CP who underwent primary single-day surgical correction for their scoliosis between 2010 and 2024 at a single paediatric institution. Patients either underwent a primary posterior spinal fusion (PSF) or Bipolar surgeries. Revision procedures and patients undergoing anterior spinal surgery were excluded. Patient charts and x-rays were reviewed to collect data on demographics, pre-operative curve severity and peri-operative details.
Results: PSF cohort included 46 patients and Bipolar included 78 patients. Demographic and curve severity data were similar between the groups. Bipolar surgery resulted in shorter operative times than PSF (228 min vs. 270 min) and reduced blood loss based on cell-saver return (113 mL vs. 382 mL) and lowest post-operative Hgb level (99.8 g/L vs. 89.6 g/L). Allogenic RBC transfusion rate was markedly reduced in the Bipolar cohort compared to the PSF cohort both intra-operatively (2.6% vs. 23.9%) and post-operatively (14.1% vs. 23.9%). No patient in the Bipolar cohort required mass transfusion protocol, defined as needing more than 3 units of allogenic RBC, compared with 2 patients in the PSF cohort. Post-operative hospital length-of-stay was reduced in the Bipolar cohort compared to PSF (6.5 days vs. 8 days).
Conclusions: When compared with traditional posterior spinal fusion, Bipolar Spinal Correction resulted in decreased operative times, less surgical blood loss, decreased allogenic transfusion rate, and reduced post-operative hospital length of stay in the treatment of children with CP and scoliosis.
PMID: 40856840

6.Dual-Task Training Interventions for Cerebral Palsy: A Systematic Review and Meta-Analysis of Effects on Postural Balance and Walking Speed

Irene Cortés-Pérez, María de Los Ángeles Castillo-Pintor, Rocío Barrionuevo-Berzosa, Marina Piñar-Lara, Esteban Obrero-Gaitán, Héctor García-López

Medicina (Kaunas). Online ahead of print, 2025 Aug 5

Background and Objectives: Dual-task training (DTT) is an innovative therapeutic approach that involves the simultaneous application of two tasks, which can be motor, cognitive, or a combination of both. Children with cerebral palsy (CP) often exhibit impairments in balance, motor skills, and gait, conditions that may be amenable to improvement through DTT. The aim of this study was to determine the effectiveness of DTT in enhancing balance, walking speed, and gross motor function-related balance in children with CP. Materials and Methods: In accordance with PRISMA guidelines, a comprehensive systematic review with meta-analysis (SRMA) was conducted. Electronic databases like PubMed Medline, Scopus, Web of Science, CINAHL, and PEDro were searched up to March 2025, with no language or publication date restrictions. Only randomized controlled trials (RCTs) examining the effectiveness of DTT on balance, gross motor function, and walking speed in children with CP were included. The methodological quality and risk of bias of the included RCTs were assessed using the PEDro scale. Pooled effects were calculated using Cohen's standardized mean difference (SMD) and its 95% confidence interval (95% CI) within random-effects models. Results: Eight RCTs, providing data from 216 children, were included. Meta-analyses suggested that DTT was more effective than conventional therapies for increasing functional, dynamic, and static balance, as well as standing and locomotion dimensions of the Gross Motor Function Measure (GMFM) and walking speed. Subgroup analyses revealed that a motor-cognitive dual task is better than a motor single task for functional, dynamic, and static balance and standing and locomotion dimensions for the GMFM. Conclusions: This SRMA, including the major number of RCTs to date, suggests that DTT is effective in increasing balance, walking and gross motor function-related balance in children with CP.
PMID: 40870460

7.The Role of Physical Examination in Assessing Hip Migration in Children with Cerebral Palsy

Merel Charlotte Rosalie Roelen, Renée Anne van Stralen, Jim Bono Aalbers, Denise Eygendaal, Max Reijman, Jaap Johannes Tolk

J Clin Med. Online ahead of print, 2025 Aug 17

Abstract
Background: Hip migration is a common comorbidity in children with cerebral palsy (CP) and can progress to complete hip dislocation, resulting in a reduced quality of life. Structured surveillance programs designed to prevent complete hip dislocation have demonstrated success regarding the early identification of hip migration. The objectives of this study are to determine whether there is a correlation between hip abduction in flexion (AIF) and migration percentage (MP) and to determine if there are clear cutoff values for hip abduction in flexion that are associated with progressive hip migration. Methods: This retrospective study evaluated children at our neuromuscular clinic between 2018 and 2022. We included children diagnosed with spastic CP for whom hip radiographs and concurrent physical examinations were available. The outcomes were assessed using AIF as a measure of range of motion and migration percentage according to Reimers. Results: In total, 83 patients were included, with a mean MP of 30.7% and a median AIF of 40 degrees. Mixed-effects modeling revealed a significant correlation between MP and AIF ($\beta = -0.51$, $p < 0.001$). Using generalized linear mixed-effects models and ROC analysis, we established a cutoff value of 40 degrees for AIF in predicting MP above 30%, with a sensitivity of 94.5% and a specificity of 80%. Conclusions: A negative correlation between AIF and MP was found, indicating that as AIF decreases, MP increases. Furthermore, a distinct cutoff value of 40° for AIF in progressive hip migration was found, which can guide timely referrals and early imaging.
PMID: 40869639

8.Baclofen and Botulinum Toxin A Use in Tone Management for Children With Cerebral Palsy: A Review of Current Literature and Research Gaps in Pre- and Perioperative Care

Michael Li, Naama Rozen, Kate Wortley, Ram Mishaal

Pediatr Neurol. Online ahead of print, 2025 Aug 8

Abstract
Cerebral palsy (CP) is a leading cause of motor disability in children. Many children with CP have hypertonia, and some will require orthopedic surgery. Botulinum toxin A (BoNT-A), a muscle relaxant, is commonly pre- or perioperatively injected to improve surgical outcomes and reduce postoperative pain and muscle tone. However, inconsistent evidence supporting its efficacy, potential research bias from industry sponsorship, and numerous adverse effects, such as long-term changes to muscle morphology, highlight the need for a better alternative. Preoperatively increasing the dose of oral baclofen, a first-line treatment for generalized CP-related hypertonia, may improve surgical outcomes with fewer long-term adverse effects. To date, the impact of an increased oral baclofen dose for this purpose has not yet been studied. This article reviews the current evidence on the effectiveness and safety of the three more commonly used antispastic treatments, BoNT-A, oral baclofen, and intrathecal baclofen, with the goal of trialing increased oral baclofen dose as an adjunct to surgery.
PMID: 40882243

9.Defining Goal-Directed Training for Children with Cerebral Palsy: A Scoping Review and Framework for Implementation

Angela Shierk, Bridget Barry Thias, Haley Becker, Baylee Allen, Benjamin Chaiprasert, Katherine C Lampe, Ava Wallace-McCollom, Aidan O'Brien, Heather Roberts

Children (Basel). 2025 Aug 8;12(8):1039

Abstract
Background/Objectives: This scoping review aimed to define goal-directed training (GDT) and its impact on outcomes for children with cerebral palsy (CP), and to develop a structured framework outlining its core components for effective implementation.
Methods: Using the Arksey and O'Malley framework and PICO criteria, nine databases were searched and reference lists reviewed. Two reviewers independently screened and extracted data, which were analyzed using a qualitative descriptive approach.
Results: From 1273 articles, 156 met inclusion criteria, including 112 efficacy studies (53 randomized trials, 53 non-randomized trials, 6 secondary analyses) involving 4708 children aged 3 months to 21 years (mean age 6.7 years). Interventions addressed all GMFCS and MACS levels. Ninety outcome measures across ICF domains were used. GDT was associated with improvements in motor function, hand use, self-care, communication, and participation. Findings were synthesized into an eight-step GDT framework highlighting collaborative goal setting, goal analysis, strategy determination, structured practice, feedback, re-evaluation, and generalization. This framework supports consistent, high-quality GDT implementation across settings and disciplines.
Conclusions: In conclusion, GDT shows broad functional benefits and emphasizes individualized, client-centered care. The review offers a practical, evidence-informed framework to guide clinicians and researchers in delivering GDT with fidelity.
PMID: 40868492

10.Evaluation of stem/stromal cell transplantation safety and efficacy in children diagnosed with cerebral palsy: A systematic review and meta-analysis of randomized controlled trials

Ronak Fatahi, Fatemeh Heydarpour, Sepehr Moradi Motlagh, Kamran Mansouri

Stem Cell Res Ther. 2025 Aug 29;16(1):468

Background: Cerebral palsy is a neurological disorder that affects both postnatal and prenatal children. It results from brain damage in the cerebral motor cortex. The three types of CP are spastic, dyskinetic, and mixed forms. This study aims to evaluate the efficacy and safety of stem or stromal cell therapy in children diagnosed with cerebral palsy. A systematic search was conducted across four databases: PubMed, ISI Web of Science, Scopus, and Embase from inception to August 23, 2024, to identify studies evaluating the efficacy and safety of stem cell therapy for cerebral palsy. Data extraction was performed for all randomized controlled clinical studies. ROB2 (Risk of Bias Tool 2) was used to assess the risk of bias in the included studies. The main outcome measures were extracted from each study for meta-analysis, and a PRISMA flow diagram was used to illustrate the study selection process. Eventually, thirteen studies met the inclusion criteria. The Gross Motor Function Measure (GMFM) is crucial for assessing motor function changes and evaluating the impact of stem cell therapy. Subgroup analysis of GMFM scores were conducted based on assessment time points (3, 6, and 12 months post-treatment), route of administration, and type of stem cell used. The results demonstrate that stem cell therapy remarkably improved GMFM score in the treatment group. For safety analysis, adverse events such as irritability, fever, nausea, and vomiting were assessed, and risk ratios (RRs) were calculated to confirm the safety of stem cell therapy.
Conclusion: The findings suggest that stem cell transplantation was safe and effective for treating cerebral palsy. However, further high-quality RCTs with standardized protocols are necessary to investigate the efficacy of alternative stem cell types for cerebral palsy.
PMID: 40877893

11.Modified Sports Intervention Combined with a Context-Focused Intervention for Children with Cerebral Palsy: A Feasibility Randomised Clinical Trial

Luana Cristina da Silva, Rafael Coelho Magalhães, Acsa Soares Santos, Ana Carolina Andrade Ramos de Souza, Emily Martins Ribeiro, Julia Melo Rocha Xavier, Ricardo Rodrigues de Sousa Junior, Dana Anaby, Georgina Clutterbuck, Egmar Longo, Ana Cristina Resende Camargos, Deisiane Oliveira Souto, Hércules Ribeiro Leite

Phys Occup Ther Pediatr. 2025 Aug 26:1–22. Online ahead of print

Abstract
Aims: To investigate the feasibility and preliminary effects of a modified sports intervention (Sports Stars) combined with a contextual-focused approach (Pathways and Resources for Engagement in Participation–PREP).
Methods: This is a feasibility randomized clinical trial (RCT), registered under RBR-4m3b4b6 and U1111-1256-4998. Eighteen children with cerebral palsy (CP) were allocated to either the Sports Stars Brazil + PREP group (n = 9) or the Sports Stars Brazil group (n = 9). Feasibility outcomes included willingness to participate; acceptability of random allocation and screening; evaluator blinding feasibility; group contamination; treatment adherence and satisfaction; therapist communication; adverse events, and implementation resources. Effectiveness outcomes included performance and satisfaction with participation goals, participation pattern, physical literacy, family empowerment, and physical activity level. Descriptive statistics and tests were applied.
Results: Feasibility analysis showed a high completion rate and adequate satisfaction, credibility, and acceptability in both groups. Significant differences were found favoring the Sports Stars Brazil + PREP group in performance ($p = 0.02$) and satisfaction ($p = 0.04$); family empowerment at post-intervention ($p = 0.005$); and involvement in school ($p = 0.04$) at follow-up. No significant differences were found for other outcomes.
Conclusions: A future robust clinical trial appears feasible with adjustments. Combining a context-focused intervention with a modified sports approach shows potential to improve participation outcomes.
PMID: 40856330

12.A Single-Button Mobility Platform for Cause-Effect Learning in Children with Cerebral Palsy: A Pilot Study

Alberto J Molina-Cantero, Félix Biscarri-Triviño, Alejandro Gallardo-Soto, Juan M Jaramillo-Pareja, Silvia Molina-Criado, Azahara Díaz-Rodríguez, Luisa Sierra-Martín

Children (Basel). 2025 Aug 16;12(8):1077

Background: Mobility plays a fundamental role in causal reasoning (causal inference or cause-effect learning), which is essential for brain development at early ages. Children naturally develop causal reasoning through interaction with their environment. Therefore, children with severe motor disabilities (GMFCS levels IV-V), who face limited opportunities for interaction, often show delays in causal reasoning.
Objective: This study investigates how a wheelchair-mounted, semi-autonomous mobility platform operated via a simple switch may enhance causal learning in children with severe disabilities, compared with traditional therapies. However, due to the scarcity of participants who meet the inclusion criteria and the need for long-term evaluation, recruitment poses a significant challenge. This study aims to provide an initial assessment of the platform and collect preliminary data to estimate the required sample size and number of sessions for future studies.
Methods: We conducted a pilot randomized controlled trial (RCT) to assess platform usability and its effect on reaction time and keystroke accuracy. Four children, aged 8.5 ± 2.38, participated in seven 30 min sessions. They were randomly assigned in equal numbers, with two participants in the intervention group (using the platform) and two in the control group (receiving standard therapy). Usability was evaluated through a questionnaire completed by two therapists. Key outcome measures included the System Usability Scale (SUS), reaction time (RT), and keystroke accuracy (NIS).
Results: Despite the small sample size and recruitment challenges, the data allowed for preliminary estimates of the sample size and number of sessions required for future studies. Therapists reported positive usability scores. Children using the platform showed promising trends in RT and NIS, suggesting improved engagement with cause-effect tasks.
Conclusions: The findings support the feasibility and usability of the mobility platform by therapists, although some improvements should be implemented in the future. No conclusive evidence was found regarding the platform's effectiveness on causal learning, despite a positive trend over time. This pilot study also provides valuable insights for designing larger, statistically powered trials, particularly focused on NIS.
PMID: 40868528

13.Sleep Disorders in Infants and Toddlers with Hypoxic Ischemic Encephalopathy Treated with Therapeutic Hypothermia: A Case-Control Study Using the SDSC

Domenico M Romeo, Chiara Arpaia, Maria Rosaria Lala, Giorgia Cordaro, Claudia Brogna, Marianna Moro, Francesca Gallini, Giovanni Vento, Eugenio Mercuri

Children (Basel). 2025 Aug 12;12(8):1058

Background and objectives: Sleep complaints are particularly relevant in the development of children, affecting cognitive development, neuropsychological functioning, and learning abilities. The aims of this study were as follows: (i) to determine the incidence of sleep disorders in low-risk infants and toddlers with hypoxic ischemic encephalopathy (HIE) treated with therapeutic hypothermia (TH), using the Italian version of the Sleep Disturbance Scale for Children (SDSC); and (ii) to compare the data with those of a healthy control group.
Materials and methods: This is a cross-sectional case-control study involving a total of 167 infants and toddlers (aged 6-36 months) with HIE treated with TH and 160 typically developing infants assessed using the SDSC filled out by the mother. A neurocognitive assessment was also performed. Exclusion criteria were mild perinatal asphyxia, major brain lesions, congenital malformations, severe postnatal infectious diseases, metabolic complications, cerebral palsy, neurodevelopmental impairment, and epilepsy.
Results: In the study group, an abnormal total SDSC score was found in 1.8% of infants; 10% of infants had an abnormal score on at least one of the SDSC factors. No specific differences in the SDSC total and the factor scores were observed between the study and control group, with the exception of difficulties in maintaining sleep and sleep hyperhidrosis, with higher scores in HIE infants.
Conclusions: Low-risk infants and toddlers with HIE showed a low incidence of sleep disorders, similar to those observed in control group, with some exceptions. As these incidences may increase significantly with age, further clinical assessments will be needed to confirm these data at older ages.
PMID: 40868509

14.Risk for Sleep-Disordered Breathing Among Children and Adolescents With Perinatal Stroke and the Impact on Mental Health, Quality of Life, and Caregivers

Lisa Smithson, Muhammad Khan, Jacqueline Pei, John Andersen, Jerome Yager, Piushkumar Mandhane, Adam Kirton, Carmen Rasmussen

Pediatr Neurol. 2025 Aug 6;172:21–27. Online ahead of print

Background: Perinatal stroke is a leading cause of cerebral palsy and lifelong neurological disability and a potential risk factor for sleep-disordered breathing (SDB).
Methods: We examined the risk for SDB and associated psychosocial outcomes among 77 children with perinatal stroke. Caregivers completed validated questionnaires evaluating their children's sleep (Pediatric Sleep Questionnaire), mental health (Behavior Assessment System for Children, Third Edition [BASC-3]), and quality of life (Pediatric Quality of Life Inventory [PedsQL]) as well as the psychosocial impact on themselves (Parental Outcome Measure [POM]).
Results: The risk of SDB (SDB ratio of 0.33 or higher) in children with perinatal stroke was 34%. SDB symptomology was adversely associated with composite measures assessed by the BASC-3 including Externalizing and Internalizing Problems, Behavioral Symptoms Index, and Adaptability. SDB symptoms were associated with greater impairment in the following domains of the PedsQL: Daily Activities, Movement and Balance, Pain and Hurt, Fatigue, and Eating Activities. SDB symptomatology was also correlated with worse psychosocial impact and overall caregiver outcomes on the POM.
Conclusions: In conclusion, SDB symptoms are prevalent in children with perinatal stroke and may be associated with adverse psychosocial outcomes for children and caregivers. As a treatable modifier of long-term outcomes, increased awareness, screening, and study are required.
PMID: 40857940

15.Characteristics of Obstructive Sleep Apnea in Children with Cerebral Palsy: A Comparative Study with Healthy Children

Yangyang Cao, Yanyan Sun, Junhui Wang, Juan Song, Qianyu Guo, Xirui Peng, Bingbing Li, Bibo Liu, Dengna Zhu, Yiran Xu, Changlian Zhu, Jun Wang

Eur J Med Res. 2025 Aug 26;30(1):810

Abstract
Background: Obstructive sleep apnea (OSA) can affect the growth and development of children, and serious OSA can lead to significant complications if left untreated. Children with cerebral palsy (CP) also experience sleep problems. Therefore, the present study examined the prevalence and differences of OSA in children with CP compared to healthy children. In addition, it sought to classify the children with CP according to different severities and clinical types in order to investigate whether there are differences in the severity of OSA and in sleep and respiratory characteristics among groups of children with different severities of CP.
Methods: One hundred and fifty-six children with CP and one hundred and fifty healthy children completed the Pediatric Sleep Questionnaire (PSQ). Based on the PSQ results, a threshold of 0.33 was used to define high risk of OSA. Children identified as high risk underwent polysomnography (PSG) to analyze their sleep structure, breathing events, oxygen saturation, and heart rate.
Results: 48.7% of children with CP and 26.67% of healthy children identified as high risk of OSA. The prevalence of OSA in children with CP (23.72%) was higher than that in healthy children (7.3%). Thus, children with CP have both a higher risk and a higher prevalence of OSA than healthy children, but the difference in the severity of OSA was not statistically significant. Also, there were no differences in OSA severity among groups of children with varying severities and types of CP. The proportion of rapid eyes movement (REM) sleep time, minimum transcutaneous oxygen saturation (SpO_2), and average SpO_2 during the sleep period was lower in children with CP than in healthy children. However, the N2 ratio, sleep latency (SL), OAI, OAHI and ODI were higher in children with CP as compared to healthy children. Additionally, the average and maximum heart rates during sleep were higher in children with CP than in healthy children. According to the severity of CP and clinical classification, children with severe CP exhibited a lower proportion of REM sleep time, a lower N3 ratio, reduced total sleep time (TST), decreased sleep efficiency (SE), and lower average SpO_2 during the sleep period compared to children with mild and moderate CP. However, they had a higher N2 ratio, increased OAI, elevated ODI, and a higher maximum heart rate during the sleep period compared to children with mild and moderate CP. Children with dyskinetic CP had a higher ODI index and N2 ratio than children with spastic CP.
Conclusion: Children with CP have a higher risk and prevalence of OSA than healthy children. Although there were no differences in OSA severity among groups of children with varying severities of CP, children with severe CP exhibited more severe sleep disturbances and breathing issues compared to children with mild and moderate CP.
PMID: 40855572

16.Validity of PROMIS® Pediatric Physical Activity Parent Proxy Short Form Scale as a Physical Activity Measure for Children with Cerebral Palsy Who Are Non-Ambulatory

Nia Toomer-Mensah, Margaret O'Neil, Lori Quinn

Behav Sci (Basel). 2025 Jul 31;15(8):1042

Background: Self-report physical activity (PA) scales, accelerometry, and heart rate (HR) monitoring are reliable tools for PA measurement for children with cerebral palsy (CP); however, there are limitations for those who are primary wheelchair users. The purpose of our study was to evaluate face and construct validity of the PROMIS® Pediatric PA parent proxy short form 8a in measuring PA amount and intensity in children with CP who are non-ambulatory.
Methods: Face validity: Semi-structured interviews with parents and pediatric physical therapists (PTs) were conducted about the appropriateness of each item on the PROMIS® Pediatric PA short form. Construct validity: Children with CP who were non-ambulatory participated in a one-week observational study. PA amount and intensity were examined using PA monitors (Actigraph GT9X) and HR monitors (Fitbit Charge 4). Activity counts and time in sedentary and non-sedentary intensity zones were derived and compared to the PROMIS® T-scaled score.
Results: Twenty-two physical therapists (PTs) and fifteen parents participated in the interviews, and ten children completed 1-week PA observation. Eight and seven participants completed sufficient time of uninterrupted PA and HR monitor wear, respectively. Parents and PTs agreed that several questions were not appropriate for children with CP who were non-ambulatory. PA intensity via activity counts derived from wrist worn monitors showed a strong positive correlation with the PROMIS® PA measure.
Conclusions: Construct validity in our small sample was established between PROMIS® scores and accelerometry activity counts when documenting PA amount and intensity; however, there were some differences on PROMIS® face validity per parent and PT respondents. Despite some concerns regarding face validity, the PROMIS® Pediatric PA parent proxy short form 8a shows promise as a valid measure of physical activity amount and intensity in non-ambulatory children with CP, warranting further investigation and refinement.
PMID: 40867399

17.PredictMed-CDSS: Artificial Intelligence-Based Decision Support System Predicting the Probability to Develop Neuromuscular Hip Dysplasia

Carlo M Bertoncelli, Federico Solla, Michal Latalski, Sikha Bagui, Subhash C Bagui, Stefania Costantini, Domenico Bertoncelli

Bioengineering (Basel). 2025 Aug 6;12(8):846

Abstract
Neuromuscular hip dysplasia (NHD) is a common deformity in children with cerebral palsy (CP). Although some predictive factors of NHD are known, the prediction of NHD is in its infancy. We present a Clinical Decision Support System (CDSS) designed to calculate the probability of developing NHD in children with CP. The system utilizes an ensemble of three machine learning (ML) algorithms: Neural Network (NN), Support Vector Machine (SVM), and Logistic Regression (LR). The development and evaluation of the CDSS followed the DECIDE-AI guidelines for AI-driven clinical decision support tools. The ensemble was trained on a data series from 182 subjects. Inclusion criteria were age between 12 and 18 years and diagnosis of CP from two specialized units. Clinical and functional data were collected prospectively between 2005 and 2023, and then analyzed in a cross-sectional study. Accuracy and area under the receiver operating characteristic (AUROC) were calculated for each method. Best logistic regression scores highlighted history of previous orthopedic surgery ($p = 0.001$), poor motor function ($p = 0.004$), truncal tone disorder ($p = 0.008$), scoliosis ($p = 0.031$), number of affected limbs ($p = 0.05$), and epilepsy ($p = 0.05$) as predictors of NHD. Both accuracy and AUROC were highest for NN, 83.7% and 0.92, respectively. The novelty of this study lies in the development of an efficient Clinical Decision Support System (CDSS) prototype, specifically designed to predict future outcomes of neuromuscular hip dysplasia (NHD) in patients with cerebral palsy (CP) using clinical data. The proposed system, PredictMed-CDSS, demonstrated strong predictive performance for estimating the probability of NHD development in children with CP, with the highest accuracy achieved using neural networks (NN). PredictMed-CDSS has the potential to assist clinicians in anticipating the need for early interventions and preventive strategies in the management of NHD among CP patients.
PMID: 40868359

18.Exoskeleton Therapy in Cerebral Palsy: Improved Gait Endurance Without Kinematic Change

Paweł Chmara, Sabina Brazevic, Marek Jóźwiak, Brian Po-Jung Chen, Faustyna Manikowska

Front Hum Neurosci. 2025 Aug 7;19:1644585. eCollection 2025

Abstract
Introduction: Cerebral palsy (CP) often leads to impairments in movement and posture, limiting functional mobility. Robotic-assisted gait training (RAGT) using powered exoskeletons has emerged as a novel approach to enhance gait in individuals with CP. However, evidence regarding its effectiveness, particularly in unassisted gait performance, remains limited and inconclusive.
Methods: This study involved 44 ambulatory youth with bilateral hypertonic CP (GMFCS levels I–III), who underwent an intensive RAGT program using the EksoGT exoskeleton. The intervention consisted of 28 sessions (90 min each) over 8 weeks, with a 2 weeks mid-point break. Gait assessments were conducted before (T1) and after (T2) therapy using 3D motion analysis and the 6-minute walk test (6MWT). Primary outcomes included spatiotemporal parameters, gait symmetry, gait deviation index (GDI), and walking endurance.
Results: Following the exoskeleton training, participants demonstrated a statistically significant improvement in gait efficiency, with 6MWT distances increasing from 375 to 418 m ($p < 0.01$). However, no significant changes were observed in gait symmetry, spatiotemporal parameters, or GDI scores, indicating no measurable effect on unassisted gait mechanics.
Conclusion: Intensive exoskeleton therapy significantly improved walking endurance but did not alter gait symmetry or kinematics in independently ambulatory youth with hypertonic CP. These findings suggest that while exoskeleton assisted training enhances functional endurance, its impact on gait pattern may be limited. Further research should explore its broader benefits on quality of life, participation, and psychosocial outcomes.
PMID: 40852505

19.Experiences of Brazilian mothers in pain management of children and adolescents with cerebral palsy

Letícia Pereira Coelho, Danton Matheus de Souza, João Vitor de Jesus Santana, Sofia de Souza Cruz, Ana Paula Scoleze Ferrer, Lisabelle Mariano Rossato

Disabil Rehabil. Online ahead of print, 2025 Aug 29

Purpose: To understand the experiences of mothers of children and adolescents with cerebral palsy (CP) regarding the assessment, intervention, and reassessment of their children's pain.
Material and methods: This is a descriptive-exploratory qualitative study, developed in light of Herbert Blumer's Symbolic Interactionism. Data collection involved interviews with 15 Brazilian women over 18 years old who self-identified as literate, had internet access, and were mothers of at least one child or adolescent with CP. Participants were recruited using the snowball sampling technique. The interviews were transcribed and analyzed using thematic content analysis.
Results: Three categories emerged: (1) Uncertainties and individualities in the assessment and reassessment of pain; (2) Challenges in seeking interventions for pain relief and (3) "A domino effect, where everything goes wrong": Impacts of pain.
Conclusion: Mothers report ambivalent feelings of confidence and insecurity in managing their child's pain, especially by characteristics, frequency, and causes of pain. The interventions described are predominantly pharmacological. Mothers perceive healthcare professionals as devaluing their child's pain complaints, rarely seeking care for this symptom. Inadequate pain management can lead to negative outcomes for both children and caregivers.
Plain language summary
Mothers fluctuate between certainty and uncertainty while facing numerous challenges in managing their children’s pain at home.The characteristics, frequency, and causes of pain in children with cerebral palsy vary according to individual conditions and mothers’ prior experiences.Pain experiences in children and adolescents with cerebral palsy directly affect both the child’s and mother’s well-being.Rehabilitation professionals should recognize and support mothers as key partners in the individualized assessment and management of pain in children and adolescents with cerebral palsy.
PMID: 40879140

20.Use of Mid-Upper Arm Circumference Band in Wasting Detection in Children with Cerebral Palsy in Türkiye

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Children (Basel). 2025 Jul 30;12(8):1002

Abstract
Background/Objectives: Malnutrition is a common problem in children with cerebral palsy (CP). The aim of this study was to investigate the suitability and diagnostic performance of mid-upper arm circumference (MUAC) z-score in diagnosing wasting in children with CP, and its impact on diagnostic accuracy when evaluated concomitantly with additional clinical factors (birth weight, history of phototherapy).
Methods: This single-center, cross-sectional study included 83 children with CP, aged 6 months–17 years, followed-up in our clinic. Anthropometric measurements (MUAC, Body Mass Index (BMI)) and clinical data (birth weight, history of phototherapy, Gross Motor Function Classification System (GMFCS)) were prospectively collected. Wasting was defined according to the BMI z-score ≤ -2 criteria. The diagnostic performance of MUAC z-score was evaluated by Receiver Operating Characteristic (ROC) analysis. The contribution of additional covariates was examined using logistic regression analysis and the backward elimination method.
Results: MUAC z-score alone demonstrated good discrimination in diagnosing wasting with an Area Under the Curve (AUC) value between 0.805 and 0.821, but its sensitivity was limited (67.0%). No statistically significant difference was found in diagnostic performance between MUAC measurements of the right arm, left arm, and the unaffected arm ($p > 0.050$). In logistic regression analysis, MUAC z-score ($p = 0.001$), birth weight ($p = 0.014$), and a history of phototherapy ($p = 0.046$) were found to be significantly associated with wasting malnutrition. The simplified model including these variables yielded an AUC value of 0.876.
Conclusions: MUAC z-score is a usable tool for wasting malnutrition screening in children with CP. Although its sensitivity is limited when used alone, its diagnostic accuracy increases when evaluated concomitantly with additional clinical factors such as birth weight and a history of phototherapy. This combined approach may offer clinicians a more robust tool for the early diagnosis and management of wasting malnutrition in children with CP.
PMID: 40868454

21.Botulinum Toxin Treatment in a Resource-Limited Setting: Experiences from a Public Institution in a Developing Country

Gloria Andrea Panesso, Juan Diego Martínez, Annelise Velasco, Stefanía Forero, Daniel Perdomo, Ángela Villamil, Edna Rocío González, Claudio Alejandro Jiménez

Biomedica. 2025 Aug 11;45(3):390–405

Abstract
Introduction: Botulinum toxins have at least 30 therapeutic indications across different medical specialties. Some Latin American studies have described the experience of applying botulinum toxin in isolated clinical contexts. However, researchers have yet to provide comprehensive analysis about its use across diverse clinical indications.
Objective: To classify the therapeutic use of botulinum toxin in a public health center in Bogotá, identifying the risks of pharmacological interactions and possible barriers related to its use. This knowledge will promote a better understanding of the indications, practices, and regulations regarding the use of the botulinum toxin in the Colombian context.
Materials and methods: A cross-sectional study was conducted to analyze the use of botulinum toxin in a public institution in Bogotá, Colombia, applying the prescription-indication methodology. Sociodemographic, clinical, and pharmacoepidemiologic data were extracted from medical records and the electronic prescription database Mi prescripción. A bivariate statistical analysis was performed using JAMOVI software, version 2.2.5.
Results: A total of 197 patients received a prescription for botulinum toxin. Although the main indication was temporomandibular joint disorder, 70.6% of the prescriptions were classified under neurological conditions. In pediatric patients, the main indication was spastic cerebral palsy (90%). Most described clinical uses (92.4%) were aligned with the indications approved by the Instituto Nacional de Vigilancia de Medicamentos y Alimentos de Colombia. Risks of drug interactions were identified in 30.9% of the cases and were significantly associated with an anticholinergic load ($p < 0.001$).
Conclusions: Botulinum toxin is used for multiple indications in multiple medical specialties. There is consistency between prescription and indication of the medication recommended by regulatory entities. Reviewing patient's pharmacological history is essential before prescribing botulinum toxin to reduce the risk of drug interactions.
PMID: 40865107

22.Mortality and Neurodevelopmental Outcome in an Italian Cohort of Very Low Birth Weight Infants

Lugli Licia, Bedetti Luca, Pugliese Marisa, Guidotti Isotta, Ancora Gina, Gargano Giancarlo, Perrone Serafina, Solinas Agostina, Motta Mario, Corvaglia Luigi Tommaso, Sansavini Alessandra, Stella Marcello, Cuoghi Costantini Riccardo, DiCaprio Antonella, Della Casa Muttini Elisa, Roversi Maria Federica, Bertoncelli Natascia, Catenazzi Piero, Ballardini Elisa, Grandi Sara, Moretti Sabrina, Turoli Daniela, Aceti Arianna, Braibanti Silvia, Insalaco Anna, Camilla Migliozzi, Fumagalli Monica, Ferrari Fabrizio, Berardi Alberto

Acta Paediatr. 2025 Aug 27. Online ahead of print

Aim: Preterm infants face high risks of mortality and neurodevelopmental impairment. We aimed to evaluate the outcomes in an Italian cohort of very low birth weight infants.
Methods: This multicenter prospective study included very low birth weight infants born in Italy between 2016 and 2020. Severe functional disability was defined as cognitive impairment, cerebral palsy, blindness or deafness.
Results: A total of 1381 patients were enrolled (median gestational age: 29.1 weeks; males: 678) and 136 (9.8%) died. Multivariate analysis identified gestational age (OR 0.65), prenatal steroids (OR 0.36), magnesium sulphate (OR 0.48), advanced resuscitation (OR 4.04) and admission body temperature (OR 0.84) as predictors of mortality. A total of 802 (65.5%) completed the 24-month neurodevelopmental follow-up. Severe functional disability was observed in 71/802 (8.9%) infants, including neuropsychological impairment (59.1%), cerebral palsy (4.2%), deafness (1%) and blindness (0.2%). Multivariate analysis identified male gender (OR 1.84), advanced resuscitation (OR 1.92), periventricular leukomalacia (OR 9.94) and periventricular-intraventricular haemorrhage (OR 1.74) as predictors of severe functional disability.
Conclusion: Mortality and neurodevelopmental impairments in very low birth weight infants were associated with gestational age and neonatal complications. Early interventions, including prenatal steroids, magnesium sulphate and improved neonatal care, may enhance survival and outcomes.
PMID: 40864163

23.Parental Quality of Life and Its Predictors in Jordanian Families with Children with Cerebral Palsy

Mohammad Al-Wardat, Husam Magableh, Khader A Almhdawi, Mohammad Yabroudi, Mohammad Etoom, Hashem Abu Tariah, Auwal Abdullahi, Nihad Almasri

BMJ Paediatr Open. 2025 Aug 26;9(1):e003462

Background: The lifelong care responsibilities associated with cerebral palsy (CP) may place significant physical and psychological burdens on parents, which might hinder their quality of life (QOL). Despite their importance, factors affecting parents' QOL in CP cases remain understudied globally, including Jordan. This study aimed to assess the QOL of parents of children with CP and investigate its predictors.
Methods: Sociodemographic factors were evaluated in this cross-sectional study for both the parents and their children with CP. The parents' QOL and musculoskeletal pain were assessed using the Beach Centre Family Quality of Life Scale (BCFQOL) and the Nordic Musculoskeletal Questionnaire. For a comprehensive assessment of psychological well-being and sleep quality, the Depression Anxiety Stress Scale and the Pittsburgh Sleep Quality Index were administered. The significant predictors of parents' QOL were determined using multivariable linear regression analysis.
Results: 150 parents of children with CP participated in this study. Participants reported a moderate to high overall level of satisfaction with BCFQOL. The highest satisfaction was observed in the family interaction and parenting, while the lowest was in emotional well-being. The regression model explained approximately 35% of the variance in parents' QOL (R^2=0.35, F=5.568, p<0.001). Factors significantly predicting higher levels of parents' QOL were absence of child mental health symptoms (β=0.176 (95% CI 0.611 to 9.340), p=0.026), parents who are not smokers (β=0.2 (95% CI 1.468 to 11.608), p=0.012) and parents who do not report pain in the past 12 months (β=0.184 (95% CI 1.038 to 12.303), p=0.021).
Conclusions: Parents of children with CP showed acceptable levels of QOL. A higher level of QOL was associated with the absence of child mental health symptoms, and parents who are not smokers or do not report pain. The findings highlight the need for mental health interventions, healthier habits and musculoskeletal pain management to improve parents' well-being.
PMID: 40858357

Prevention and Cure

24.High-risk infant follow-up: where are we and where to from here?

Stephanie M Boyd, Darazel Perez, Michelle Juarez, Nadia Badawi

Pediatr Res. Online ahead of print, 2025 Aug 29

Abstract
No abstract available
PMID: 40883466

25.Cord blood-derived cell therapies for preterm brain injury

Abdul Razak, Lindsay Zhou, Graham Jenkin, Rod W Hunt, Suzanne L Miller, Courtney A McDonald, Atul Malhotra

Early Hum Dev. Online ahead of print, 2025 Aug 21

Abstract
Preterm birth, defined as delivery before 37 weeks of gestation, remains a leading contributor to neonatal morbidity and long-term neurodevelopmental impairments. Brain injuries such as intraventricular haemorrhage, white matter injury and hypoxic-ischemic encephalopathy are common in this population and are mediated by overlapping pathophysiological mechanisms including inflammation, cerebrovascular immaturity, cell death and impaired repair. Current therapeutic options for these conditions are limited and are largely supportive. Umbilical cord blood (UCB)-derived cell therapy has emerged as a novel strategy to target these shared pathophysiological pathways. UCB contains diverse cell types-hematopoietic stem cells, mesenchymal stromal cells, endothelial progenitor cells and regulatory T cells-with regenerative, immunomodulatory and neuroprotective properties. Preclinical studies in rodent and limited large-animal models show consistent benefits of UCB therapy, including attenuation of neuroinflammation, reduced apoptosis, promotion of oligodendrocyte maturation and improved functional outcomes. However, variability in model design and lack of long-term endpoints hinder clinical translation. Clinical research into cord blood-derived therapies for preterm brain injury is still in its early stages, with most studies to date focused on feasibility and safety rather than efficacy. While preventative approaches have dominated, therapeutic trials for infants with established brain injury remain limited. Small case series suggest potential benefits in intraventricular haemorrhage, but other injury types, such as hypoxic-ischemic encephalopathy, stroke, or cerebellar haemorrhage, remain largely unexplored in the preterm population. Recent studies using reinfusion of a preterm infant's own cord blood derived cells show promising safety and early signs of reduced risk for conditions like cerebral palsy. Larger efficacy trials are now underway, including those targeting severe, established preterm brain injuries, marking a significant step toward clinical application.
PMID: 40882441

26.Early high risk of cerebral palsy classification is predictive of cerebral palsy at 2 years: an implementation cohort study

Amanda Kl Kwong, Abbey L Eeles, Peter J Anderson, Shankari Arunanthy, Nadia Badawi, Roslyn N Boyd, Kate Lc Cameron, Paul B Colditz, Cathryn Crowle, Russell Dale, Lex W Doyle, Joanne M George, Pieter J Koorts, Katherine J Lee, Carly R Luke, Lynda McNamara, Catherine Morgan, Iona Novak, Joy E Olsen, Nadia G Reid, Paul Scuffham, Koa Whittingham, Jeanie Ly Cheong, Alicia J Spittle

Arch Dis Child. Online ahead of print, 2025 Aug 28

Objective: To determine the predictive accuracy of an early high risk of cerebral palsy (CP) classification for CP diagnosed by 2 years' corrected age within an implementation study of international clinical CP guidelines. Design: Implementation cohort study. Setting: Eleven Australian neonatal intensive care units. Patients: 453 infants born 2019–21 <28 weeks' gestation, or ≥28 weeks with other newborn-detectable risk factors for CP. Interventions: Implementation included providing professional development for clinicians, technology (smartphone app) and health network peer support. Infants were classified as high risk of CP if they had abnormal findings on at least two of the following three assessments: neonatal neuroimaging, General Movements Assessment at 3–4 months or Hammersmith Infant Neurological Examination. Main outcome measures: Baseline perinatal data and 2-year outcome data were collected from medical record review. Any parent-report of CP at the 2-year interview was confirmed by medical records and/or a paediatrician's report. We calculated predictive values for high risk of CP classification for confirmed CP at 2 years. Results: We obtained 2-year outcomes from 425 infants (95%). High risk of CP was classified in 105 (25%) of these infants at a mean age of 3.5 months (SD 2.5). This classification demonstrated 91% sensitivity (95% CI 82% to 96%), 90% specificity (95% CI 86% to 93%) and 90% accuracy (95% CI 87% to 93%) for predicting CP, with a mean age of diagnosis of 10.8 months (SD 6.3). Conclusion: Being classified as high risk of CP using a combination of neuroimaging, General Movements Assessment and/or Hammersmith Infant Neurological Examination can predict CP by 2 years of age with high accuracy.
PMID: 40877021

27.A Multidimensional and Integrated Rehabilitation Approach (A.M.I.R.A.) for Infants at Risk of Cerebral Palsy and Other Neurodevelopmental Disabilities

Angela Maria Setaro, Erika Loi, Serena Micheletti, Anna Alessandrini, Nicole D'Adda, Andrea Rossi, Jessica Galli, Amira Group, Elisa Fazzi

Children (Basel). 2025 Jul 30;12(8):1003

Background/Objectives: Early experiences can significantly influence brain development, particularly when they occur during specific time windows known as sensitive or critical periods. Therefore, the early promotion of neurodevelopmental functions is crucial in children at risk for neurodevelopmental disabilities, such as those with cerebral palsy. This article introduces AMIRA (A Multidimensional and Integrated Rehabilitation Approach), a rehabilitative framework designed for infants at risk of neurodevelopmental disabilities.
Methods: AMIRA is intended to guide clinical-rehabilitation reasoning rather than prescribe a rigid sequence of predetermined activities for the child. The theoretical foundation and structure of AMIRA are presented by formalizing its criteria, objectives, tools, and intervention procedures. The framework comprises four distinct sections, each supported by adaptive strategies to facilitate access to materials and to promote play-based interactions among the child, their environment, and communication partners. Particular attention is given to optimizing both micro- and macro-environments for children with, or at risk of, co-occurring visual impairment. Each rehabilitative section includes three progressive phases: an initial observation phase, a facilitation phase to support the child's engagement, and an active experimentation phase that gradually introduces more challenging tasks.
Results: The intervention pathways in AMIRA are organized according to six core developmental domains: behavioral-emotional self-regulation, visual function, postural-motor skills, praxis, interaction and communication, and cognitive function. These are outlined in structured charts that serve as flexible guidelines rather than prescriptive protocols. Each chart presents activities of increasing complexity aligned with typical developmental milestones up to 24 months of age. For each specific ability, the corresponding habilitation goals, contextual recommendations (including environmental setup, objects, and tools), and suggested activities are provided.
Conclusions: This study presents a detailed intervention approach, offering both a practical framework and a structured set of activities for use in rehabilitative settings. Further studies will explore the efficacy of the proposed standardized approach.
PMID: 40868455

28.Case Report of a Neonate with Severe Perinatal Asphyxia: A Multidisciplinary Approach Involving Therapeutic Hypothermia and Physiotherapy

Marcelina Powązka, Maciej Grzeszczuk, Tatiana Jagodzińska, Ewa Syweńki, Rita Suchanska, Ewa Gieysztor

Pediatr Rep. 2025 Aug 11;17(4):86

Abstract
Hypoxic-ischaemic encephalopathy (HIE), a leading cause of perinatal mortality and neurological impairment, affects 1–8/1000 live births in developed countries. Therapeutic hypothermia (TH), the standard treatment for moderate to severe HIE, reduces brain injury by lowering metabolic demand and inhibiting apoptosis. This case study presents a full-term female newborn delivered via caesarean section due to intrauterine asphyxia, with meconium aspiration syndrome and severe HIE (Apgar 0/0/0/2). Notwithstanding the presence of multiorgan failure and grade II intraventricular haemorrhage, TH was initiated within six hours. The patient received circulatory and respiratory support, sedation, and nitric oxide. Early rehabilitation was initiated immediately. Neurofunctional assessment using the TIMP test revealed initial delays (16–25th percentile) at 11 weeks of age; however, the subsequent two evaluations, conducted approximately every two weeks, indicated that the patient was within normal developmental ranges. A similar outcome was observed in the AIMS assessment conducted at seven months of age, which also yielded normal results. Despite MRI findings post-TH showing hypoxic and haemorrhagic lesions, the patient achieved normal development. This case demonstrates the effectiveness of combining TH with early physiotherapy in mitigating severe consequences of HIE, such as cerebral palsy and epilepsy. Long-term follow-up remains crucial for detecting later deficits, particularly during school age. The outcome of this case underscores the significance of timely intervention and multidisciplinary care. While TH and rehabilitation have been shown to improve prognosis, ongoing monitoring is crucial to ensure optimal neurological development trajectories.
PMID: 40863720

29.Mesenchymal Stromal Cells: A New Hope for Perinatal Arterial Ischemic Stroke

Rhandi Christensen, Mahendranath Moharir

Stroke. 2025 Sep;56(9):2419–2421. Epub 2025 Aug 25

Abstract
No abstract available.
PMID: 40854047