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Cerebral palsy research news

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Interventions and Management

1. Effects of Video-Based Exercises and Conventional Physiotherapy on Upper Extremity Functionality, Selective Motor Control, and Proprioception in Unilateral Cerebral Palsy: A Randomized Controlled Trial

Demet Gözaçan Karabulut, Çağtay Maden, Yalçın Karabulut, Mehmet Aslan

Games Health J. 2024 Jul 29. doi: 10.1089/g4h.2024.0044. Online ahead of print.

Objective: The present study was conducted to evaluate the effects of video-based exercises added to conventional physiotherapy (CPT) on upper extremity functionality, selective motor control, and proprioception in individuals with unilateral cerebral palsy (UCP). Materials and Methods: Thirty patients with UCP were randomized into two groups: the intervention group (15 individuals with a mean age of 9.2 ± 3.8 years) and the control group (15 individuals with a mean age of 8.3 ± 4.1 years). The intervention group received 8 weeks of video-based exercises, and the control group received 8 weeks of conventional physiotherapy. Upper extremity functional abilities, upper extremity selective motor control, proprioception, and entertainment levels were evaluated before and after the intervention for all groups. Results: While a significant change was observed in the mean scores of the ABILHAND-Kids, Selective Control of the Upper Extremity Scale right-left scores, shoulder flexion, shoulder abduction, and elbow flexion proprioception angles after the video-based exercises in the intervention group ($P < 0.05$), a significant change was observed only in the 60-degree flexion angle in the control group ($P = 0.001$). In the comparison between the groups, there were significant differences in post-intervention value only in shoulder flexion and abduction angles, whereas there was no difference between the groups in elbow flexion angles ($P > 0.05$). Conclusion: Incorporating video-based exercises into the upper extremity rehabilitation processes of individuals with UCP is beneficial in terms of upper extremity functionality, selective motor control, and proprioception.

PMID: 39069879

2. In-hospital post-operative fever after posterior spinal fusion for neuromuscular scoliosis in non-ambulatory cerebral palsy patients: is there value for clinical workup for an isolated fever?

K Aaron Shaw, Joshua S Murphy, Ryan Koehler, Hilary Harris, Numera Sachwani, Robert Bruce, Dennis Devito, Michael Schmitz, Jorge Fabregas, Daniel Raftis, Just West, Nicholas Fletcher

Spine Deform. 2024 Jul 29. doi: 10.1007/s43390-024-00930-y. Online ahead of print.

Purpose: Children with neuromuscular scoliosis (NMS) resultant to cerebral palsy (CP) are at a heightened risk for complications following surgical treatment. These children have a reported 22-64% rate of post-operative fever development, and additional fever workup has been shown to have limited clinical utility. However, this has yet to be investigated in the setting of an accelerated discharge (AD) pathway. Methods: A retrospective review of children with non-ambulatory CP treated at 2 centers with posterior spinal fusion (PSF) for NMS was performed. One institution uses a standardized AD post-operative pathway for NMS patients, whereas the second institution had no standard pathway. A post-operative fever was defined as temperature > 38.5 °C. Target outcome variables included the development of a fever as well as re-admission within 90 days of surgery. Results: A total of 122 non-ambulatory children were identified (82% GMFCS V, mean 14.3 ± 3.4 years at surgery). A post-operative fever was documented in 75.4% of patients (N = 92) and all additional culture studies

reported negative results. Children admitted to the PICU were more likely to undergo a fever workup (P < 0.001) and more likely to receive additional or extended antibiotic therapy (P < 0.001). Children treated at the AD pathway had a significantly lower rate of PICU admission (P < 0.001). Post-operative PICU admission was associated with a post-operative fever (49.5% vs 25%, P = 0.03). Conclusion: Non-ambulatory CP children with NMS undergoing PSF have a 75.4% rate of developing early post-operative fevers. Reflexive fever work-ups provided limited clinical utility while increasing the hospital length of stay and potentially exposing patients to antibiotic-related complications.

PMID: 39069587

3. Impact of Spinal Deformity and Surgery on Health-Related Quality of Life in Cerebral Palsy: A Multicenter Prospective Controlled Trial

Patrick J Cahill, Unni Narayanan, Margaret Bowen, Sulagna Sarkar, Joshua M Pahys, Firoz Miyanji, Burt Yaszay, Suken A Shah, Paul D Sponseller; Harms Study Group

J Pediatr Orthop. 2024 Jul 30. doi: 10.1097/BPO.0000000000002774. Online ahead of print.

Background: Spinal fusion for scoliosis associated with cerebral palsy (CP) is challenging to study because specialized outcome measures are needed. Therefore, evidence in favor of the benefits of surgery has not been firmly established. This study aimed to determine if corrective spinal fusion improves health-related quality of life (HRQoL) in children with CP scoliosis at 2 years. Methods: Children with CP and scoliosis who met the criteria for posterior spinal fusion were offered enrollment at 16 US and Canada centers. Participants' families selected either operative intervention (OP) or nonoperative treatment (NON) in discussion with their surgeon with no influence by the decision to participate in the research study. Demographic, clinical data (function level, magnitude of deformity, comorbidities), and HRQoL (CPCHILD Questionnaire) were collected at baseline and 2 years. Change (from baseline) in total CPCHIL scores was the primary outcome. Results: Three hundred one OP and 34 NON subjects had complete baseline and 2-year data. At baseline, both groups were comparable in function level, comorbid status, and CPCHILD scores (52.1 ±15.3 vs. 53.4 ±14.5; P=0.66). The OP group had a larger spinal deformity magnitude (84.5˚ ± 21.8˚ vs. 66.3˚ ± 18.1˚) (P=0.001). The total CPCHILD score improved in the OP group by 6.6 points (P<0.001). NON scores were unchanged (+1.2; P=0.65) during follow-up. There were also significant score increases in the OP group for 5 of 6 CPCHILD domains. The change in CPCHILD scores from enrollment to 2 years was more significant in the OP group (P=0.05). Conclusion: For children with CP who undergo spinal fusion, HRQoL improved over preoperative levels and an unchanged nonoperative control group. Level of evidence: Level II.

PMID: 39077879

4. A coactivation strategy in anticipatory postural adjustments during voluntary unilateral arm movement while standing in individuals with bilateral spastic cerebral palsy

Daisuke Kawaguchi, Hidehito Tomita, Yoshiki Fukaya, Akira Kanai

Hum Mov Sci. 2024 Jul 30:96:103255. doi: 10.1016/j.humov.2024.103255. Online ahead of print.

Individuals with bilateral spastic cerebral palsy (BSCP) reportedly has problems with anticipatory postural adjustments (APAs) while standing. However, the use of coactivation strategy in APAs in individuals with BSCP has conflicting evidence. Hence, this study aimed to investigate postural muscle activities in BSCP during unilateral arm flexion task in which postural perturbations occur in the sagittal, frontal, and horizontal planes. We included 10 individuals with BSCP with level II on the Gross Motor Function Classification System (BSCP group) and 10 individuals without disability (control group). The participants stood on a force platform and rapidly flexed a shoulder from 0° to 90° at their own timing. Surface electromyograms were recorded from the rectus femoris, medial hamstring, tibialis anterior, and medial gastrocnemius. The control group showed a mixture of anticipatory activation and inhibition of postural muscles, whereas the BSCP group predominantly exhibited anticipatory activation with slight anticipatory inhibition. Compared with the control group, the BSCP group tended to activate the ipsilateral and contralateral postural muscles and the agonist-antagonist muscle pairs. The BSCP group had a larger disturbance in postural equilibrium, quantified by the peak displacement of center of pressure during the unilateral arm flexion, than those without disability. Individuals with BSCP may use coactivation strategy, mainly the anticipatory activation of postural muscle activity, during a task that requires a selective postural muscle activity to maintain stable posture.

PMID: 39089055

5. Beyond words: embracing migration percentage as the universal measurement for hip displacement in children with cerebral palsy by radiologists and orthopedic surgeons

Daniel Raftis, Sarah Dance, Laura Mazudie Ndjonko, Ahmed Elabd, Sean Tabaie

J Pediatr Orthop B. 2024 Sep 1;33(5):515-517. doi: 10.1097/BPB.0000000000001162. Epub 2024 Jul 30.

No abstract available

PMID: 39087521

6. Redisplacement rate after bony hip reconstructive surgery in nonambulatory patients with cerebral palsy: a systematic review and meta-analysis

Heide Delbrück, Yannik Gehlen, Frank Hildebrand, Reinald Brunner

EFORT Open Rev. 2024 Aug 1;9(8):773-784. doi: 10.1530/EOR-23-0043.

Purpose: Up to 90% of nonambulatory patients with cerebral palsy (CP) experience hip displacement during their lifetime. Reconstructive surgery is recommended. Redisplacement rate is an outcome parameter. Methods: In a systematic literature review (MEDLINE, Embase and CENTRAL databases) until January 2023 we searched for reports with redisplacement rates after bony hip reconstructive surgery in nonambulatory patients. Quantitative data synthesis, subgroup analysis and meta-regression with moderators were carried out. Results: The pooled mean redisplacement rate was 16% (95% CI: 12-21%) with a prediction interval of 3-51% (Q: 149; df: 32; P < 0.001; I2: 78%; τ2: 0.67 and τ: 0.82) in 28 studies (1540 hips). Varus derotation osteotomy (VDRO) alone showed a higher redisplacement rate than VDRO + pelvic osteotomy (30% vs 12%, P < .0001). Mean age in the VDRO-alone subgroup was 7.1 years and in the combined group 9.5 years (P = .004). In meta-regression, lower redisplacement rates were observed with higher preoperative migration index (MI) (correlation coefficient: -0.0279; P = .0137), where comprehensive surgery was performed. Variance in true effects are explained by type of bone surgery (57%), preoperative MI (11%), age (5%) and MI for definition of failure (20%). No significant reduction in the redisplacement rate could be observed over the mid-years of studies (1977-2015). Conclusion: Our pooled data support the more extensive surgical approach in patients with high preoperative MI and emphasize the superiority of combined surgery. Studies should report a coordinated set of parameters and outcome classifications according to internationally accepted gradings to reduce redisplacement in future.

PMID: 39087495

7. Letter to the Editor re: "States RA, Salem Y, Krzak JJ, Godwin EM, McMulkin ML, Kaplan SL. Three-dimensional instrumental gait analysis for children with cerebral palsy: an evidence-based clinical practice guideline. Pediatr Phys Ther. 2024;36:182-206"

No authors listed

Pediatr Phys Ther. 2024 Jul 30. doi: 10.1097/PEP.0000000000001137. Online ahead of print.

No abstract available

PMID: 39074057

8. Postoperative pain management strategies following selective dorsal rhizotomy in pediatric cerebral palsy patients: a systematic review of published regimens

Victor M Lu, Sima Vazquez, Toba N Niazi

Review Childs Nerv Syst. 2024 Jul 30. doi: 10.1007/s00381-024-06559-6. Online ahead of print.

Background: Surgical selective dorsal rhizotomy (SDR) in appropriate pediatric cerebral palsy patients is an effective treatment for spasticity. However, there remains heterogeneity reported in postoperative pain management with and without opioid medication in this delicate cohort. The objective of this study was to aggregate pertinent metadata by means of systematic review to summarize all relevant postoperative pain regimens in the literature. Methods: Searches of multiple electronic databases from inception to June 2024 were conducted following PRISMA guidelines. Articles were screened against pre-specified criteria. Outcomes and regimens were then summarized. Results: A total of 16 cohort studies were included in this study published between 1989 and 2024. Amongst all studies, outcomes were reported for a total of 636 with median cohort age 6.3 years, and median cohort male proportion 62% was reported. Four studies reported regimens involving systemic analgesia, 8 studies reported regimens involving epidural analgesia, and the remaining 4 studies reported regimens involving intrathecal analgesia. All studies primary pain management involved opioid medication, with 8 studies having opioid medication available as indicated, 3 studies having opioid medication as a single dose, and the remaining studies having opioid medication as a continuous agent in the immediate postoperative period. Across all studies, rates of desaturations, nausea and/or vomiting, and pruritis ranged from 0 to 55%, 25 to 82%, and 15 to 70% respectively. Eleven of the 16 studies included a comparative component, demonstrating that their regimen was at least comparable to their control regimen, if not superior. Conclusions: Multiple variations of postoperative pain management in pediatric cerebral palsy patients following SDR have been reported in the literature, involving systemic, epidural, and intrathecal analgesia. Concerns for adverse effects with the

utilization of opioid medication has led to the trend towards multimodal pain management relying more on non-opioid medication regimens in the more recent literature.

PMID: 39080014

9. Postoperative outcomes and stimulation responses for sectioned nerve roots during selective dorsal rhizotomy in cerebral palsy

Ziyad Makoshi, Monica Islam, Jennifer McKinney, Jeffrey Leonard

Acta Neurochir (Wien). 2024 Jul 30;166(1):308. doi: 10.1007/s00701-024-06187-8.

Background: Cerebral palsy (CP) is the most cause of motor dysfunction in children. Selective dorsal rhizotomy (SDR) plays a major role in long term spasticity control. However, limited data exists on the effect of SDR on postoperative spasticity treatment requirements and supraspinal effects, and the stimulation responses of dorsal nerve roots in those with CP. Methods: The current study included the outcome for 35 individuals undergoing SDR for motor functional outcome, spasticity, baclofen dose changes, botulinum toxin injection frequency, and spasticity related orthopedic procedures. We also report on the stimulation responses in 112 individuals who underwent SDR at our institution. Results: There was a significant difference in gross motor function measures (GMFM)-66 scores at last follow up that remained present when considering only ambulatory children but not with non-ambulatory children. Ashworth scores were significantly decreased for both upper and lower extremities after SDR at all follow up points. There was a significant decrease in Baclofen dose and botulinum toxin injections requirements after SDR, but no significant difference in the need for orthopedic intervention. A total of 5502 dorsal nerve roots were tested showing a decrease in stimulation intensity and increase in grade on the right side and for descending lumbosacral levels. Conclusions: SDR improves gross motor scores during short term follow up but has additional benefits in decreasing baclofen dosing and botulinum toxin injections requirements after surgery. They stimulation responses of sectioned dorsal nerve roots adds to the limited available data and our understanding of the pathological changes that occur in CP.

PMID: 39078485

10. Modified patella tendon plication in ambulant children with cerebral palsy

A M Khan, Y Alkhalfan, A Afsharpad, M Kokkinakis

Ann R Coll Surg Engl. 2024 Jul 31. doi: 10.1308/rcsann.2024.0052. Online ahead of print.

No abstract available

PMID: 39081177

11. A usability study on the inGAIT-VSO: effects of a variable-stiffness ankle-foot orthosis on the walking performance of children with cerebral palsy

Luc van Noort, Nikko Van Crey, Elliott J Rouse, Ignacio Martínez-Caballero, Edwin H F van Asseldonk, Cristina Bayón

J Neuroeng Rehabil. 2024 Aug 1;21(1):132. doi: 10.1186/s12984-024-01433-7.

Background: Ankle-foot orthoses (AFOs) are commonly used by children with cerebral palsy (CP), but traditional solutions are unable to address the heterogeneity and evolving needs amongst children with CP. One key limitation lies in the inability of current passive devices to customize the torque-angle relationship, which is essential to adapt the support to the specific individual needs. Powered alternatives can provide customized behavior, but often face challenges with reliability, weight, and cost. Overall, clinicians find certain barriers that hinder their prescription. In recent work, the Variable Stiffness Orthosis (VSO) was developed, enabling stiffness customization without the need for motors or sophisticated control. Methods: This work evaluates a pediatric version of the VSO (inGAIT-VSO) by investigating its impact on the walking performance of children with CP and its potential to be used as a tool for assessing the effect of variable stiffness on pathological gait. Data was collected for three typical developing (TD) children and six pediatric participants with CP over two sessions involving walking/balance tasks and questionnaires. Results: The sensors of the inGAIT-VSO provided useful information to assess the impact of the device. Increasing the stiffness of the inGAIT-VSO significantly reduced participants' dorsiflexion and plantarflexion. Despite reduced range of motion, the peak restoring torque increased with stiffness. Overall the participants' gait pattern was altered by reducing crouch gait, preventing drop-foot and supporting body weight. Participants with CP exhibited significantly lower ($p < 0.05$) physiological cost when walking with the inGAIT-VSO compared to normal condition (own AFO or shoes only). Generally, the device did not impair walking and balance of the participants compared to normal conditions. According to the questionnaire results, the inGAIT-VSO was easy to use and participants reported positive experiences. Conclusion: The inGAIT-VSO stiffnesses significantly affected participants' plantarflexion and dorsiflexion and yielded objective data regarding walking performance in pathological gait (e.g. ankle angle, exerted torque and restored

assistive energy). These effects were captured by the sensors integrated in the device without using external equipment. The inGAIT-VSO shows promise for customizing AFO stiffness and aiding clinicians in selecting a personalized stiffness based on objective metrics.

PMID: 39090725

12. A prospective non-randomized feasibility study of an online membership-based fitness program for promoting physical activity in people with mobility impairments

Laurie A Malone, Tapan Mehta, Christen J Mendonca, Sangeetha Mohanraj, Mohanraj Thirumalai

Pilot Feasibility Stud. 2024 Aug 2;10(1):104. doi: 10.1186/s40814-024-01528-x.

Background: People with mobility limitations have a disproportionately higher rate of acquiring secondary conditions such as obesity, cardiovascular comorbidity, pain, fatigue, depression, deconditioning, and type 2 diabetes. These conditions often result from poor access to home and community-based health promotion/wellness programs. The aim of this project was to determine the feasibility of delivering an online community membership-based fitness program for individuals with mobility impairments. Methods: For this prospective single-arm study, participants were recruited from members of a community fitness facility that serves people with physical disabilities and chronic health conditions. While all members had access to the online platform, individuals had to opt-in to participate in the research component. Activity options included 16 pre-recorded videos and 9 live exercise classes. During the 8-week program, participants had an opportunity to earn three exercise incentives for reaching certain activity milestones. Enrollment percentage, attendance, and attrition were tracked to assess program feasibility and acceptability. Changes in participant-reported outcomes including self-reported physical activity, psychosocial outcomes, and health-related quality of life (HRQOL) were examined using non-parametric analyses. Results: A total of 146 eligible individuals were screened of which 33 enrolled (22.6%). Two participants withdrew from the study, so a total of 31 were used for analyses. Participants included 29 women and 12 Black people with an average age of 60 (± 15.9) years. Health conditions included stroke, post-polio, arthritis, neuropathy, cerebral palsy, and obesity. Ten participants used an assistive device to get around inside the home. Twenty-six participants (78.8%) completed the online program, and 5 participants earned all 3 participation incentives. The mean number of live Zoom exercise classes attended by the participants was 12.8 (range = 0-43) over 8 weeks; 3 of 31 participants did not attend any classes. On average, participants watched 128 min (range = 0-704 min) of pre-recorded videos; 6 of 31 participants did not view any pre-recorded videos. Self-reported physical activity showed the largest improvement (11.15 units; 95% CI, 3.08, 19.56) with an effect size of 0.51 (Cohen's d). Conclusions: This pilot study of an online membership-based fitness program for people with mobility impairments demonstrated preliminary effectiveness in increasing physical activity and was found to be feasible and acceptable. Feasibility endpoints do indicate potential to improve retention. These results suggest that online delivery of exercise programs can broaden the reach of specialized community fitness programs and is a promising direction for future work and fully powered trials are warranted to assess intervention efficacy. Trial registration: ClinicalTrials.gov, NCT05138809. Registered September 2, 2021, ClinicalTrials.gov PRS: Record Summary NCT05138809.

PMID: 39095876

13. Contributions of the sensory system to motor learning : Focus on Cerebral Palsy

Max J Kurz, Morgan T Busboom

Pediatr Res. 2024 Jul 27. doi: 10.1038/s41390-024-03421-y. Online ahead of print.

No abstract available

PMID: 39068271

14. Gross Motor Family Report: Refinement and evaluation of psychometric properties

Elton D D Magalhães, Peter Rosenbaum, Marilyn Wright, F Virginia Wright, Lesley Pritchard, Kennea M A Ayupe, Ana Carolina de Campos, Rosane S Morais, Hercules R Leite, Paula S C Chagas

Dev Med Child Neurol. 2024 Jul 30. doi: 10.1111/dmcn.16042. Online ahead of print.

Aim: To refine the Gross Motor Family Report (GM-FR) using parents' input and to evaluate its psychometric properties. Method: In this measurement study, 12 parents of children and adolescents with cerebral palsy (CP), aged 2 to 18 years, classified in all levels of the Gross Motor Function Classification System (GMFCS), were interviewed about their experience completing the GM-FR (content validity). Parents' feedback was used to refine the measure which was then completed by 146 families to evaluate internal consistency, and discriminative and concurrent validity. Forty-six parents completed the GM-FR again, 7 to 30 days later, to evaluate test-retest reliability. Results: GM-FR scoring, pictures, descriptions, and the total number

of items were revised based on parents' feedback. The GM-FR version 2.0 demonstrated high internal consistency (Cronbach's $\alpha = 0.99$), no floor/ceiling effects, and excellent test-retest reliability (intraclass correlation coefficient = 0.99). GM-FR scores discriminated between GMFCS levels ($p < 0.05$) and were strongly negatively correlated with GMFCS level ($r = -0.92$; $p < 0.001$). GM-FR scores correlated positively and strongly with the Gross Motor Function Measure-66 ($r = 0.94$; $p < 0.001$) and the Pediatric Evaluation of Disability Inventory - Computer Adaptive Test mobility domain ($r = 0.93$; $p < 0.001$). Interpretation: Active participation of families in the GM-FR's development facilitated creation of a family-friendly instrument. This study provides strong evidence of reliability and validity to support GM-FR use in clinical practice and research for assessing gross motor performance of children and adolescents with CP.

PMID: 39080984

15. Comprehensive assessment of periodontal health in cerebral palsy: A systematic review and meta-analysis

Thais Alves de Oliveira, Victor Zanetti Drumond, Anna Carolina Rye Sato Kimura, José Alcides Almeida de Arruda, Sharat Chandra Pani, Ricardo Alves Mesquita, Najara Barbosa da Rocha, Lucas Guimarães Abreu

Spec Care Dentist. 2024 Jul 30. doi: 10.1111/scd.13049. Online ahead of print.

Aims: Cerebral palsy (CP) is the term for a set of neurological disorders resulting from brain damage that impairs motor function. The aim of the present study was to perform a systematic review of the literature to determine whether individuals with CP are at a greater risk of negative periodontal health outcomes compared to those without CP. Methods: This study followed the recommendations of the MOOSE guidelines. Electronic searches were conducted in the PubMed, Web of Science, Scopus, Ovid, Embase, and PsycInfo databases. Observational studies assessing periodontal outcomes in individuals with CP were included. Risk of bias was appraised using the Newcastle-Ottawa scale. Meta-analyses were conducted and the results were presented using standardized mean differences (SMD), odds ratios (OR), and 95% confidence intervals (CI). The strength of the evidence was also assessed. Results: A total of 316 records were retrieved from the electronic databases, 17 of which were included in the qualitative synthesis. Meta-analyses revealed significantly higher scores in individuals with CP compared to those without CP for the oral hygiene index (SMD = 0.47 [95% CI: 0.17-0.78, I2 = 80%), gingival index (SMD = 0.75 [95% CI: 0.39-1.11], I2 = 79%), plaque index (SMD = 0.70 [95% CI: 0.07-1.33], I2 = 93%), and calculus index (SMD = 0.98 [95% CI: 0.76-1.20], I2 = 0%). However, no significant difference was found between groups for the prevalence of gingivitis (OR = 1.27 [95% CI: 0.28-5.66], I2 = 93%). The risk of bias for the outcome assessment and statistical tests was low. The strength of the evidence was deemed very low. Conclusion: Individuals with CP may experience more significant negative periodontal health outcomes compared to those without CP.

PMID: 39080876

16. Treatment of Catatonia With Electroconvulsive Therapy in a Patient With Neuropsychiatric Systemic Lupus Erythematosus, Epilepsy, and Cerebral Palsy

Tyler J Thompson, Benjamin D Smart, Heather E Douglas, Sahil Munjal

Case Reports Prim Care Companion CNS Disord. 2024 Jul 25;26(4):24cr03707. doi: 10.4088/PCC.24cr03707.

No abstract available

PMID: 39082958

17. Relationship between somatosensory and visuo-perceptual impairments and motor functions in adults with hemiparetic cerebral palsy

Isabelle Poitras, Alexandre Campeau-Lecours, Catherine Mercier

Front Neurol. 2024 Jul 17:15:1425124. doi: 10.3389/fneur.2024.1425124. eCollection 2024.

Introduction: Children with cerebral palsy (CP) exhibit a variety of sensory impairments that can interfere with motor performance, but how these impairments persist into adulthood needs further investigation. The objective of this study was to describe the sensory impairments in adults having CP and how they relate to motor impairments. Methods: Nineteen adults having CP performed a set of robotic and clinical assessments. These assessments were targeting different sensory functions and motor functions (bilateral and unilateral tasks). Frequency of each type of impairments was determined by comparing individual results to normative data. Association between the sensory and motor impairments was assessed with Spearman correlation coefficient. Results: Impairment in stereognosis was the most frequent, affecting 57.9% of participants. Although less frequently impaired (26.3%), tactile discrimination was associated with all the motor tasks (unilateral and bilateral, either robotic or clinical). Performance in robotic motor assessments was more frequently associated with sensory impairments than with clinical assessments. Finally, sensory impairments were not more closely associated with bilateral tasks than with

unilateral tasks. Discussion: Somatosensory and visuo-perceptual impairments are frequent among adults with CP, with 84.2% showing impairments in at least one sensory function. These sensory impairments show a moderate association with motor impairments.

PMID: 39087017

18. Can we do better supporting young adults with cerebral palsy as they navigate adulthood? A review of current and future transitional practices

Debajyoti Datta, Hedva Chiu, Hana Alazem, Anna McCormick, Guangwen Sun, Albert Tu

Review Neurosurg Focus. 2024 Aug 1;57(2):E14. doi: 10.3171/2024.5.FOCUS24215.

Objective: Patients with cerebral palsy (CP) face lifelong consequences of their condition, and their healthcare needs evolve as they age. Transitional care for these patients is not universally available and various models have been described. In this article, the authors review the current literature surrounding transitional care for patients with CP, focusing predominantly on the neurosurgical aspects of transitional care, and they describe current approaches adopted by programs in North America. They further describe their own experience developing a transitional care clinic for patients with CP, as well as the integration of this program with a multidisciplinary clinic to address the specific challenges that growing patients face in our region. Methods: The authors performed a literature review to identify models, barriers, and assessments of effective transitional care for CP patients. They also reviewed the recommendations of various professional societies regarding transitional care practices. They performed qualitative analysis of the relevant literature. Results: Transitional care has been broadly categorized into transitional care clinics with multidisciplinary teams and facilitator-led transitional care. CP patients have to overcome a variety of barriers, including those from within the healthcare system as well as environmental and personal, during the period of their transition. These challenges are all interconnected, and navigation requires healthcare professionals to work closely with patients and their caregivers. Multiple instruments are described to measure successful transition, which is likely a reflection of the unique needs that a patient may require. Current guidelines recommend that neurosurgeons select a suitable model of care based on their own local practice and available services, develop a well-defined transition plan, and identify a primary transition facilitator or care coordinator. Conclusions: Providing effective transitional care to CP patients remains challenging given the different models of care and the barriers faced by them during the period of transition. In developing a transitional care program for these patients, attention must be given to the resources that are available regionally, with an effort to incorporate the best practices from successful transitional care programs.

PMID: 39088858

19. EPIDEMIOLOGY OF DEPRESSIVE STATES IN ACUTE AND CHRONIC CONDITIONS

I Barreto, J Rocca, Y Guilen, C Galarza, F Valencia

Georgian Med News. 2024 May:(350):31-35.

Depression is the only silent cause that mainly affects the adult population and manifests itself in this case in 4% of the world population. However, more than three quarters of those affected belong to land in urbanization without receiving any type of treatment; a situation that represents a gap in access to mental health services. Now, the hallucinatory relationships mean that this condition has a high level of competition with chronic diseases such as HIV, diabetes, lung disease, asthma, arthritis, angina pectoris and cerebral palsy; Assimilation, it has been detected that patient with affective disorders such as coronary syndrome, inflammation, malnutrition, pain, stress and even critical stages of COVID-19 infection act as risk factors for the development of the disease. In this context, as a result of concern for public health, particularly in countries following the crisis, this study presents a proposal to carry out a review regarding the prevalence of depression in the presence of aggravated cases and crises. Strategies are implemented to address this situation. For this, a systematic review of the literature was carried out, complemented with bibliometric data on scientific contributions, with a period of 10 years (2011-2021) registered in the databases: Web of Science, Scopus and PubMed. In this way, the results allowed us to identify that, in recent years, in the fight to combat this problem, various remedies were used for its treatment and prevention; in which the focus is on the modification of health behaviors and collaborative care, which seeks quality of life in cases of patients with chronic diseases. On the other hand, the bibliometric information allows us to determine that the United States, Australia and Canada are the countries with the greatest scientific production on the subject. It is concluded that, although health services have demonstrated and improved their strategies in recent years, and that part of them have been supported by technological innovation, there are bridging markets at the cultural and socioeconomic level that the treatment and primary care of these patients.

PMID: 39089267

20. Characterization of bilateral reaching development using augmented reality games

Shelby Ziccardi, Samantha Timanus, Ghazaleh Ashrafzadehkian, Stephen J Guy, Rachel L Hawe

Hum Mov Sci. 2024 Jul 30:96:103254. doi: 10.1016/j.humov.2024.103254. Online ahead of print.

Bilateral coordination is commonly impaired in neurodevelopmental conditions including cerebral palsy, developmental coordination disorder, and autism spectrum disorder. However, we lack objective clinical assessments that can quantify bilateral coordination in a clinically feasible manner and determine age-based norms to identify impairments. The objective of this study was to use augmented reality and computer vision to characterize bilateral reaching abilities in typically developing children. Typically developing children (n = 133) ages 6-17 years completed symmetric and asymmetric bilateral reaching tasks in an augmented reality game environment. We analyzed the number of target pairs they could reach in 50 s as well as the time lag between their hands reaching the targets. We found that performance on both tasks developed in parallel, with development slowing but not plateauing after age 12. Children performed better on the symmetric task than asymmetric, both in targets reached and with shorter hand lags. Variability between children in hand lag decreased with age. We also found gender differences with females outperforming males, which were most pronounced in the 10-11 year olds. Overall, this study demonstrates parallel development through childhood and adolescence of symmetric and asymmetric reaching abilities. Furthermore, it demonstrates the ability to quantify bilateral coordination using computer vision and augmented reality, which can be applied to assess clinical populations.

PMID: 39084100

21. Therapeutic insights: Use of ceftazidime-avibactam in pediatric patients

Özge Metin Akcan, Mustafa Gençeli, Talha Üstüntaş, Abdullah Akkuş, Sevgi Pekcan, Metin Doğan

Pediatr Int. 2024 Jan-Dec;66(1):e15787. doi: 10.1111/ped.15787.

Background: The increasing worldwide prevalence of multidrug-resistant (MDR) bacteria underscores the pressing demand for innovative therapeutic solutions. Ceftazidime-avibactam (CAZ-AVI) represents a promising new drug combination that has received approval for specific infection types. However, there is limited information regarding its application in pediatric patients. Methods: This study investigates the effectiveness and adverse reactions associated with CAZ-AVI treatment in pediatric patients with life-threatening infections caused by MDR pathogens. The study was conducted at a tertiary children's hospital between December, 2021 and July, 2023. Results: A total of 21 patients with life-threatening infections caused by MDR pathogens were enrolled in the study. All patients had underlying medical conditions: 10 had cerebral palsy, four had congenital neurometabolic disease, two had Nieman-Pick disease, two had cystic fibrosis, two had primary immunodeficiency, and one had leukemia. Among these, 12 patients had tracheostomies. Eight patients received CAZ- AVI monotherapy, and 13 patients received combination therapy. Microbiological eradication was achieved in 18 patients (85.7%), and a clinical response was observed in 20 patients (95.2%). Two patients (9.5%) experienced relapse with the same bacteria. One patient developed anaphylaxis, and one patient had elevated creatine phosphokinase levels that normalized following discontinuation of treatment. One patient died during the study period due to gastrointestinal bleeding. Conclusions: Ceftazidime-avibactam may be a promising new drug option for the treatment of life-threatening infections caused by MDR Gram-negative microorganisms in pediatric patients. However, further studies with larger case series are needed to further evaluate the efficacy and safety of CAZ-AVI in this population.

PMID: 39087252

22. Long-Term Outcomes Following Hypoxic Ischemic Encephalopathy

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Review Clin Perinatol. 2024 Sep;51(3):683-709. doi: 10.1016/j.clp.2024.04.008. Epub 2024 May 28.

Hypoxic ischemic encephalopathy (HIE) is the most common cause of neonatal encephalopathy and results in significant morbidity and mortality. Long-term outcomes of the condition encompass impairments across all developmental domains. While therapeutic hypothermia (TH) has improved outcomes for term and late preterm infants with moderate to severe HIE, trials are ongoing to investigate the use of TH for infants with mild or preterm HIE. There is no evidence that adjuvant therapies in combination with TH improve long-term outcomes. Numerous trials of various adjuvant therapies are underway in the quest to further improve outcomes for infants with HIE.

PMID: 39095104

23. Causes and Terminology in Neonatal Encephalopathy: What is in a Name? Neonatal Encephalopathy, Hypoxic-ischemic Encephalopathy or Perinatal Asphyxia

Aoife Branagan, Eleanor J Molloy, Nadia Badawi, Karin B Nelson

Review Clin Perinatol. 2024 Sep;51(3):521-534. doi: 10.1016/j.clp.2024.04.015. Epub 2024 May 23.

Neurologic depression in term/near-term neonates (neonatal encephalopathy, NE) is uncommon with modern obstetric care. Asphyxial birth, with or without co-factors, accounts for a minority of NE, while maldevelopment (congenital malformations, growth aberrations, genetic, metabolic and placental abnormalities) plays an enlarging role in identifying etiologic subgroups of NE. The terms NE and hypoxic-ischemic encephalopathy (HIE) have not been employed uniformly, hampering research and clinical care. The authors propose the term NE as an early working-diagnosis, to be supplemented by a diagnosis of NE due to HIE or to other factors, as a final diagnosis once workup is complete.

PMID: 39095093

24. Current status and controversies in the treatment of neonatal hypoxic-ischemic encephalopathy: A review

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Review Medicine (Baltimore). 2024 Aug 2;103(31):e38993. doi: 10.1097/MD.0000000000038993.

Neonatal hypoxic-ischemic encephalopathy is a type of traumatic brain injury caused by insufficient cerebral perfusion and oxygen supply in the perinatal neonate, which can be accompanied by different types of long-term neurodevelopmental sequelae, such as cerebral palsy, learning disabilities, mental retardation and epilepsy It is one of the main causes of neonatal death and disability, and it has caused a great burden on families and society. Therefore, this article mainly reviews the latest developments in mild hypothermia therapy and related drugs for neonatal hypoxic-ischemic encephalopathy.

PMID: 39093737

25. Reader Response: Risk Factors and Outcomes for Cerebral Palsy With Hypoxic-Ischemic Brain Injury Patterns Without Documented Neonatal Encephalopathy

Floris Groenendaal

Neurology. 2024 Aug 27;103(4):e209485. doi: 10.1212/WNL.0000000000209485. Epub 2024 Jul 31.

No abstract available

PMID: 39083725

26. Editors' Note: Risk Factors and Outcomes for Cerebral Palsy With Hypoxic-Ischemic Brain Injury Patterns Without Documented Neonatal Encephalopathy

James E Siegler, Steven L Galetta

Editorial Neurology. 2024 Aug 27;103(4):e209786. doi: 10.1212/WNL.0000000000209786. Epub 2024 Jul 31.

No abstract available

PMID: 39083720

27. Author Response: Risk Factors and Outcomes for Cerebral Palsy With Hypoxic-Ischemic Brain Injury Patterns Without Documented Neonatal Encephalopathy

Mary Dunbar

Neurology. 2024 Aug 27;103(4):e209557. doi: 10.1212/WNL.0000000000209557. Epub 2024 Jul 31.

No abstract available

PMID: 39083708

28. Integrating Clinical and Neuroimaging Markers to Predict the Onset of Posthemorrhagic Ventricular Dilatation in Preterm Neonates

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Pediatr Neurol. 2024 Jul 11:159:4-11. doi: 10.1016/j.pediatrneurol.2024.07.005. Online ahead of print.

Background: Posthemorrhagic ventricular dilatation (PHVD) is a major complication of intraventricular hemorrhage (IVH); it

is associated with high risks of cerebral palsy and cognitive deficits compared with infants without PHVD. This study aims to explore the early perinatal risk factors-associated with the risk of progressive PHVD. Methods: Neonates ≤29 weeks gestational age (GA) with Grade II-III IVH and periventricular hemorrhagic infarct (PVHI) between 2015 and 2021 were retrospectively reviewed. All cranial ultrasounds done within 14 days postnatal age (PNA) were assessed for grade of IVH, anterior horn width (AHW), ventricular index (VI), and thalamo-occipital index (TOD). The outcome was defined as death of any cause or VI and/or AHW and/or TOD ≥ moderate-risk zone based on an ultrasound done beyond two weeks PNA. Results: A total of 146 infants with a mean GA of 26 ± 1.8 weeks, birth weight 900 ± 234 g were included, 46% were females. The primary outcome occurred in 56 (39%) infants; among them 17 (30%) and 11 (20%) needed ventricular reservoir and shunt insertion, respectively. The risk factors present within 14 days PNA that significantly increased the odds of developing PHVD were hemodynamically significant patent ductus arteriosus (odds ratio [OR] 6.1, 95% confidence interval [CI] 1.9 to 22), culture-proven sepsis (OR 5.4, 95% CI 1.8 to 18), Grade III IVH (OR 4.6, 95% CI 1.1 to 22), PVHI (OR 3.0, 95% CI 0.9 to 10), and VI (OR 2.1, 95% CI 1.6 to 2.9). Conclusions: Clinical predictors such as significant ductus arteriosus and bacterial septicemia, along with risk levels of AHW and VI measured with early cranial ultrasounds, are potential predictors of subsequent onset of PHVD.

PMID: 39089183

29. The RhoB p.S73F mutation leads to cerebral palsy through dysregulation of lipid homeostasis

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EMBO Mol Med. 2024 Jul 30. doi: 10.1038/s44321-024-00113-2. Online ahead of print.

Cerebral palsy (CP) is a prevalent neurological disorder that imposes a significant burden on children, families, and society worldwide. Recently, the RhoB p.S73F mutation was identified as a de novo mutation associated with CP. However, the mechanism by which the RhoB p.S73F mutation causes CP is currently unclear. In this study, rabbit models were generated to mimic the human RhoB p.S73F mutation using the SpG-BE4max system, and exhibited the typical symptoms of human CP, such as periventricular leukomalacia and spastic-dystonic diplegia. Further investigation revealed that the RhoB p.S73F mutation could activate ACAT1 through the LYN pathway, and the subsequently altered lipid levels may lead to neuronal and white matter damage resulting in the development of CP. This study presented the first mammalian model of genetic CP that accurately replicates the RhoB p.S73F mutation in humans, provided further insights between RhoB and lipid metabolism, and novel therapeutic targets for human CP.

PMID: 39080495

30. Effect of cannabidiol as a neuroprotective agent on neurodevelopmental impairment in rats with neonatal hypoxia

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Brain Dev. 2024 Jul 26:S0387-7604(24)00097-4. doi: 10.1016/j.braindev.2024.07.002. Online ahead of print.

Objective: This study aims to investigate the neuroprotective effects of cannabidiol (CBD) on neurodevelopmental impairments in rats subjected to neonatal hypoxia, specifically examining its potential to mitigate motor and sensory deficits without the confounding effects of ischemia. Methods: Neonatal Sprague-Dawley rats were allocated to one of four groups: Control, Control-CBD, Hypoxia, and Hypoxia-CBD. Hypoxia was induced on postnatal days 0 and 1. CBD (50 mg/kg) was administered orally for 14 days starting at postnatal day 0. Neurodevelopmental outcomes were assessed using the Neurodevelopmental Reflex Testing in Neonatal Rat Pups scale and the Revised Neurobehavioral Severity Scale for rodents. Statistical analyses were conducted using two-way and one-way ANOVA, with Tukey's post-hoc tests for group comparisons. Results: Pup weights were recorded on specified postnatal days, with no significant differences observed across the groups ($p = 0.1834$). Significant neurological impairments due to hypoxia were noted in the Control group compared to the Hypoxia group, particularly in hindlimb grasping on postnatal day 3 ($p = 0.0025$), posture on postnatal day 12 ($p = 0.0073$), and in general balance and sound reflex on postnatal day 20 ($p = 0.0016$ and $p = 0.0068$, respectively). Additionally, a statistically significant improvement in posture was observed in the Hypoxia-CBD group compared to the Hypoxia group alone ($p = 0.0024$). Conclusion: Our findings indicate that CBD possesses neuroprotective properties that significantly counteract the neurodevelopmental impairments induced by neonatal hypoxia in rats. This study not only supports the therapeutic potential of CBD in managing conditions characterized by neurodevelopmental challenges due to hypoxia but also underscores the necessity for further investigation into the specific molecular mechanisms driving CBD's neuroprotective effects. Further research is essential to explore CBD's clinical applications and its potential role in treating human neurodevelopmental disorders.

PMID: 39068045

Prevention and Cure

31. Magnesium sulfate for fetal neuroprotection in preterm pregnancy: a meta-analysis of randomized controlled trials

Kyana Jafarabady, Arman Shafiee, Nasim Eshraghi, Seyyed Amirhossein Salehi, Ida Mohammadi, Shahryar Rajai, Zahra Zareian, Fatemeh Movahed, Mahmood Bakhtiyari

Meta-Analysis BMC Pregnancy Childbirth. 2024 Aug 1;24(1):519. doi: 10.1186/s12884-024-06703-9.

Background: Intravenous administration of magnesium sulfate (MgSO4) to expectant individuals before childbirth, has been evaluated to reduce the likelihood of mortality and occurrence cerebral palsy in their offspring. Therefore, this systematic review and meta-analysis conducted to determine if were the prophylactic use of magnesium sulfate in women at risk for preterm delivery leads to decrease in the incidence of death or cerebral palsy. Methods: A comprehensive search of electronic databases was done to identify relevant studies. Selection of eligible studies was based on predetermined inclusion criteria. Data extraction was performed, and the methodological quality of the selected studies was assessed using appropriate evaluative tools. A meta-analysis was carried out to estimate the overall effect of intravenous administration of magnesium sulfate on the incidence of death or cerebral palsy. Results: A total of 7 studies met the inclusion criteria and were included in the final analysis. No significant publication bias was observed. The risk of fetal neurological impairment was significantly lower in the MgSO4 group compared to the control group relative risk (RR = 0.70, 95% CI: 0.56 to 0.87; I20%). However, neonatal mortality was not significantly associated with MgSO4 injection. (RR = 1.03, 95% CI: 0.88 to 1.21; I2 = 42%). Subgroup analysis was done based on the bolus dosage of MgSO4 and the duration of the trial follow-up. revealing a non-significant differences between-group. Conclusion: This study demonstrated that MgSO4 administration can improve fetal neurological impairment and cerebral palsy but is not linked to reducing mortality. Further studies are necessary to strengthen the evidence and clarify the underlying mechanisms.

PMID: 39090579