Cerebral palsy research news

Monday 11 April 2022

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at cerebralpalsy.org.au/our-research

Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

Subscribe to CP Research News

Interventions and Management

1. Corticomuscular coherence is reduced in relation to dorsiflexion fatigability to the same extent in adults with cerebral palsy as in neurologically intact adults
Christian Riis Forman, Kim Jennifer Jacobsen, Anke Ninija Karabanov, Jens Bo Nielsen, Jakob Lorentzen

Eur J Appl Physiol. 2022 Apr 2. doi: 10.1007/s00421-022-04938-y. Online ahead of print.

Purpose: Fatigue is frequent in adults with cerebral palsy (CP) and it is unclear whether this is due to altered corticospinal drive. We aimed to compare changes in corticospinal drive following sustained muscle contractions in adults with CP and neurologically intact (NI) adults. Methods: Fourteen adults with CP [age 37.6 (10.1), seven females, GMFCS levels I-II] and ten NI adults [age 35.4 (10.3), 6 females] performed 1-min static dorsiflexion at 30% of maximal voluntary contraction (MVC) before and after a submaximal contraction at 60% MVC. Electroencephalography (EEG) and electromyography (EMG) from the anterior tibial muscle were analyzed to quantify the coupling, expressed by corticomuscular coherence (CMC). Results: Adults with CP had lower MVCs but similar time to exhaustion during the relative load of the fatigability trial. Both groups exhibited fatigability-related changes in EMG median frequency and EMG amplitude. The CP group showed lower beta band (16-35 Hz) CMC before fatigability, but both groups decreased beta band CMC following fatigability. There was a linear correlation between decrease of beta band CMC and fatigability-related increase in EMG. Conclusion: Fatigability following static contraction until failure was related to decreased beta band CMC in both NI adults and adults with CP. Our findings indicate that compensatory mechanisms to fatigability are present in both groups, and that fatigability affects the corticospinal drive in the same way. We suggest that the perceived physical fatigue in CP is related to the high relative load of activities of daily living rather than any particular physiological mechanism.

PMID: 35366090

2. Walking speed and patient-reported outcomes in young adults with cerebral palsy
Matthew MacCarthy, Patricia Heyn, Alex Tagawa, James Carollo

Dev Med Child Neurol. 2022 Apr 2. doi: 10.1111/dmcn.15225. Online ahead of print.

Aim: To examine the relationship between quantitative gait measurements and self-reported physical, psychological, cognitive, and social function status in young adults with cerebral palsy (CP). Method: Seventy-two adults with CP (range 18-48y; median age 23y [interquartile range 21-27y]; 34 males, 38 females), in Gross Motor Function Classification System levels I to IV, who previously underwent an instrumented gait analysis (IGA) at our center as children were recruited. Participants underwent a repeated IGA. National Institutes of Health Patient-Reported Outcomes Information System (PROMIS) instruments including the PROMIS-57, Applied Cognition - General Concerns (Short Form), and Applied Cognition - Executive Function (Short Form) were administered. Data derived from current and prior IGA were compared via non-parametric correlation analysis with PROMIS subscores. Results: Subscores for anxiety, depression, sleep, and fatigue did not significantly correlate with any IGA data. Walking speed, adjusted for stature, correlated strongly with multiple

subscores: physical function (p<0.001, rs =0.708); participation in social roles (p=0.007, rs =0.319); executive function (p=0.005, rs =0.335). Pain interference correlated with longitudinal change in adjusted walking speed (p=0.032, rs =-0.259). The Applied Cognition - General Concerns (Short Form) correlated with prior absolute walking speed, but not adjusted values. Interpretation: This study underscores the importance of walking speed and its association with a variety of functional domains in adults with CP.

PMID: 35366333

3. Commentary on "Instrumented Gait Analysis (IGA) for Management of Children With Cerebral Palsy: A Needs Assessment Survey"
Eline A M Bolster, Mirjam van Eck, Laura Oudenhoven, Annemieke I Buizer

Pediatr Phys Ther. 2022 Apr 1;34(2):229. doi: 10.1097/PEP.0000000000000895.

No abstract available

PMID: 35385458

4. Commentary on "The Short-term Effects of Hippotherapy and Therapeutic Horseback Riding on Spasticity in Children With Cerebral Palsy: A Meta-analysis"
David Lucena-Anton, Jose A Moral-Munoz

Pediatr Phys Ther. 2022 Apr 1;34(2):179. doi: 10.1097/PEP.0000000000000888.

No abstract available

PMID: 35385448

5. Chronicling Research and Practice Evolution in Pediatric Physical Therapy
Natasha L Benn, Elizabeth A Birchard, Evelyn I Korompai, Maryam Davari, Vaidehi Patel, Laura K Brunton

Review Pediatr Phys Ther. 2022 Apr 1;34(2):253-260. doi: 10.1097/PEP.0000000000000885.

Purpose: To observe research and practice trends in the journal, Pediatric Physical Therapy, as a proxy for the field. Methods: All issues of Pediatric Physical Therapy published from 1989 to 2019 were chronicled and summarized. Data were extracted regarding variables related to the issues and individual articles. Results: The most common diagnosis studied was cerebral palsy. The proportion of studies involving middle childhood and adolescent-aged participants increased over time. Cohort studies and exercise were the most common study type and intervention studied, respectively. The proportion of scientific content in the journal increased. Conclusion: It is evident that pediatric physical therapy research has evolved over the past 30 years, both in rigor of articles published and in breadth of populations studied. What this adds to the evidence: This review adds an in-depth evaluation of trends in the literature, facilitating the profession's continued growth.

PMID: 35385463

6. Leisure Time Physical Activity in Children and Young People With Cerebral Palsy: A Population-Based Study
Marietta L van der Linden, Sarah J Wordie, Bethany K Dufton, Kavi C Jagadamma, Cathleen Hunter, Thomas H Mercer, Mark S Gaston, James E Robb

Pediatr Phys Ther. 2022 Apr 1;34(2):230-237. doi: 10.1097/PEP.0000000000000882.

Purpose: To describe leisure time physical activity in children and young people with cerebral palsy and identify barriers and facilitators to participation. Methods: Leisure time physical activity participation was derived from a national cerebral palsy register and associated factors were analyzed. Barriers and facilitators to participation were investigated through a survey. Results: Leisure time physical activity participation was recorded. Outcomes of participation decreased with increasing Gross Motor Function Classification System level. Leisure time physical activity "not in club" for 11- to 18-year-olds was

significantly lower than for those aged 5 to 10 years for Gross Motor Function Classification System level II. The survey supported that disability and disliking help were common barriers and parental encouragement and enjoyment were common facilitators. Conclusions: Data from the register and survey provide insight into factors influencing leisure time physical activity participation in young people with cerebral palsy and how to increase.

PMID: 35385459

7. Commentary on "Leisure Time Physical Activity in Children and Young People With Cerebral Palsy: A Population-Based Study"
Egmar Longo, Claire Shrader

Pediatr Phys Ther. 2022 Apr 1;34(2):238. doi: 10.1097/PEP.0000000000000902.

No abstract available

PMID: 35385460

8. Early detection and intervention in cerebral palsy: from knowledge to action
Mercedes Martínez Moreno, Lourdes Macias Merlo

Editorial Dev Med Child Neurol. 2022 May;64(5):529. doi: 10.1111/dmcn.15178.

No abstract available

PMID: 35383896

9. Congenital hyperinsulinism in a newborn presenting with poor feeding
Kiran Mazloom, Pedro A Sanchez-Lara, Seth Langston, Katheryn Grand, Bahareh Schweiger

SAGE Open Med Case Rep. 2022 Mar 28;10:2050313X221083174. doi: 10.1177/2050313X221083174. eCollection 2022.

Hyperinsulinemic hypoglycemia is a condition linked to several genetic, metabolic, and growth disorders in which there is dysregulated insulin secretion. In infants, an inappropriately persistent hypoglycemic and hypoketotic state can cause severe brain injury leading to epilepsy, cerebral palsy, and neurodevelopmental disabilities due to the lack of glucose and ketone substrate to serve as fuel for the developing brain. The most common cause of persistent hypoglycemia in neonates and children has been found to be congenital hyperinsulinism. Here, we report a child with a unique presentation, found to have a novel genetic variant as the underlying cause of hyperinsulinism. This case study highlights the importance of maintaining a broad differential and considering a diagnosis of congenital hyperinsulinism in a baby with poor feeding in the newborn period. Recognizing and treating congenital hyperinsulinism is essential to prevent potential neurological sequelae from recurrent, severe hypoglycemia.

PMID: 35371490

10. Cognitive, academic, executive and psychological functioning in children with spastic motor type cerebral palsy: Influence of extent, location, and laterality of brain lesions
Olga Laporta-Hoyos, Kerstin Pannek, Alex M Pagnozzi, Koa Whittingham, Jane Wotherspoon, Kath Benfer, Simona Fiori, Robert S Ware, Roslyn N Boyd

Eur J Paediatr Neurol. 2022 Mar 16;38:33-46. doi: 10.1016/j.ejpn.2022.02.004. Online ahead of print.

Purpose: To investigate, in spastic motor-type cerebral palsy, the association between 1) the location and extent of brain lesions and numerous psychological outcomes; 2) the laterality of brain lesions and performance of verbal-related cognitive functions. Methods: The semi-quantitative scale for MRI (sqMRI) was scored for 101 children with cerebral palsy. Non-verbal and verbal proxy intelligence quotients (IQ), word reading, spelling, numerical operations skills, executive functioning, and psychological

adjustment were assessed. Relationships between global and regional sqMRI scores and clinical scores were examined. The best multivariable linear regression model for each outcome was identified using the Bayesian Information Criteria. Regional sqMRI scores, gross motor functioning, manual ability, and epilepsy status were considered for inclusion as covariables. Where sqMRI scores made statistically significant contributions to models of verbal-related functioning, data were reanalysed including these sqMRI scores' laterality index. Verbal-related outcomes were compared between participants with left-sided versus bilateral brain lesions. Results: Medial dorsal thalamus and parietal lobe lesions significantly accounted for poorer verbal proxy-IQ. Left-hemisphere lateralization of temporal lobe lesions was associated with poorer verbal proxy-IQ. Participants with bilateral lesions performed significantly better than those with unilateral left-sided lesions in verbal cognitive functions. Controlling for epilepsy diagnosis, participants with ventral posterior lateral thalamus lesions presented with better Behaviour Rating Inventory of Executive Function scores, although within the normal range. sqMRI scores were not significantly associated with some psychological outcomes or these only bordered on significance after accounting for relevant control variables. Conclusion: The laterality of early-life lesions influences the development of verbal-related cognitive functions.

PMID: 35381411

11. Characteristics of Interventions to Improve Bone Health in Children With Cerebral Palsy: A Systematic Review
Brianna M Liquori, Mary E Gannotti, Deborah E Thorpe, Robyn K Fuchs

Pediatr Phys Ther. 2022 Apr 1;34(2):163-170. doi: 10.1097/PEP.0000000000000878.

Purpose: A systematic review evaluated exercise parameters and ages that produced the most improvement in bone among individuals with cerebral palsy (CP) ages 3 to 21 years. Methods: PubMed, Scopus, Ebscohost, and Web of Science identified potential articles. Covidence was used to identify eligible citations and assess bias. The osteogenic index (OI) was used to evaluate intervention parameters. Results: The database search identified 312 citations. Twelve full-text articles were included. A 1-hour calisthenic exercise program performed 2 to 3 times a week for 8 months targeting each body region had the highest effect size and a substantial OI. Most of the interventions reviewed had low OIs. Activities of longer duration and greater intensity had greater OIs and prepubertal age-enhanced treatment effects. Conclusion: Bone interventions for individuals with CP have low OIs, and principles of mechanostat theory should be applied to exercise dosing.

PMID: 35385446

12. Commentary on "Characteristics of Interventions to Improve Bone Health in Children With Cerebral Palsy: A Systematic Review"
Andrea Fergus, Jodi Burgett

Pediatr Phys Ther. 2022 Apr 1;34(2):171. doi: 10.1097/PEP.0000000000000892.

No abstract available

PMID: 35385447

13. Psychological Interventions for Individuals With Acquired Brain Injury, Cerebral Palsy, and Spina Bifida: A Scoping Review
Morgan Jefferies, Taylor Peart, Laure Perrier, Andrea Lauzon, Sarah Munce

Review Front Pediatr. 2022 Mar 21;10:782104. doi: 10.3389/fped.2022.782104. eCollection 2022.

Background: With current medical advancements, more adolescents with neurodevelopmental disorders are transitioning from child- to adult-centred health care services. Therefore, there is an increasing demand for transitional services to help navigate this transition. Health care transitions can be further complicated by mental health challenges prevalent among individuals with cerebral palsy (CP), spina bifida (SB), and childhood onset acquired brain injury (ABI). Offering evidence-based psychological interventions for these populations may improve overall outcomes during transition period(s) and beyond. The objective of this scoping review is to identify key characteristics of psychological interventions being used to treat the mental health challenges of adolescents and adults with CP, SB, and childhood onset ABI. Methods: Methodological frameworks by Arksey and O'Malley, and Levac and colleagues were used to explore studies published between 2009 and 2019. Included studies were required to be written in English and report on a psychological intervention(s) administered to individuals at least 12 years of

age with a diagnosis of CP, SB, or childhood onset ABI. All study designs were included. Results: A total of 11 studies were identified. Of these, eight reported psychological interventions for childhood onset ABI, while three reported on CP. No studies reporting on SB were identified. Commonly used interventions included acceptance and commitment therapy (ACT), psychotherapy, and cognitive behavioral therapy (CBT). Conclusions: There are a limited number of studies investigating psychological interventions for individuals with childhood onset ABI and CP, and none for individuals with SB. Further research into effective psychological interventions for these populations will improve mental health outcomes and transitional services.

PMID: 35386256

14. Quality of life and mental health in emerging adults with cerebral palsy compared to the general population
Silke Schmidt, Henriette Markwart, Marion Rapp, Audrey Guyard, Catherine Arnaud, Jérôme Fauconnier, Ute Thyen, Stefanie Hahm, Nicolas Vidart d'Egurbide Bagazgoïtia, Holger Muehlan

Health Qual Life Outcomes. 2022 Apr 2;20(1):61. doi: 10.1186/s12955-022-01961-7.

Background: While evidence concerning Quality of Life (QoL) in youth with cerebral palsy (CP) in comparison to the general population has been accumulating, there is a lack of studies exploring differences on a wider range of positive and negative mental health outcomes in emerging adults. Methods: This binational case control study is part of the SPARCLE cohort study on QoL and participation of youth with CP. QoL (WHOQOL-BREF), depression (PHQ-9), anxiety (GAD-7) and self-efficacy (GSE) were assessed in 198 emerging adults with CP and 593 emerging adults from the general population, matched for country of residence, age and gender. ANCOVAs with impairment and pain as covariates were run. Results: Similar levels of QoL were found in both samples, except for the environmental domain, with better QoL for emerging adults with CP compared to the general population. There were significant descriptive differences regarding depression with worse levels in the CP sample, however, also worse levels of self-efficacy. Pain as a covariate had a significant negative impact on all measures, leading to poorer self-efficacy while worsening depression and anxiety; impairment had a significant worsening impact on physical QoL and self-efficacy only. Conclusion: Similar expressions of mental health outcomes in emerging adults with CP and the general population indicate the high adaptive capability of emerging adults with CP.

PMID: 35366892

15. Eye movements and stress during eye-tracking gaming performance in children with dyskinetic cerebral palsy
Saranda Bekteshi, Petra Karlsson, Lieselot De Reyck, Karen Vermeerbergen, Marco Konings, Patrick Hellin, Jean-Marie Aerts, Hans Hallez, Bernard Dan, Elegast Monbaliu

Dev Med Child Neurol. 2022 Apr 8. doi: 10.1111/dmcn.15237. Online ahead of print.

Aim: This study aimed to explore eye movements and stress during eye-tracking gaming performance in children with dyskinetic cerebral palsy (CP) compared with typically developing children, and associations between eye-tracking performance, eye movements, stress, and participants' characteristics. Method: This cohort study included 12 children with dyskinetic CP aged 5 to 12 years (mean age 8 years 7 months, standard deviation [SD] 2 years 3 months) and 23 typically developing children aged 5 to 13 years (mean age 9 years 0 months, SD 2 years 7 months). Participants played 10 eye-tracking games. Tobii X3-120 and Tobii Pro Lab were used to record and analyse eye movements. Stress was assessed through heart rate variability (HRV), recorded during rest, and eye-tracking performance using the Bittium Faros360° ECG Holter device. Eye-tracking performance was measured using gaming completion time. Fixation and saccade variables were used to quantify eye movements, and time- and frequency-domain variables to quantify HRV. Non-parametric statistics were used. Results: Gaming completion time was significantly different ($p < 0.001$) between groups, and it was negatively correlated with experience ($r_s = -0.63$, $p = 0.029$). No significant differences were found between groups in fixation and saccade variables. HRV significantly changed from rest to eye-tracking performance only in typically developing children and not in children with dyskinetic CP. Interpretation: Children with dyskinetic CP took longer to perform the 10 games, especially the inexperienced users, indicating the importance of the early provision of eye-tracking training opportunities. It seems that eye-tracking tasks are not a source of increased stress and effort in children with dyskinetic CP.

PMID: 35393636

16. PedBotHome: A Video Game-Based Robotic Ankle Device Created for Home Exercise in Children With Neurological Impairments
Catherine Coley, Staci Kovelman, Justine Belschner, Kevin Cleary, Manon Schladen, Sarah Helen Evans, Tyler Salvador, Reza Monfaredi, Hadi Fooladi Talari, Jacob Slagle, Md Sohel Rana

Pediatr Phys Ther. 2022 Apr 1;34(2):212-219. doi: 10.1097/PEP.0000000000000881.

Purpose: This pilot study assesses the feasibility of using PedBotHome to promote adherence to a home exercise program, the ability of the device to withstand frequent use, and changes in participant ankle mobility.PedBotHome is a robotic ankle device with integrated video game software designed to improve ankle mobility in children with cerebral palsy. Methods: Eight participants enrolled in a 28-day trial of PedBotHome. Ankle strength, range of motion, and plantar flexor spasticity were measured pre- and posttrial. Performance was monitored remotely, and game settings were modified weekly by physical therapists. Results: Four participants met the study goal of 20 days of use. There were statistically significant improvements in ankle strength, spasticity, and range of motion. Conclusions: PedBotHome is a feasible device to engage children with static neurological injuries in ankle home exercise. This pilot study expands the paradigm for future innovative home-based robotic rehabilitation.

PMID: 35385456

17. The Effect of Robotic Rehabilitation on Posture and Trunk Control in Non-Ambulatory Cerebral Palsy
Nihan Abidin, Ece Ünlü Akyüz, Damla Cankurtaran, Özgür Zeliha Karaahmet, Nihal Tezel

Assist Technol. 2022 Apr 6. doi: 10.1080/10400435.2022.2059592. Online ahead of print.

Aim: The purpose of this study was to investigate the effects of a combined Robot Assisted Gait Training (RAGT) with standard physiotherapy (PT) on trunk control and posture in non-ambulatory children with cerebral palsy (CP). Methods: This nonrandomized, controlled study included 31 CP assigned into 2 groups. Study Group: RAGT (three times a week, 30 min/session, for 6 weeks) + PT. Control group: PT only. The patients were evaluated using Gross motor function measure (GMFM)-88 (Section B, Sitting) and Trunk Impairment Scale (TIS), pretreatment and 3rd month post-treatment. Results: In the RAGT group, significant improvements were observed in the GMFM-B and TIS scores at the 3rd month post-treatment ($p<0.05$). Comparison of the changes in GMFM-B and TIS scores from end to beginning of the study, the change in TIS-static are significantly higher in the RAGT group than control group ($p<0.05$). Conclusion: Addition of RAGT to standard physiotherapy seems to improve trunk control, sitting balance and posture in non ambulatory CP.

PMID: 35385378

18. Validity and reliability of an electromyography-based similarity index to quantify lower extremity selective voluntary motor control in children with cerebral palsy
Julia Balzer, Annina Fahr, Jeffrey W Keller, Marietta L van der Linden, Thomas H Mercer, Hubertus J A van Hedel

Clin Neurophysiol Pract. 2022 Mar 17;7:107-114. doi: 10.1016/j.cnp.2022.03.003. eCollection 2022.

Objective: To quantify selective voluntary motor control (SVMC) objectively and more precisely, we combined the "Selective Control Assessment of the Lower Extremity" (SCALE) with surface electromyography. The resulting Similarity Index (SI) measures the similarity of muscle activation patterns. This study evaluated the preliminary validity and reliability of this novel SISCALE measure in children with cerebral palsy (CP). Methods: We investigated concurrent validity by correlating the SISCALE of 24 children with CP (median age 10.6 years) with comparator assessments. For discriminative validity, the patients' SISCALE scores were compared to 31 neurologically intact age-matched peers. Test-retest reliability was quantified using intraclass correlation coefficients (ICC) and minimal detectable change (MDC) values. Results: The SISCALE correlated strongly with the SCALE ($\rho = 0.90$, $p < .001$) and the Gross Motor Function Classification System ($\rho = -0.74$, $p < .001$). SISCALE scores were significantly lower in children with CP compared to healthy peers. Test-retest reliability appeared good (for the more and less affected leg, ICC ≥ 0.84, and MDC ≤ 0.17). Conclusions: Validity and reliability of the SISCALE leg and total scores lay within clinically acceptable ranges. Further clinimetric analyses should include responsiveness. Significance: A neurophysiology-based assessment could contribute to a more refined assessment of SVMC impairments.

PMID: 35372733

19. A Family-Centered, Multidisciplinary Clinic for Early Diagnosis of Neurodevelopmental Impairment and Cerebral Palsy in China-A Pilot Observation
Hai-Bo Huang, Man Joe Watt, Matthew Hicks, Qian-Shen Zhang, Fang Lin, Xue-Qing Wan, Chun-Bong Chow, Po-Yin Cheung

Front Pediatr. 2022 Mar 17;10:840190. doi: 10.3389/fped.2022.840190. eCollection 2022.

Background: Comprehensive multidisciplinary assessment of neurodevelopmental outcomes of high-risk neonates may have significant challenges in low- and middle-income countries, in addition to socio-cultural barriers. We aimed to compare the time to diagnosis of neurodevelopmental impairment (NDI) and cerebral palsy (CP) in preterm neonates (<29 weeks) at a multidisciplinary assessment and care (MDAC) clinic with that of a conventional high-risk infant follow-up clinic in China. Methods: All eligible surviving very preterm neonates born at <29 weeks gestation at the University of Hong Kong-Shenzhen Hospital between January 2015 and December 2019 were followed up in conventional (2015-2017) and MDAC (2018-2020) clinics up to 2 years corrected age with clinical demographic information collected in a prospective database. The MDAC team used standardized developmental assessments. The rates and timing of diagnosing NDI and CP in two epochs were compared. Results: The rates of NDI and CP were not different in two epochs [NDI: 12 (50%) vs. 12 (41%); CP: 3 (12%) vs. 2 (7%) of 24 and 29 surviving infants assessed in conventional and MDAC clinics, respectively]. Infants in the MDAC clinic were diagnosed with NDI and CP earlier than those in the pre-MDAC epoch (6 vs. 14 months corrected age, respectively, $P < 0.05$). Conclusion: High-risk preterm neonates can be followed more effectively in a family-centered, child-friendly multidisciplinary clinic, leading to an earlier diagnosis of NDI and CP. Early counseling and interventions could be implemented accordingly.

PMID: 35372170

20. Improving epilepsy control among children with cerebral palsy in rural Bangladesh: a prospective cohort-based study

Tasneem Karim, Manik Chandra Das, Mohammad Muhit, Nadia Badawi, Gulam Khandaker, Shekeeb S Mohammad

BMJ Open. 2022 Apr 5;12(4):e052578. doi: 10.1136/bmjopen-2021-052578.

Objective: To define the prevalence and seizure subtypes among children with cerebral palsy (CP) in rural Bangladesh and explore barriers to optimum epilepsy control. Design: Prospective cohort study. Setting: The study was conducted in Shahjadpur, a rural subdistrict of Bangladesh. Participants: Children (<18 years) with CP and epilepsy identified using the Bangladesh CP Register (BCPR) in the study site. Methods: Assessments were conducted in three focused epilepsy clinics overseen by a paediatric neurologist between December 2016 and January 2018, with intervening phone and video-conference follow-ups. Details of event type, frequency and medication compliance were collected. Antiepileptic drugs (AEDs) were prescribed based on seizure type, family income, comorbidity and medication availability. Results: 23.4% (170/726) of the BCPR cohort had a clinical diagnosis of epilepsy of whom 166 were assessed. Following the focused epilepsy clinics, 62.0% (103/166) children were clinically determined to have ongoing epileptic seizures. 62.1% (64/103) had generalised onset tonic clonic seizures, 27.2% (28/103) had focal onset seizures with impaired awareness and 10.7% (11/103) had other seizure types. None of the children with prolonged seizures (31/103) had an emergency seizure management plan. Non-epileptic events were being pharmacologically treated as seizures in 18.1% (30/166) children. Financial constraints were the main reason for non-compliance on follow-up. Conclusions: Gaps in optimum epilepsy management in rural Bangladesh are amenable to improvement anchored with local healthcare workers. Training and clinical care focused on recognition of common seizure types, seizure mimics and rationalising use of available AEDs can be facilitated by better referral pathways and telehealth support.

PMID: 35383059

21. Tool Use for Early Detection of Cerebral Palsy: A Survey of Spanish Pediatric Physical Therapists

Javier Merino-Andrés, Álvaro Hidalgo-Robles, Soraya Pérez-Nombela, Sîan A Williams, Ginny Paleg, Francisco Javier Fernández-Rego

Pediatr Phys Ther. 2022 Apr 1;34(2):202-210. doi: 10.1097/PEP.0000000000000877.

Purpose: The purpose of this study was to assess the use of diagnostic assessment tools in pediatric physical therapy practice in Spain. Best practice recommendations indicate the timely use of key assessment tools to reduce the age of diagnosis of cerebral palsy (CP). Methods: Pediatric physical therapists currently working in Spain in early intervention were recruited through targeted physical therapy entities. They were invited to complete the purpose-developed electronic survey, consisting of 45 multiple-choice questions, with 5 thematic blocks. Results: Results from 140 anonymous respondents were analyzed. The average reported age when CP was suspected was 12.6 months. Most used the child's clinical history (88.1%), the Alberta Infant Motor Scale (41.3%), and Vojta Assessment Procedure (32.1%) to assess and detect CP. General Movements Assessment (25.7%) and Hammersmith Infant Neurological Examination (28.4%) were used infrequently. Conclusions:

Currently, pediatric physical therapists in Spain rely on clinical history and outdated tools to identify children with CP.

PMID: 35385454

22. Commentary on "Tool Use for Early Detection of Cerebral Palsy: A Survey of Spanish Pediatric Physical Therapists"
Elena Pinero-Pinto, Ana León-Dominguez

Pediatr Phys Ther. 2022 Apr 1;34(2):211. doi: 10.1097/PEP.0000000000000894.

No abstract available

PMID: 35385455

23. The Impact of Different Degrees of Intraventricular Hemorrhage on Mortality and Neurological Outcomes in Very Preterm Infants: A Prospective Cohort Study
Yong Wang, Juan Song, Xiaoli Zhang, Wenqing Kang, Wenhua Li, Yuyang Yue, Shan Zhang, Falin Xu, Xiaoyang Wang, Changlian Zhu

Front Neurol. 2022 Mar 21;13:853417. doi: 10.3389/fneur.2022.853417. eCollection 2022.

Objective: Intraventricular hemorrhage (IVH) is a common complication in preterm infants and is related to neurodevelopmental outcomes. Infants with severe IVH are at higher risk of adverse neurological outcomes and death, but the effect of low-grade IVH remains controversial. The purpose of this study was to evaluate the impact of different degrees of IVH on mortality and neurodevelopmental outcomes in very preterm infants. Methods: Preterm infants with a gestational age of <30 weeks admitted to neonatal intensive care units were included. Cerebral ultrasound was examined repeatedly until discharge or death. All infants were followed up to 18-24 months of corrected age. The impact of different grades of IVH on death and neurodevelopmental disability was assessed by multiple logistic regression. Results: A total of 1,079 preterm infants were included, and 380 (35.2%) infants had grade I-II IVH, 74 (6.9%) infants had grade III-IV IVH, and 625 (57.9%) infants did not have IVH. The mortality in the non-IVH, I-II IVH, and III-IV IVH groups was 20.1, 19.7, and 55.2%, respectively ($p < 0.05$), and the incidence of neurodevelopmental disabilities was 13.9, 16.1, and 43.3%, respectively ($p < 0.05$), at 18-24 months of corrected age. After adjusting for confounding factors, preterm infants with III-IV IVH had higher rates of cerebral palsy [26.7 vs. 2.4%, OR = 6.10, 95% CI (1.840-20.231), $p = 0.003$], disability [43.3 vs. 13.9%, OR = 2.49, 95% CI (1.059-5.873), $p = 0.037$], death [55.2 vs. 20.1%, OR = 3.84, 95% CI (2.090-7.067), $p < 0.001$], and disability + death [73.7 vs. 28.7%, OR = 4.77, 95% CI (2.518-9.021), $p < 0.001$] compared to those without IVH. However, the mortality and the incidence of neurodevelopmental disability in infants with I-II IVH were similar to those without IVH ($p > 0.05$). Conclusions: Severe IVH but not mild IVH increased the risk of mortality and neurodevelopmental disability in very preterm infants.

PMID: 35386416

24. Early-life respiratory trajectories and neurodevelopmental outcomes in infants born very and extremely preterm: A retrospective study
Wen-Hao Yu, Chi-Hsiang Chu, Yung-Chieh Lin, Ray-Bing Chen, Osuke Iwata, Chao-Ching Huang

Dev Med Child Neurol. 2022 Apr 5. doi: 10.1111/dmcn.15234. Online ahead of print.

Aim: To determine whether early-life respiratory trajectories are associated with neurodevelopmental impairment (NDI) in infants born very and extremely preterm. Method: The daily type of respiratory supports in the first 8 weeks after birth were analysed in 546 infants (285 males, 261 females; median gestational age = 28.0 weeks, interquartile range = 3 weeks), comprising 301 infants born very preterm (gestation = 28-30 weeks) and 245 infants born extremely preterm (gestation <28 weeks), who survived to discharge from 2004 to 2018 and received follow-up assessment by Bayley Scales of Infant and Toddler Development at a corrected age of 24 months. NDI included cognition or motor impairment, moderate and severe cerebral palsy, or visual and hearing impairment. Results: Clustering analysis identified three respiratory patterns with increasing severity: improving; slowly improving; and delayed improvement. These were significantly associated with increasing rates of NDI in infants born very and extremely preterm and smaller head circumference in infants born extremely preterm (both $p < 0.001$). By day 28, the proportion of infants who were under different categories of ventilation support significantly differed according to the three trajectory groups in infants born very and extremely preterm (both $p < 0.05$).

Models that included adverse respiratory trajectories demonstrated more negative impacts on neurodevelopment than those without. Interpretation: An adverse early-life respiratory trajectory was associated with NDI at follow-up, especially in infants born extremely preterm, suggesting a lung-brain axis of preterm birth.

PMID: 35383902

25. Study Protocol: Multimodal Longitudinal Assessment of Infant Brain Organization and Recovery in Perinatal Brain Injury
Catarina Saiote, Ellen Sutter, Annette Xenopoulos-Oddsson, Raghavendra Rao, Michael Georgieff, Kyle Rudser, Colleen Peyton, Douglas Dean, Ryan M McAdams, Bernadette Gillick

Pediatr Phys Ther. 2022 Apr 1;34(2):268-276. doi: 10.1097/PEP.0000000000000886.

Purpose: Perinatal brain injury is a primary cause of cerebral palsy, a condition resulting in lifelong motor impairment. Infancy is an important period of motor system development, including development of the corticospinal tract (CST), the primary pathway for cortical movement control. The interaction between perinatal stroke recovery, CST organization, and resultant motor outcome in infants is not well understood. Methods: Here, we present a protocol for multimodal longitudinal assessment of brain development and motor function following perinatal brain injury using transcranial magnetic stimulation and magnetic resonance imaging to noninvasively measure CST functional and structural integrity across multiple time points in infants 3 to 24 months of age. We will further assess the association between cortical excitability, integrity, and motor function. Discussion: This protocol will identify bioindicators of motor outcome and neuroplasticity and subsequently inform early detection, diagnosis, and intervention strategies for infants with perinatal stroke, brain bleeds, and related diagnoses.

PMID: 35385465

26. Proteomic analysis of the effects of caffeine in a neonatal rat model of hypoxic-ischemic white matter damage
Liu Yang, Xuefei Yu, Yajun Zhang, Na Liu, Danni Li, Xindong Xue, Jianhua Fu

CNS Neurosci Ther. 2022 Apr 8. doi: 10.1111/cns.13834. Online ahead of print.

Aim: White matter damage (WMD) is the main cause of cerebral palsy and cognitive impairment in premature infants. Although caffeine has been shown to possess neuroprotective effects in neonatal rats with hypoxic-ischemic WMD, the mechanisms underlying these protective effects are unclear. Herein, proteins modulated by caffeine in neonatal rats with hypoxic-ischemic WMD were evaluated. Methods: We identified differential proteins and performed functional enrichment analyses between the Sham, hypoxic-ischemic WMD (HI), and HI+caffeine-treated WMD (Caffeine) groups. Confirmed the changes and effect of proteins in animal models and determined cognitive impairment via water maze experiments. Results: In paraventricular tissue, 47 differential proteins were identified between the Sham, HI, and Caffeine groups. Functional enrichment analyses showed that these proteins were related to myelination and axon formation. In particular, the myelin basic protein (MBP), proteolipid protein, myelin-associated glycoprotein precursor, and sirtiun 2 (SIRT2) levels were reduced in the hypoxic-ischemic WMD group, and this effect could be prevented by caffeine. Caffeine alleviated the hypoxic-ischemic WMD -induced cognitive impairment and improved MBP, synaptophysin, and postsynaptic density protein 95 protein levels after hypoxic-ischemic WMD by preventing the HI-induced downregulation of SIRT2; these effects were subsequently attenuated by the SIRT2 inhibitor AK-7. Conclusion: Caffeine may have clinical applications in the management of prophylactic hypoxic-ischemic WMD; its effects may be mediated by proteins related to myelin development and synapse formation through SIRT2.

PMID: 35393758

27. Dysmature patterns of newborn EEG recordings: Biological markers of transitory brain dysfunction or brain injury
Zvonka Rener-Primec, David Neubauer, Damjan Osredkar

Eur J Paediatr Neurol. 2022 Mar 26;38:20-24. doi: 10.1016/j.ejpn.2022.03.008. Online ahead of print.

Perinatal hypoxic-ischemic brain injury is a major cause of non-progressive neurological deficits in children. Dysmature patterns can be seen in newborns' electroencephalograms (EEGs) and may have prognostic value for long-term outcomes. Objective: To investigate the prognostic value of dysmature EEG patterns in term or near-term newborns. Methods: Neonates with dysmature patterns in their first neonatal EEG, assessed during a 6-year period from January 2010 to December 2015, were included in the study. Their outcomes at their follow-ups in June 2019 (at the age of 3 years or more) were assessed, and

the presence of neurological deficits and/or epilepsy was noted. Results: We identified 347 neonates with video-EEG recordings during the observed period, in which 10 neonates had dysmature patterns in their first EEG. Eight were born at term and two were born late preterms, born at the 35 and 36-week gestational age. The reasons for admission were HIE grade I in 2 patients, grade II in 6 neonates, and heart problems in 2 patients. The second EEG was recorded at different time intervals, in 7 infants between 1 and 6 weeks; three infants had second EEG much later and were excluded from the study. Six of seven infants showed normal background activity (BA), and five had sharp waves over different regions, all six had normal developmental outcomes. One child with dysrhythmic pattern in the second EEG was diagnosed with genetic encephalopathy, developed spastic cerebral palsy and died due to severe pneumonia at the age of 6 years. Conclusion: Dysmature patterns may reflect transitory brain dysfunctions. Neonatal EEG tests remain reliable and important diagnostic tool in the very first weeks of life, particularly due to the availability of sequential EEG recordings and interpretations.

PMID: 35381409

28. Corrigendum: Effects of Melatonin on Neurobehavior and Cognition in a Cerebral Palsy Model of plppr5-/- Mice
Yuxiao Sun, Liya Ma, Meifang Jin, Yuqin Zheng, Dandan Wang, Hong Ni

Published Erratum Front Endocrinol (Lausanne). 2022 Mar 14;13:879685. doi: 10.3389/fendo.2022.879685. eCollection 2022.

[This corrects the article DOI: 10.3389/fendo.2021.598788.].

PMID: 35370970

29. Attainment of personal goals in the first year of intrathecal baclofen treatment in dyskinetic cerebral palsy: a prospective cohort study
Laura A Bonouvrié, Helga Haberfehlner, Jules G Becher, Johan S H Vles, R Jeroen Vermeulen, Annemieke I Buizer, IDYS Study Group

Disabil Rehabil. 2022 Apr 6;1-8. doi: 10.1080/09638288.2022.2057600. Online ahead of print.

Purpose: To assess attainment of individual treatment goals one year after intrathecal baclofen (ITB) pump implantation in individuals with dyskinetic cerebral palsy (CP). Materials and methods: A multi-center prospective cohort study was conducted including 34 non-walking individuals with severe dyskinetic CP, classified as Gross Motor Function Classification System (GMFCS) IV/V, aged 4-24 years, 12 months after pump implantation. The main outcome measure was Goal Attainment Scaling (GAS). Predictors of GAS results were analyzed. Complications were registered systematically. Results: Seventy-one percent of individuals with dyskinetic CP fully achieved one or more treatment goals. One or more treatment goals were partially achieved in 97% of individuals. Two factors were found to be associated with attainment of goals: Dyskinesia Impairment Scale (DIS) score at baseline and the difference in pain score between baseline and follow-up. These two variables explain 30% of the variance in the outcome. Conclusions: Intrathecal baclofen is effective in achieving individual treatment goals in children and young adults with dyskinetic CP after nine to 12 months of ITB treatment. A positive outcome on treatment goals is, for a small part, associated with higher severity of dystonia at baseline and with improvement of pain during treatment. Clinical trial registration number: Dutch Trial Register, number NTR3642.Implications for rehabilitation Intrathecal baclofen treatment is effective in attainment of personal treatment goals, one year after pump implantation in patients with dyskinetic cerebral palsy. A positive outcome on treatment goals is, for a small part, related to higher severity of dystonia at the start and on improvement of pain during treatment.

PMID: 35387541

30. The rights of children with disabilities during armed conflict
Verónica Schiariti, Sandra Julsen Hollung

Dev Med Child Neurol. 2022 Apr 2. doi: 10.1111/dmcn.15240. Online ahead of print.

No abstract available

PMID: 35366336

31. Excess healthcare spending associated with fractures among adults with cerebral palsy
Daniel G Whitney, Michelle S Caird, Karl J Jepsen, Edward A Hurvitz, Richard A Hirth

Disabil Health J. 2022 Mar 10;101315. doi: 10.1016/j.dhjo.2022.101315. Online ahead of print.

Background: Fractures represent a triple threat to adults with cerebral palsy (CP): common, accumulate early in adulthood, and are consequential to health. An economic evaluation of fractures in CP is needed to highlight priorities for allocating resources to clinical and public health programs aimed at preventing fractures and their disease sequela. Objective: To identify short-term healthcare costs associated with fractures among adults with CP. Methods: A retrospective cohort study was performed using Optum's de-identified Clinformatics® Data Mart Database from 01/01/2011-12/31/2017. The primary cohort included adults ≥ 18 years old with CP with an incident fracture (CP+Fx), and cost estimates were compared with: CP without fractures (CPw/oFx) and without CP+Fx (w/oCP+Fx). A difference-in-difference (DiD) analysis compared the change in pharmacy and medical costs between cohorts from the one-year baseline period through the one-year post-index period in three-month quarters. Results: CP+Fx (n = 855) had higher mean costs in the baseline and follow-up periods compared with CPw/oFx (n = 5667) and w/oCP+Fx (n = 588,042). The first post-index quarter DiD estimate suggests that CP+Fx accumulated an excess $6462 (95%CI = $3810-$9021) compared with w/oCP+Fx and $17,197 (95%CI = $14,418-$19,833) compared with CPw/oFx. The CP+Fx cohort had higher DiD estimates in the other follow-up quarters, but they were not statistically significant compared with CPw/oFx. When stratified by fracture site, vertebral column fractures for CP+Fx vs. w/oCP+Fx accumulated an excess $25,226 (95%CI = $12,639-$37,417). Conclusions: Fractures, especially of the vertebral column, were associated with high healthcare costs among adults with CP. Studies are needed to identify cost-effective opportunities to utilize available resources to prevent fractures and their costly sequela for CP.

PMID: 35370108