Cerebral palsy research news

Monday 7 October 2024

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. Effectiveness of intensive motor learning approaches from working on a vertical surface on hemiplegic children's upper limb motor skills, a randomized controlled trial

Omnya Samy A Ghoneim, Dina Othman Shokri Morsi Galal, Doha H Al-Afify, Mariam Hossam El Ebrashy, Fatma S Zidan, Rasha Atef Saad

Disabil Rehabil. 2024 Oct 2:1-7. doi: 10.1080/09638288.2024.2407505. Online ahead of print.

Purpose: This study compares the effect of intensive motor learning approaches on improving the quality of upper extremity skills in children with unilateral cerebral palsy (UCP) by working on vertical surfaces versus horizontal surfaces during rehabilitation sessions. Materials and methods: Forty UCP children of both sexes were randomized into two equal groups. All participants received 60 min of intensive motor learning approaches three days/week for three successive months. These approaches included constraint-induced movement therapy (CIMT), in which children wore a splint or sling on the unaffected upper limb, as well as hand-arm bimanual intensive training (HABIT) that requires the use of both hands during specific play-based activities. The control group received training on a horizontal surface while the child sat in front of an elbow-height table while the study group (vertical surface training) sat or stood in front of a wall/mirror/board. The task requirements were graded to ensure success. Results: Statistically significant differences were detected between the mean values of post-treatment of all scorers, with a greater percentage of improvement in favor of the study group. Conclusions: This study revealed that working on a vertical surface improved upper limb motor skills more significantly than working on a horizontal surface.

PMID: 39354893

2. Commentary on "Infant Modified Constraint-Induced Movement Therapy Paired with Neuromuscular Electrical Stimulation: A Feasibility Study"

Kimberley Scott, Kayce Marsh, Angie Ohlrich

Comment Pediatr Phys Ther. 2024 Oct 1;36(4):486-487. doi: 10.1097/PEP.0000000000001138. Epub 2024 Oct 1.

No abstract available

PMID: 39356263

3. Exploring the Relationship between Cerebral Palsy and Hip Dysplasia: Insights from the National Inpatient Sample

Reem Abdullah Alyoubi, Huda Yahya Alyahyawi, Abrar Nayel Alsharief, Ghadeer Ghazi Alahmadi, Faris Althubaiti, Mazen A Basheikh, Elham H Alhifthy, Ahmed Abu-Zaid

Medicina (Kaunas). 2024 Aug 26;60(9):1394. doi: 10.3390/medicina60091394.

Background and Objective: Cerebral palsy (CP) significantly impacts quality of life globally. Hip dysplasia (HD) is a common musculoskeletal issue in CP patients. This study investigates the prevalence, risk factors, and impact of HD on CP patients using a large national database. Materials and Methods: Data from the National Inpatient Sample (NIS) database (2016-2019) were used, identifying CP and HD diagnoses through ICD-10 codes. Baseline characteristics were tabulated. Univariate and multivariate logistic regression analyses examined predictors of HD development in CP patients, presenting data as odds ratios (ORs) with 95% confidence intervals (CIs). Results: Among 3,951,040 pediatric patients, 28,880 had CP (27,466 without HD, and 1414 with HD), and 3,922,160 did not have CP. CP significantly increased the likelihood of developing HD in univariate (OR = 35.03, 95% CI [33.01, 37.17], $p < 0.0001$) and multivariate (OR = 26.61, 95% CI [24.94, 28.40], $p < 0.0001$) analyses. Among patients with CP, race was significantly associated with HD, with ORs below 1 for all racial categories compared to Whites. Females had nearly twice the odds of HD compared to males (OR = 1.96, 95% CI [1.86, 2.05], $p < 0.0001$). Age was significantly associated with HD, with each additional year increasing the odds (OR = 1.03, 95% CI [1.026, 1.034], $p < 0.0001$). Individuals in the high 51st-75th income quartile had a 17% increase in the odds of HD (OR = 1.17, 95% CI [1.09, 1.25], $p < 0.0001$) compared to the low 1st-25th income quartile. Conclusions: This study reinforces the strong association between CP and HD, highlighting the need for further research and prospective studies to validate these findings.

PMID: 39336435

4. Timely Hip Surgery Access in Children With Cerebral Palsy: Unaffected by Social Disadvantage at a Large Urban Safety Net Hospital

Sam P Wimmer, Melissa A Bent, Tishya A L Wren, Robert M Kay

J Pediatr Orthop. 2024 Oct 1. doi: 10.1097/BPO.0000000000002837. Online ahead of print.

Background: Socioeconomic disadvantage has been shown to limit timely access to pediatric orthopaedic care and can result in poor surgical outcomes. Insurance coverage has often served as a proxy for socioeconomic status; however, area deprivation index (ADI) and child opportunity index (COI) are more comprehensive measures of social determinants of health (SDOH). The treatment of hip displacement in children with cerebral palsy (CP) requires early radiographic identification and continuous surveillance, which may be impacted by SDOH. This study seeks to evaluate the influence of insurance, ADI, and COI on preoperative Reimer migration percentage and need for pelvic osteotomy during varus derotation osteotomy (VDRO) in children with CP. Methods: This retrospective cohort study examined 219 patients with CP who underwent VDRO surgery for hip subluxation or dislocation at a tertiary referral center (135 male, mean age 7.9 y, SD: 2.9, range: 2.4 to 17.2; 17 GMFCS II, 21 GMFCS III, 89 GMFCS IV, 92 GMFCS V) from 2004 to 2022. Imaging and clinical documentation for patients with CP and hip displacement, age <18 years with ≥1 year of follow-up, treated with VDRO were reviewed. GMFCS level, preoperative Reimer migration percentages (MP), surgical details, and demographic and socioeconomic data were collected, and addresses were used to determine ADI (2018 version) and COI (2.0 database). The relationship of ADI, COI, and insurance type to preoperative Reimer MP of the more displaced hip and the need for pelvic osteotomy were analyzed with linear regressions and logistic regressions. Results: The mean preoperative Reimer MP was 64.4% (SD: 25.0, range: 0 to 100). As expected, patients functioning at higher GMFCS levels presented with greater Reimer MPs. The average Reimer MP was 34.0 for GMFCS II, 44.2 for GMFCS III, 64.6 for GMFCS IV, and 74.5 for GMFCS V ($P<0.01$). The mean ADI state decile (1 to 10 scale) and COI (1 to 100 scale) for the cohort were 5.6 (SD: 2.2, range: 1 to 10) and 37.2 (SD: 28.1, range: 4 to 100), respectively. ADI ($P=0.77$), COI ($P=0.30$), and insurance type ($P=0.78$) were not related to preoperative Reimer MP. However, patients with lower ADIs (OR 0.83, 95% CI [0.70, 0.99], $P=0.04$) and higher COIs (OR 1.01, 95% CI [1.00, 1.03], $P=0.03$) underwent pelvic osteotomies at a higher rate. Conclusions: ADI, COI, and insurance type were not related to preoperative Reimer MP. Interestingly, greater social disadvantage was associated with a lower frequency of pelvic osteotomy at the time of VDRO. Our data demonstrate that at our institution, greater social disadvantage does not result in limited access to timely orthopaedic care for children with CP. This is likely due to adequate governmental insurance coverage for children with neuromuscular disorders in this state and the active involvement of pediatric orthopaedic surgeons in government-sponsored clinics, including ongoing hip screening programs for children with CP. These results provide hope that healthcare disparities can potentially be mitigated.

PMID: 39350583

5. Individualized orthotic alignment and footwear for balance and mobility in children with bilateral spastic cerebral palsy: A randomized trial

No authors listed

Dev Med Child Neurol. 2024 Oct 1. doi: 10.1111/dmcn.16097. Online ahead of print.

No abstract available

PMID: 39353086

6. Commentary on "How Does Standing Anteroposterior Stability Limits Correlate to Foot/Ankle Functions in Bilateral Spastic Cerebral Palsy?"

Ana Livecchi, Kelly Greve, Christine M Casciato

Pediatr Phys Ther. 2024 Oct 1;36(4):517. doi: 10.1097/PEP.0000000000001140. Epub 2024 Oct 1.

No abstract available

PMID: 39356266

7. Neuromuscular impairments of cerebral palsy: contributions to gait abnormalities and implications for treatment

Kylie Clewes, Claire Hammond, Yiwen Dong, Mary Meyer, Evan Lowe, Jessica Rose

Front Hum Neurosci. 2024 Sep 18:18:1445793. doi: 10.3389/fnhum.2024.1445793. eCollection 2024.

Identification of neuromuscular impairments in cerebral palsy (CP) is essential to providing effective treatment. However, clinical recognition of neuromuscular impairments in CP and their contribution to gait abnormalities is limited, resulting in suboptimal treatment outcomes. While CP is the most common childhood movement disorder, clinical evaluations often do not accurately identify and delineate the primary neuromuscular and secondary musculoskeletal impairments or their specific impact on mobility. Here we discuss the primary neuromuscular impairments of CP that arise from early brain injury and the progressive secondary musculoskeletal impairments, with a focus on spastic CP, the most common form of CP. Spastic CP is characterized by four primary interrelated neuromuscular impairments: 1. muscle weakness, 2. short muscle-tendon units due to slow muscle growth relative to skeletal growth, 3. muscle spasticity characterized by increased sensitivity to stretch, and 4. impaired selective motor control including flexor and extensor muscle synergies. Specific gait events are affected by the four primary neuromuscular impairments of spastic CP and their delineation can improve evaluation to guide targeted treatment, prevent deformities and improve mobility. Emerging information on neural correlates of neuromuscular impairments in CP provides the clinician with a more complete context with which to evaluate and develop effective treatment plans. Specifically, addressing the primary neuromuscular impairments and reducing secondary musculoskeletal impairments are important treatment goals. This perspective on neuromuscular mechanisms underlying gait abnormalities in spastic CP aims to inform clinical evaluation of CP, focus treatment more strategically, and guide research priorities to provide targeted treatments for CP.

PMID: 39359619

8. Strategies for unplanned gait termination at comfortable and fast walking speeds in children with cerebral palsy

Minoru Kimoto, Kyoji Okada, Kazutaka Mitobe, Masachika Saito, Hitoshi Sakamoto

J Biomech. 2024 Sep 26:176:112349. doi: 10.1016/j.jbiomech.2024.112349. Online ahead of print.

Collision avoidance while walking is necessary for safe living, and faster walking speeds tend to increase collision risk. However, gait termination strategies for patients with cerebral palsy (CP), from comfortable to faster speed, remain unexplored. This study aimed to analyze these strategies in children with CP compared to typically developing (TD) children at two different speeds. Study participants included 10 children with CP (mean age, 12.5; five females; mean height, 147.8 cm; mean weight, 41.7 kg) and 10 TD children (mean age, 11.4; nine females; mean height, 142.0 cm; mean weight, 38.1 kg). Effects of walking speed on spatial, force, and temporal parameters were assessed at 100 % (WS1) and 125 % (WS2) speeds of comfortable walking. The TD group exerted a more pronounced braking force at the first step after the stop line appeared on the floor until the contralateral step at both WS1 ($P = 0.006$) and WS2 ($P = 0.019$); however, the CP group exerted a more potent force after the second step (WS1: $P = 0.026$, WS2: $P = 0.023$) in the anterior-posterior (AP) direction. Additionally, an increase in the center of mass (COM)-center of pressure (COP) divergence in the AP direction ($P = 0.032$), which decreased in the mediolateral (ML) direction ($P = 0.036$) at faster walking speeds, influenced the kinetic characteristics of the CP group from WS1 to WS2. The complex adaptations, such as unique braking forces and changes in the COM-COP divergence, suggest that gait interventions should consider the distinctive forces and adopt dynamic balancing strategies to avoid collisions during walking.

PMID: 39366271

9. Physical activity and sedentary behavior among ambulatory children with cerebral palsy using accelerometer: a cross -sectional study

Njoud Aydhah Alamoudi, Maha F Algabbani, Muhammad O Al-Heizan, Adel A Alhusaini

Front Pediatr. 2024 Sep 19:12:1463288. doi: 10.3389/fped.2024.1463288. eCollection 2024.

Background and objective: Physical activity (PA) is paramount for childhood development and growth. However, children diagnosed with Cerebral Palsy (CP) were often considered sedentary, and their physical inactivity was associated with adverse health conditions and complications. Therefore, this study aimed to objectively describe and compare the PA levels and SB levels of children with and without CP of the same age group. It also studied the factors correlating with PA, SB, and step count per day in children with CP. Subjects and methods: A cross-sectional study using a wrist-worn accelerometer was conducted. PA and SB were measured over seven consecutive days. Results: Eighty-five children aged 6-12 years, consisting of 41 children with CP and 44 TD children, participated in this study with a mean age of 9.18 ± 1.95 and 8.45 ± 1.78 years, respectively. According to the gross functional measures, 53.6% of children with CP were classified as first classification. A significant amount of time was spent in SB and Light PA (LPA) by children with CP compared to TD children, and no significant differences were observed in moderate PA (MPA) or step count. Gender mainly affected MPA as girls spent more time in MPA than boys. The age, height, and weight of children with CP correlate significantly with SB. As children's age, height, and weight increase, SB increases. Additionally, children with higher weights have lower step counts per day. Conclusion: This study showed that children with CP spend more time in LPA and SB than typically developed children. Therefore, concerted efforts are needed to encourage physical activity and reduce the sedentary lifestyle, to take into account the gender and anthropometric measures of children to enhance the quality of life among children with CP, and to consider gender and anthropometric measures of the children.

PMID: 39363968

10. Children with Cerebral Palsy and Their Parents Have Different Experiences of Pain Management: A Qualitative Study

Elisabeth Rønning Rinde, Agneta Anderzén-Carlsson, Reidun Birgitta Jahnsen, Randi Dovland Andersen

Children (Basel). 2024 Aug 29;11(9):1055. doi: 10.3390/children11091055.

Aim: The aim of this study is to explore and compare experiences of pain management strategies for children with CP from the perspectives of children themselves and their parents. Methods: A secondary inductive analysis of previously collected qualitative data was performed. Fourteen children with CP and one parent of each child were interviewed separately about the management of the child's pain. A dyadic data analysis was used to compare parents' and children's perspectives. Findings: The main thematic categories of pain management identified were self-care, psychological strategies, physical interventions and professional treatment. Experiences described by the child and parent differed within all participating dyads but to different degrees. On a group level, children described more use of psychological strategies than parents did. Parents described more professional treatment strategies. Conclusions: Parents and children described different experiences of pain management strategies, and both perspectives are needed to understand the child's situation.

PMID: 39334588

11. The Effectiveness of Lee Silverman Voice Treatment (LSVT LOUD) on Children's Speech and Voice: A Scoping Review

Angelos Papadopoulos, Louiza Voniati, Nafsika Ziavra, Dionysios Tafiadis

Review Brain Sci. 2024 Sep 19;14(9):937. doi: 10.3390/brainsci14090937.

Background: This scoping review had as a primary goal a review of the literature and the an analysis of the possible effectiveness of the LSVT LOUD approach in children with voice and speech deficits. Methods: A search was conducted in the Scopus and PubMed databases in May of 2024. Eleven articles were obtained from the search. The standards of PRISMA recommendations were used for scoping reviews and the PCC framework was used for the eligibility criteria. Furthermore, the study used the instructions in the Cochrane Handbook for a quality assessment. The Mendeley Reference Manager software collected the studies and removed duplicates. Results: The reviewed studies employed formal and informal measures to assess voice and speech abilities in the children. Regarding the sample's characteristics, the studies mostly included children with Cerebral Palsy (CP) and also those with Down Syndrome (DS). All the studies reported that children with CP and DS undertook a total dose of the LSVT LOUD treatment. Significant post-treatment findings indicated increased speech function and sound pressure level, regarding the auditory-perceptual ratings of voice and speech improvement. In many studies, parents' and expert listeners' ratings of voice, perception of vocal loudness, speech, and communication indicated improvement. Conclusions: The majority of the included studies provide positive evidence for the LSVT as an approach. However, the small sample size that featured in the studies, as well as their limitations, made these conclusions uncertain. Moreover, the study's findings provided recommendations that speech language therapists and other clinicians need to follow when setting a treatment plan with children with CP and DS.

PMID: 39335431

12. Vocal Characteristics of Children With Cerebral Palsy and Anarthria

Helen L Long, Katherine C Hustad

J Speech Lang Hear Res. 2024 Oct 1:1-11. doi: 10.1044/2024_JSLHR-24-00317. Online ahead of print.

Purpose: This study aimed to investigate the vocal characteristics of children with cerebral palsy (CP) and anarthria using the stage model of vocal development. Method: Vocal characteristics of 39 children with CP and anarthria around 4 years of age were analyzed from laboratory-based caregiver-child interactions. Perceptual coding analysis was conducted using the Stark Assessment of Early Vocal Development-Revised to examine vocal complexity, volubility, and consonant diversity. Results: Children predominately produced vocalizations corresponding to the two earliest stages of vocal development characterized by vowel-like utterances. They showed a limited attainment of consonantal features with low consonant diversity and variably low vocal rates. Conclusions: Our results demonstrate that underlying neurological impairments resulting in an anarthric status in children with CP affect the progression of speech motor development and their ability to advance beyond early vocal stages. These findings highlight the importance of considering alternative communication modalities for children demonstrating similar vocal characteristics beyond expected periods of development.

PMID: 39353061

13. Construction, evaluation, and application of an electronic medical record corpus for cerebral palsy rehabilitation

Meirong Xiao, Qiaofang Pang, Yean Zhu, Lang Shuai, Guoqiang Jin

Digit Health. 2024 Sep 27:10:20552076241286260. doi: 10.1177/20552076241286260. eCollection 2024 Jan-Dec.

Objective: The electronic medical records (EMRs) corpus for cerebral palsy rehabilitation and its application in downstream tasks, such as named entity recognition (NER), requires further revision and testing to enhance its effectiveness and reliability. Methods: We have devised an annotation principle and have developed an EMRs corpus for cerebral palsy rehabilitation. The introduction of test-retest reliability was employed for the first time to ensure consistency of each annotator. Additionally, we established a baseline NER model using the proposed EMRs corpus. The NER model leveraged Chinese clinical BERT and adversarial training as the embedding layer, and incorporated multi-head attention mechanism and rotary position embedding in the encoder layer. For multi-label decoding, we employed the span matrix of global pointer along with softmax and cross-entropy. Results: The corpus consisted of 1405 EMRs, containing a total of 127,523 entities across six different entity types, with 24,424 unique entities after de-duplication. The inter-annotator agreement of two annotators was 97.57%, the intra-annotator agreement of each annotator exceeded 98%. Our proposed baseline NER model demonstrates impressive performance, achieving a F1-score of 93.59% for flat entities and 90.15% for nested entities in this corpus. Conclusions: We believe that the proposed annotation principle, corpus, and baseline model are highly effective and hold great potential as tools for cerebral palsy rehabilitation scenarios.

PMID: 39347507

14. Neonatal Markers of Prematurity as Predictors of Permanent Childhood Hearing Loss and Neurodevelopmental Impairment in Children Admitted to the Neonatal Intensive Care Unit

Hayma Moosan, Derek J Hoare, Dulip Jayasinghe, Karen R Willis, Katherine Martin, Sally K Thornton

Brain Sci. 2024 Sep 17;14(9):926. doi: 10.3390/brainsci14090926.

Need for admission to the neonatal intensive care unit (NICU) confers an increased risk of hearing loss in the newborn and of later neurodevelopmental impairment. In this retrospective longitudinal case-controlled study, we assess how the degree of prematurity, measured via gestational age, birth weight, and z-scores, in 138 infants admitted to the NICU are associated with permanent childhood hearing loss (PCHI) and 2-year developmental outcomes. Logistic regression analyses, Kruskal-Wallis analysis of variance, and Chi-squared tests were used. Independent of prematurity, PCHI and NICU admission were predictive of poor developmental outcomes. Twenty-one (47%) children with PCHI had a moderate-to-severe developmental delay, compared to three (7%) matched controls. Days in the NICU but not z-scores predicted PCHI. Z-score was not prognostic of moderate or severe developmental impairment in children with PCHI. The odds ratio of moderate-to-severe neurodevelopmental impairment with PCHI was high, at 12.48 [95% CI = 3.37-46.40]. Children with PCHI were significantly more likely to have cerebral palsy than their matched counterparts (30% vs. 2%). These findings challenge the conventional focus on gestational age and birth weight on neurodevelopmental outcomes for children with PCHI and NICU admission. A more nuanced approach to monitoring and intervention is needed.

PMID: 39335420

15. Correlation between Bronchopulmonary Dysplasia and Cerebral Palsy in Children: A Comprehensive Analysis Using the National Inpatient Sample Dataset

Abdulrahman Al-Matary, Sameh Abozaid, Mustafa Al Suliman, Mohammed Alsubaie, Faisal K Aldandan, Faisal Mohammed Alzehairi, Huda Yahya Alyahyawi, Abrar Nayel Alsharief, Ghadeer Ghazi Alahmadi, Faris Althubaiti, Naseem Alyahyawi, Ahlam Mazi, Ahmed Abu-Zaid, Hind Alnajashi, Reem Abdullah Alyoubi

Children (Basel). 2024 Sep 18;11(9):1129. doi: 10.3390/children11091129.

Background: The existing literature lacks conclusive evidence regarding the relationship between bronchopulmonary dysplasia (BPD) and cerebral palsy (CP). This large epidemiological study aimed to explore the co-occurrence of BPD and CP among children. Methods: This retrospective cohort analysis utilized the National Inpatient Sample (NIS) dataset from 2016 to 2019, investigating pediatric patients with BPD and CP diagnoses. Descriptive and inferential statistics, including univariate and multivariate regression analyses, were conducted to explore the association between BPD and CP. Results: Overall, 3,951,039 patients were analyzed. Among them, 28,880 patients had CP (n = 796 with BPD and n = 28,084 without BPD). The rates of intraventricular hemorrhage grade 3 and 4, central nervous system anomalies, chromosomal disorders, retinopathy of prematurity (≥grade 3), periventricular leukomalacia, prematurity, and low birth weight were significantly higher in the CP-with-BPD arm contrasted to the CP-without-BPD arm. Univariate regression demonstrated a significant BPD-CP association (odds ratio [OR] = 7.78, 95% confidence interval [CI]: 7.24-8.37, $p < 0.0001$). Multivariate analysis, adjusting for various confounders, reinforced this association (OR = 5.70, 95% CI: 5.17-6.28, $p < 0.0001$). We observed a significant association between increasing prematurity in neonates with BPD and an elevated risk of CP. Conclusions: This nationwide study identified a strong correlation between the co-occurrence of BPD and CP, though it does not establish causality. Rigorous adjustments revealed that patients with BPD appear to have a six-fold increased likelihood of being diagnosed with CP later on, compared to those without BPD. While aligned with the existing literature, this study represents the largest sample size with recommendations for targeted preventive strategies to mitigate the burden of CP.

PMID: 39334661

16. Reliability and Validity of the Turkish Version of the Gross Motor Function Measurement (GMFM-88&66) in Children with Cerebral Palsy

Tuğçe Ataç, Cemil Özal, Mintaze Kerem Günel

Children (Basel). 2024 Sep 2;11(9):1076. doi: 10.3390/children11091076.

Background: The gross motor function measurement is considered as the gold standard for the motor assessment of children with cerebral palsy. The aim was to carry out the cross-cultural adaptation and investigate psychometric properties. Methods: A total of 150 children with cerebral palsy aged 2-16 (mean 8.82 ± 3.78 years; 54.7% male) included. The Gross Motor Function Measurement was adapted into Turkish. Two physiotherapies independently administered the gross motor function measurement. Internal consistency and intra/inter-rater reliability were assessed using Cronbach's alpha, intraclass-correlation-coefficient. Standard-error-of-measurement, minimal-detectible-change calculated. The Bland-Altman method was applied to estimate the measurement bias in reliability analysis. Construct validity assessed with Spearman's correlation coefficient between the gross motor function measurement and the gross motor function classification system, pediatric-evaluation-of-disability-inventory-mobility; confirmatory-factor-analysis was carried. Results: Internal-consistency (α: 0.997-1.00); reliability indices were excellent for total scale (intraclass-correlation-coefficient for intra-rater reliability 0.994-0.999, inter-rater reliability 0.997-0.999) and for each sub-dimension and total score. Standard-error-of-measurement was ranging 1.044-1.677, minimal-detectible-change was 2.435-5.520. Construct validity was supported by strong to excellent negative significant correlations ($p < 0.05$).

PMID: 39334609

17. Exploring Parents' Experiences and Needs During Disclosure of a Cerebral Palsy Diagnosis of Their Young Child: A Scoping Review

J van der Kemp, M Ketelaar, I C M Rentinck, M P J Sommers-Spijkerman, M J N L Benders, J W Gorter

Review Child Care Health Dev. 2024 Nov;50(6):e13327. doi: 10.1111/cch.13327.

Background: Parents often perceive the news that their child has cerebral palsy (CP) as overwhelming and shocking. They are at increased risk of parental stress and mental health problems, which in turn can affect the interaction between the parent and the child. Parental mental health outcomes are known to be affected by the process of disclosure of a diagnosis. In this study, we aimed to synthesize the current knowledge about parents' experiences and needs regarding communication during the

disclosure of the diagnosis of their child with (or at risk of) CP. Methods: A scoping review following the methodological steps outlined by the Joanna Briggs Institute was performed using PubMed, Embase, CINAHL and PsycINFO. We qualitatively explored parent-reported experiences and needs across included studies, using thematic analysis. Results: A total of 19 studies were included. Six themes were identified, three in relation to experiences (i.e., preceding experiences and feelings, perceptions of the disclosure and emotional impact) and three in relation to needs (i.e., transparency in information, supportive attitude and having a say). Despite high variability across studies regarding parental needs, most studies reported the need for (i) honest and clear information, (ii) good communication skills amongst professionals and (iii) emotional and practical support after diagnosis. Conclusions: Our findings suggest that parents' experiences and needs in the period when their child's diagnosis of (high risk of) CP is communicated are highly variable, due to an interplay of personal and contextual factors. To facilitate good communication during disclosure, it is crucial that health care professionals assess and understand this complex process and consider parents' needs for open communication and autonomy in the process. Therefore, professionals need to attune to parents' needs and their individual preferences regarding conversations about their child with (or at risk of) CP.

PMID: 39343726

18. Respiratory and Neurodevelopmental Outcomes at 3 Years of Age of Neonates Diagnosed with Sleep-Disordered Breathing

Bhavesh Mehta, Karen A Waters, Dominic A Fitzgerald, Nadia Badawi

J Clin Med. 2024 Sep 18;13(18):5527. doi: 10.3390/jcm13185527.

Objectives: Understanding the long-term consequences of sleep-disordered breathing (SDB) in neonates is crucial. A lack of consensus on diagnostic and treatment thresholds has resulted in limited research in this area. Our study aims to describe the trajectory of SDB in a cohort of high-risk neonates and their respiratory and neurodevelopmental outcomes at 3 years of age, and explore the relationship between SDB during early infancy and neurocognitive outcomes. Methods: A retrospectively identified cohort of neonates with moderate-severe SDB were prospectively followed at 3 years of age. Data collected included last polysomnography (PSG) parameters up to the age of 3 years and sleep physician's recommendations, duration of CPAP use, compliance with treatment, timing of SDB resolution, and neurodevelopmental outcomes. Univariate and multivariate logistic regression analyses were performed to evaluate the association between important respiratory and sleep breathing parameters with the developmental outcomes. Results: Eighty neonates were included. Respiratory and developmental outcomes were available for 58 (72.5%) and 56 (70%) patients, respectively. In most patients (47/58, 81%), SDB had resolved by 3 years of age. Survival without major developmental delay was seen in 32/56 (57%), but a significant proportion (21/56, 37.5%) demonstrated global developmental delay. Following univariate analysis, primary diagnosis, apnoea-hypopnoea index (AHI) at the time of last PSG and SDB outcome was significantly associated with developmental delay. However, these associations were not seen in multivariate analysis. Conclusions: Despite severity at baseline, SDB resolved in the majority of patients with time and treatment. Although statistically insignificant, logistic regression analysis identified some clinically important associations between neonatal SDB and neurodevelopmental outcomes.

PMID: 39337016

19. Postnatal weight loss and neurodevelopmental outcomes at age 3 years in extremely preterm infants: a cohort study

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

BMC Pediatr. 2024 Sep 30;24(1):618. doi: 10.1186/s12887-024-05090-6.

Background: Previous research has suggested a correlation between postnatal maximum weight loss (MWL) and both neonatal mortality and morbidities in extremely preterm infants. However, the relationship between MWL and neurodevelopmental outcomes remains underexplored. Methods: In a single-center, retrospective cohort study at Okayama Medical Center, we evaluated data from extremely preterm infants admitted to the neonatal intensive care unit from 2010 to 2020. Infants who died within the first 10 days of life were excluded. MWL in the first 10 days was the main exposure, categorized into three groups: >15%, 5-15%, and < 5%. The primary outcome evaluated was the occurrence of death or neurodevelopmental impairment (NDI) at age 3 years, defined as developmental impairments (developmental quotient [DQ] < 85), cerebral palsy, hearing impairments, or visual impairments. Data analysis involved robust Poisson regression, adjusted for perinatal confounders, with a restricted cubic spline function to examine the dose-response relationship. We also conducted a sensitivity analysis using a DQ of < 70 to define developmental impairment. Results: Among 135 infants assessed for neurodevelopmental outcomes, 40 were in the > 15% MWL group, 71 in the 5-15% group, and 24 in the < 5% group. Median gestational ages and birth weights were 25.9 weeks and 821 g for > 15% MWL; 26.1 weeks and 818 g for 5-15% MWL; and 26.0 weeks and 734 g for < 5% MWL. Compared with the 5-15% MWL group, the < 5% group exhibited a higher risk of death or NDI at age 3 years (62.8% vs. 80.8%, risk ratio [RR] 1.36, 95% confidence interval [CI] 1.04-1.79) and NDI alone (59.2% vs. 79.2%, RR 1.43, 95% CI 1.06-1.94). Furthermore, higher risks of developmental impairment were also noted in the > 15% (RR 1.32, 95% CI 1.00-1.75) and < 5% (RR 1.46, 95% CI 1.08-1.98) groups. These associations were confirmed by spline analyses. In contrast, the associations between MWL and neurodevelopmental outcomes using a DQ of < 70 were not apparent. Conclusions: MWL within the first 10 days of life may be associated with increased risks of NDI and developmental impairments by age 3 years in

extremely preterm infants.

PMID: 39343922

20. Neurodevelopmental disorders in children born to mothers involved in maternal motor vehicle crashes

Ya-Hui Chang, Yu-Wen Chien, Chiung-Hsin Chang, Ping-Ling Chen, Tsung-Hsueh Lu, Cheng-Fang Yen, Hung-Yi Chiou, Kuo-Sheng Tsai, Chung-Yi Li

Pediatr Res. 2024 Sep 30. doi: 10.1038/s41390-024-03608-3. Online ahead of print.

Background: To evaluate the association between maternal MVCs during pregnancy and neurodevelopmental disorders (NDDs, including intellectual disability, ADHD, ASD, and infantile cerebral palsy) in children. Methods: This population-based cohort of live births in Taiwan was analyzed, comparing children born to mothers involved in MVCs during pregnancy with those without such exposure. Children were linked to the insurance database to identify the possible diagnosis of NDDs. The Cox proportional hazards regression model was used to estimate the relative hazards. Results: A total of 19,277 children with maternal MVCs and 76,015 children without exposure were included. Children exposed to maternal MVCs during the first two trimesters or whose mothers sustained mild to severe injuries showed a higher risk of intellectual disability. Severe maternal injuries also increased the risk of infantile cerebral palsy (aHR = 3.86; 1.27-11.78). MVCs in the third trimester, or mild maternal injuries, were associated with a higher risk of ASD (third trimester: aHR = 1.40; 1.04-1.87; mild injuries: aHR = 1.38; 1.09-1.74). Conclusion: Children exposed to maternal MVCs with severe injuries had a higher risk of intellectual disability and cerebral palsy. Third-trimester exposure may increase the risk of ASD. However, these findings should be interpreted cautiously as genetic factors may contribute to the observed association. Impact: There is some evidence linking maternal MVCs during pregnancy to the development of neurodevelopmental disorders in children. Children of mothers with severely injured were more likely to suffer from infantile cerebral palsy and intellectual disability. The risk of autism spectrum disorder is higher in children whose mothers are involved in MVCs during the late stage of pregnancy, and there is also an increased risk of intellectual disability during the first two trimesters.

PMID: 39349820

21. Long-term neurodevelopmental outcomes at three years in preterm infants born before 29 Weeks gestation following Preterm Premature Rupture of Membranes (PPROM)

Harkirat Bhullar, Amelie Stritzke, Sue Makarchuk, Selphee Tang, Abhay Lodha

J Perinatol. 2024 Sep 30. doi: 10.1038/s41372-024-02134-8. Online ahead of print.

Objective: To determine the association between preterm premature rupture of membranes (PPROM) and neurodevelopmental impairment (NDI) at 3 years corrected age (CA) in infants born before 29 weeks of gestational age (GA). Design/methods: Infants born before 29 weeks GA between 2005 and 2017 were included. The primary outcome was a composite of death or NDI (full-scale intelligence quotient<85, cerebral palsy, vision or hearing impairment) at 3 years of CA. Infants were stratified by maternal PPROM status. Associations were explored using multivariate models. Results: Of 1231 participants, 481 were in the PPROM group, and 750 were in the No PPROM group. After adjusting for factors, the odds ratio of death or NDI for PPROM vs. No PPROM was 1.22 (95% Confidence Interval 0.93-1.59). Conclusion: Our study suggests that PPROM was not associated with an increased risk of a composite outcome of death or NDI at 3 years CA.

PMID: 39349683

22. The management of Pseudomonas aeruginosa respiratory infection in children with cerebral palsy: A narrative review

Georgia Apostolou, Monica S Cooper, Giuliana Antolovich, Moya Vandeleur, Katherine B Frayman

Review Pediatr Pulmonol. 2024 Sep 30. doi: 10.1002/ppul.27284. Online ahead of print.

Children with cerebral palsy have increased respiratory morbidity and mortality. Infection with Pseudomonas aeruginosa (PA) is associated with poorer outcomes, yet there are no formal guidelines to inform treatment of respiratory infection in children with cerebral palsy. This review explores the existing literature regarding management of PA-infection in children with cerebral palsy, with the aim of synthesising clinical recommendations and identifying gaps in current understanding. Medline (Ovid), PubMed and Embase were searched using keywords. Full-text articles involving the paediatric population and antimicrobial therapy were included. There was no limit on date of publication. Four retrospective case series were identified. Respiratory microbiology, in samples collected from a range of sites along the respiratory tract, was reported in three studies. Patients who received PA-specific antibiotics clinically improved. Two studies suggest that the use of suppressive inhaled anti-pseudomonal therapy may improve respiratory morbidity in the chronic setting. There is minimal evidence to guide

management of PA respiratory infection in children with cerebral palsy. Children with cerebral palsy are at risk of developing bronchiectasis, so in the absence of high-quality evidence, management should be informed by extrapolating from the non-cystic fibrosis bronchiectasis guidelines. Further research examining surveillance and management of PA-infection in this population is required given that early intervention may prevent irreversible lung damage.

PMID: 39347603

23. Nutritional status and neurodevelopmental levels in infants at high risk of cerebral palsy

Hongyu Zhou, Huiying Qiu, Xiaoyue Wang, Jingyi Zhao, Jingbo Zhang, Yuan Zhang, Tingting Peng, Xubo Yang, Yahui Cheng, Qingfen Hou, Wen Yang, Xiaoyin Huang, Shaihong Qiu, Liying Ma, Yuai Zheng, Hongmei Tang, Lu He, Kaishou Xu

Pediatr Investig. 2024 Jul 31;8(3):184-192. doi: 10.1002/ped4.12442. eCollection 2024 Sep.

Importance: Nutrition is associated with neurodevelopment. Infants at high risk of cerebral palsy (CP) usually suffer from undernutrition, yet the relationship between nutritional status and neurodevelopmental levels is unclear. Objective: To describe the nutritional status characteristics of infants at high risk of CP, and to explore the relationship between neurodevelopmental levels and nutritional status. Methods: This single-center cross-sectional study enrolled infants at high risk of CP, with corrected age from 0 days to 12 months. Weight and height were measured and calculated into z-scores, which were used to classify the nutritional status based on the World Health Organization growth charts and American Society for Parenteral and Enteral Nutrition standards. The Bayley Scales of Infant and Toddler Development were used to evaluate the developmental levels of gross motor, fine motor, cognition, receptive communication, and expressive communication. Results: A total of 479 infants at high risk of CP were recruited, with 43.4% classified as undernutrition. Compared to those with normal neurodevelopment, the odds of moderate and severe undernutrition were about 1.8 and 3.9 times higher in gross motor delay, 2.2 and 3.1 times higher in fine motor delay, 2.5 and 9.4 times higher in cognition delay, 2.2 and 3.9 times higher in receptive communication delay, and 3.0 and 5.6 times higher in expressive communication delay. There were significant positive correlations between nutritional status and neurodevelopmental levels ($P < 0.001$). Interpretation: Undernutrition and neurodevelopmental delays are prevalent among infants at high risk of CP. Worse nutritional status was correlated with lower neurodevelopmental levels.

PMID: 39347528

24. Provision of ankle foot orthoses for children with cerebral palsy in Norway

Tobias Goihl, David F Rusaw, Karin Roeleveld, Siri Merete Brændvik

J Rehabil Assist Technol Eng. 2024 Sep 27:11:20556683241276804. doi: 10.1177/20556683241276804. eCollection 2024 Jan-Dec.

Introduction: Practice of ankle-foot orthoses (AFO) provision for ambulatory children with cerebral palsy is underreported and the literature is not consistent on choice of AFO-design. This study describes clinical practice of AFO provision for children with cerebral palsy and evaluates how clinical practice aligns with existing recommendations. Methods: An online, cross-sectional survey was conducted, inviting all Norwegian orthotists working with children with cerebral palsy. Orthotic practice was investigated using a self-reported survey design. Results: From all eligible orthotists, 54% responded, revealing that AFO provision involves patients, physicians, and physiotherapists at different stages. Patient preference directly influenced the ultimate AFO-design. Shank vertical angle was evaluated by 79%. For children with crouch gait and those with short gastrocnemius, a majority preferred a combination of rigid and articulated/flexible AFO-designs. Instrumented gait analysis was conducted by 51% at AFO delivery stage. Conclusions: The findings show that AFO provision in Norway is collaborative, involving clinical team members and consideration of patient preferences. A discrepancy between clinical practice and existing recommendations for children with crouch gait and those with short gastrocnemius is observed.

PMID: 39351287

25. Comparison of participation in out-of-school activities, activity preferences and quality of life of children with cerebral palsy and typical development

Gonca Bumin, Sema Akyalcin, Sedanur Gurlek, Gokcen Akyurek

Dev Neurorehabil. 2024 Oct 2:1-9. doi: 10.1080/17518423.2024.2410173. Online ahead of print.

The aim of this correlational study was to compare the participation in out of school activities, activity preferences, and quality of life (QoL) of children between 8 and 12 years of age with cerebral palsy (CP) (n = 30) and typical development (n = 60) in Turkey. Outcome measures included the Children's Assessment of Participation and Enjoyment, Preferences for Activity of Children, and the Health-Related Quality of Life Questionnaire. Results suggest children with CP were at a disadvantage

compared to their typically developing peers in participating in out-of-school activities, however they tended to report greater preference for these activities than their typically developing peers. Based on these findings, we recommended health professionals aim to increase the quality of life for clients with CP by including social participation as one component of rehabilitation.

PMID: 39356162

26. Commentary on "Practices of Physical Therapists Who Assist People With Cerebral Palsy in Brazil: A National Survey"

Danielle M Bellows, Lindsey Schilberg, Devin W Bell

Comment Pediatr Phys Ther. 2024 Oct 1;36(4):497. doi: 10.1097/PEP.0000000000001141. Epub 2024 Oct 1.

No abstract available

PMID: 39356264

27. Epidemiology of cerebral palsy among children in Ghana

Israt Jahan, Sk Md Kamrul Bashar, Francis Laryea, Samuel Kofi Amponsah, Frederick Inkum Danquah, Mohammad Muhit, Hayley Smithers-Sheedy, Sarah McIntyre, Nadia Badawi, Gulam Khandaker

Afr J Disabil. 2024 Sep 20:13:1336. doi: 10.4102/ajod.v13i0.1336. eCollection 2024.

Background: The epidemiology of cerebral palsy (CP) is poorly described in Ghana. These data are crucial for evidence-based intervention for children with CP in the country. Objectives: We aimed to describe the epidemiology of CP among children in Ghana. Method: We established the first institution-based register of children with CP in Ghana (Ghana CP Register-GCPR). Children with confirmed CP aged < 18 years were registered following a detailed neurodevelopmental assessment. Socio-demographics, risk factors, predominant motor type and topography, gross motor function classification system (GMFCS), associated impairments, education and rehabilitation status were documented. Results: Between October 2018 and February 2020, 455 children were registered (mean [standard deviation {s.d.}] age at assessment: 5.9 [4.1] years). Preterm birth and low birthweight were reported in 52.0% and 21.1% children respectively. Most children (79.6%) had a pre- or perinatally acquired CP and the mean (s.d.) age of CP diagnosis was 22.2 (21.6) months. Overall, 55.9% of children had spastic tri- or quadriplegia, 60.5% had GMFCS level III-V and 70.3% had ≥ 1 associated impairment. However, 20.5% had never received rehabilitation services and 69.6% of school-aged children in the GCPR were not enrolled in schools. Conclusion: The study findings indicate a high burden of severe motor and associated impairment among children with CP in Ghana which highlights the need for tailored interventions to improve health and well-being of children with CP in the country. Contribution: The study highlights the need for interventions to improve functional outcome, health and well-being of children with CP in Ghana.

PMID: 39364205

28. The association between fracture and short-term adverse health outcomes among children with cerebral palsy

Daniel G Whitney, Noelle S B Whyte, Michelle S Caird

Bone. 2024 Oct 2:189:117267. doi: 10.1016/j.bone.2024.117267. Online ahead of print.

Background: Children with cerebral palsy (CP) have a high risk of fracture; yet, little is known about their post-fracture health outcomes. A fracture is an unplanned event in contrast to surgeries or procedures where there is a pre-operative period to optimize body composition and health and planned post-operative follow-up care. Fractures may be associated with significant outcomes due to the unplannable nature and reactionary care. The objective of this study was to determine if fractures were associated with an increased rate of short-term adverse health outcomes among children with CP, and if these associations were dependent on age. Methods: This retrospective cohort study used commercial claims from 01/01/2001-12/31/2018. The primary cohort was children 2-18 years old with CP and an incident fracture (CP + Fx). Comparison cohorts were propensity score matched 1:1 to CP + Fx on demographic and health-related indicators: CP without fractures (CPw/oFx); without CP with (w/oCP + Fx) or without (w/oCPw/oFx) a fracture. The incidence rate (IR) and IR ratios (IRR) of 30-day and 31-90-day pneumonia and 90-day emergency department (ED) visit were estimated. Cox regression tested for effect modification by age and sex. Results: The CP + Fx cohort (n = 1670) had higher IRs of 30-day pneumonia (IRR range, 1.53-4.54) and 90-day ED visit (IRR range, 1.45-2.37) (all $P < 0.05$), and higher IRs of 31-90-day pneumonia but this did not reach statistical significance (IRR, 1.41 to 2.32, all $P > 0.05$). Notably, there was evidence of effect modification by age. The rate of 30-day pneumonia became more problematic for CP + Fx with older age relative to comparison cohorts and for 90-day ED visit compared to CPw/oFx. The rate of 90-day ED visit for CP + Fx was more problematic at younger ages compared to w/oCP + Fx. Conclusions: Fractures among children with CP were associated with an increased rate of short-term pneumonia and ED visit, which was

more problematic with older age.

PMID: 39366537

29. Neonatal wellbeing and timing of brain injury in term and late preterm cerebral palsy

No authors listed

Dev Med Child Neurol. 2024 Oct 1. doi: 10.1111/dmcn.16103. Online ahead of print.

No abstract available

PMID: 39353074

30. Outpatient encounters, continuity of care, and unplanned hospital care for children and young people with cerebral palsy

No authors listed

Dev Med Child Neurol. 2024 Oct 3. doi: 10.1111/dmcn.16102. Online ahead of print.

No abstract available

PMID: 39363614

31. Lateral column lengthening versus subtalar arthroereisis for pes planovalgus in patients with cerebral palsy: a systematic review and meta-analysis

Chang-Hao Lin, Chun-Ho Chen, Shu-Hsin Yao

Front Pediatr. 2024 Sep 18:12:1443447. doi: 10.3389/fped.2024.1443447. eCollection 2024.

Introduction: Although pes planus, a common deformity in children with cerebral palsy (CP), is predominantly treated through lateral column lengthening (LCL), subtalar arthroereisis (SA) has also gained popularity for this purpose. This systematic review was conducted to compare surgical outcomes between LCL and SA for pes planovalgus in children with CP. Methods: PubMed, EMBASE, Cochrane Library, and Google Scholar were comprehensively searched for relevant articles reporting the outcomes of LCL and SA in the target population. Surgical outcomes were evaluated in terms of radiographic parameters and postoperative complications. Results: This review included 22 studies involving patients undergoing LCL (LCL group) and 9 studies involving those undergoing SA (SA group). LCL outperformed SA in terms of corrections in the talonavicular coverage angle (8.1°-42.1° vs. 8.0°-30.7°), anteroposterior talo-first metatarsal angle (12.3°-33.7° vs. 9.8°-21.4°), and calcaneal pitch angle (2.5°-29.7° vs. 3.5°-8.0°). Furthermore, the risk of postoperative complications, such as recurrence, pain, undercorrection, and overcorrection, was higher in the LCL group than in the SA group. However, the risks of reoperation and implant-related problems were higher in the SA group than in the LCL group. A meta-analysis of two randomized studies revealed that improvement in calcaneal pitch angle was significantly greater in the LCL group than in the SA group (mean difference: 2.09°; P = 0.0488). Conclusion: LCL outperforms SA in correcting pes planus-related radiographic parameters in patients with CP. However, postoperative complications appear to be more common after LCL than after SA.

PMID: 39359741

32. A systematic review and meta-analysis focusing on the use of ayurvedic medicine in cerebral palsy

A M O Rocha, C A Len, F H Santos, S B O Iglesias, J R Bissoto

Review J Ayurveda Integr Med. 2024 Oct 1;15(5):101035. doi: 10.1016/j.jaim.2024.101035. Online ahead of print.

Integrative practices have been incorporated into palliative care to provide holistic and multidimensional care for patients. This study aims to identify the scope of integrative practices, specifically whole medical systems, and demonstrate its safety and efficacy, specially in children with cerebral palsy. Key databases, including Embase, Cochrane, Medline/PubMed, Scopus, Google Scholar, Lilacs and Scielo were searched using specific terms. Only randomized and non-randomized clinical trials were included for meta-analysis purposes. Case-control, cohort, cross-sectional or retrospective observational studies were also included for the systematic review. Participants included children aged 0-18 years receiving palliative care for cerebral palsy and undergoing Ayurvedic Medicine practices. Descriptive analysis was conducted, including data such as year; author; design; sample size; intervention and comparison; outcomes and conclusion. Two interventional studies compared Ayurvedic practices with each other or with physiotherapy in children with cerebral palsy. The meta-analysis demonstrated an improvement in

spasticity for children using Ayurvedic medicine. However, there were limitations in terms of heterogeneity in interventions, control groups, and assessed outcomes. Integrative practices, including Ayurvedic medicine have the potential to improve quality of life, manage disease symptoms and provide emotional support. However, more robust evidence is needed to support their widespread use. The use of Ayurvedic medicine showed evidence of improvement in spasticity for children with cerebral palsy. REGISTRATION NUMBER: Prospero CRD 42020198399.

PMID: 39357472