Cerebral palsy research news

Monday 31 January 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. A national analysis on complications and readmissions for adult cerebral palsy patients undergoing primary spinal fusion surgery
Michael Fields, Nathan J Lee, Kyle McCormick, Paul J Park, Venkat Boddapati, Meghan Cerpa, Jun S Kim, Zeeshan M Sardar, Lawrence G Lenke

Eur Spine J. 2022 Jan 24. doi: 10.1007/s00586-021-07089-4. Online ahead of print.

Study design: Retrospective National Database Study. Objective: Surgical intervention with spinal fusion is often indicated in cerebral palsy (CP) patients with progressive scoliosis. The purpose of this study was to utilize the National Readmission Database to determine the national estimates of complication rates, 90-day readmission rates, and costs associated with spinal fusion in adult patients with CP. Methods: The 2012-2015 NRD databases were queried for all adult (age ≥ 19 years) patients diagnosed with CP (ICD-9: 333.71, 343.0-4, and 343.8-9) undergoing spinal fusion (ICD-9: 81.00-08). Results: 1166 adult patients with CP (42.7% female) underwent spinal fusion surgery between 2012 and 2015. 153 (13.1%) were readmitted within 90 days following the primary surgery, with a mean 33.8 ± 26.5 days. Mean hospital charge of the primary admission was $141,416 ± $157,359 and $167,081 ± $145,416 for the non-readmitted and readmitted patients, respectively (p = 0.06). The mean 90-day readmission charge was $72,479 ± $104,100. Most common complications with the primary admission included UTIs (no readmission vs. readmission: 7.6% vs. 4.8%; p = 0.18), respiratory (6.9% vs. 5.6%; p = 0.62), implant (3.8% vs. 6.0%; p = 0.21), and paralytic ileus (3.6% vs. 3.2%; p = 0.858). Multivariate analyses demonstrated the following as independent predictors for 90-day readmission: comorbid anemia (OR: 2.8; 95% CI: 1.6-4.9; p < 0.001), coagulopathy (2.9, 1.1-8.0, 0.037), perioperative blood transfusion (2.0, 1.1-3.8, 0.026), wound complication (6.4, 1.3-31.6, 0.023), and transfer to short-term hospital versus routine disposition (4.9, 1.0-23.3, 0.045). Conclusion: Quality improvement efforts should be aimed at reducing rates of infection related complications as this was the most common reason for short-term complications and unplanned readmission following surgery.

PMID: 35067761

2. Femoral varus derotational osteotomy without pelvic osteotomy in nonambulatory children with cerebral palsy: Minimum 5 years follow-up
Dai Iwase, Kensuke Fukushima, Yasuaki Kusumoto, Yukie Metoki, Jun Aikawa, Tomonori Kenmoku, Sayoko Minato, Atsushi Matsuo, Masashi Takaso

Medicine (Baltimore). 2022 Jan 21;101(3):e28604. doi: 10.1097/MD.0000000000028604.

Whether femoral varus derotational osteotomy (VDRO) alone or a combination of femoral and pelvic osteotomies should be performed for hip dislocation in nonambulatory children with cerebral palsy (CP) remains controversial. Few studies have reported radiographical results after the surgical treatment in nonambulatory children with CP. This study aimed to assess the results and determine predictors indicating progressive hip subluxation and redislocation after VDRO without pelvic osteotomy. We retrospectively analyzed 22 hips in 15 nonambulatory children with CP. All patients underwent VDRO

without pelvic osteotomy and were followed up for at least 5 years. The mean follow-up period was 7.3 ± 1.9 years. In radiological assessments, we investigated migration percentage (MP), center-edge angle, neck-shaft angle, teardrop distance, break in Shenton's line (SL), sharp's angle, acetabular ridge angle (ARA), and the change ratio of MP (Change MP). We classified patients with an MP of <40% at final follow-up in the Good group and those with an MP of ≥40% in the Poor group. The Good group included 10 children (14 hips), and the Poor group included 8 children (8 hips). No preoperative differences were found in the means of all the radiographical parameters. However, MP was significantly different between the groups from 1 year postoperatively. ARA showed improvement 5 years after surgery in the Good group. Change MP in the Good group was maintained from immediately after surgery to the final follow-up. Multivariate logistic regression analyses revealed that preoperative break in SL and Change MP immediately after surgery were parameters to predict MP at the final follow-up. In the receiver operating characteristic analysis, the cut-off values were estimated to be 19.2 mm for preoperative SL and 79.0% for Change MP immediately after surgery. Within 7.3 years of follow-up, 63.6% of the patients who underwent VDRO without pelvic osteotomy had good results. Preoperative SL and postoperative Change MP can be considered as predictors of postoperative subluxation and/or dislocation.

PMID: 35060529

3. Pelvic fixation is not always necessary in children with cerebral palsy scoliosis treated with growth-friendly instrumentation
Ying Li, Jennylee Swallow, Joel Gagnier, John T Smith, Robert F Murphy, Paul D Sponseller, Patrick J Cahill, Pediatric Spine Study Group

Spine Deform. 2022 Jan 23. doi: 10.1007/s43390-022-00474-z. Online ahead of print.

Purpose: A previous study showed that patients with neuromuscular scoliosis who underwent fusion to L5 had excellent coronal curve correction and improvement in pelvic obliquity (PO) when preoperative L5 tilt was < 15°. Our purpose was to identify indications to exclude the pelvis in children with cerebral palsy (CP) scoliosis treated with growing-friendly instrumentation. Methods: In a retrospective cohort study, children with CP scoliosis treated with TGR, MCGR, or VEPTR with minimum 2-year follow-up were identified from a multicenter database. Results: 27 patients with distal spine anchors (DSA) and 71 patients with distal pelvic anchors (DPA) placed at the index surgery were analyzed. The DSA group had a lower pre-index PO (9° vs 16°, P = 0.0001). Most recent radiographic data were similar except the DSA patients had a smaller major curve (47° vs 58°, P = 0.038). 6 (22%) DSA patients underwent extension of the instrumentation to the pelvis (DSA-EXT), most commonly at final fusion (5 patients). DSA-EXT patients had a higher pre-index L5 tilt than patients who did not require extension (DSA-NO EXT) (19° vs 10°, P = 0.009). Sub-analysis showed a lower major curve at most recent follow-up in the DSA-EXT group compared to the DPA group (33° vs 58°, P = 0.021). The DSA-EXT group had a higher number of complications per patient compared to the DSA-NO EXT group (2.3 vs 1.1, P = 0.029). Conclusion: Pre-index L5 tilt ≤ 10° and PO < 10° may be indications to exclude the pelvis in children with CP scoliosis treated with growth-friendly instrumentation. DSA may provide better long-term control of the major curve than DPA.

PMID: 35066795

4. Residual Deformity and Outcome of Ambulatory Adults With Cerebral Palsy: A Long-term Longitudinal Assessment
Tanyawat Saisongcroh, Michael W Shrader, Nancy Lennon, Chris Church, Julieanne P Sees, Freeman Miller

J Pediatr Orthop. 2022 Jan 24. doi: 10.1097/BPO.0000000000002057. Online ahead of print.

Background: Advances in pediatric orthopaedic care have improved mobility and function for children with cerebral palsy (CP) as mobility declines from adolescence into adulthood. The long-term effectiveness of modern orthopaedic care is not widely reported. This study aimed to report the pediatric orthopaedic surgical burden, residual deformities, and outcomes using objective evidence of mobility in ambulatory adults with CP. Methods: An institutional review board-approved prospective cohort study was performed in ambulatory adults with CP between 25 and 45 years, who had an adolescent gait analysis. Orthopaedic interventions were reviewed, and adolescent and adult gait analyses were compared using paired 2-tailed t tests. Adults were categorized by the presence of no, mild, or severe residual deformities in rotation, crouch, stiff knee, equinus, and foot deformity. Results: Of 106 adults with CP, Gross Motor Function Classification System (GMFCS) distribution was grade I (22%), II (50%), III (23%), and IV (5%). Sixty-one males and 45 females were tested. The average age was 30±4 years with follow-up of 13±4 years since previous analysis; 279 surgical events (1165 procedures) were performed with a mean per patient of 2.6 events and 11 procedures. Comm on procedures were gastrocsoleus complex (88%) and hamstring lengthening (79%). The mean gait deviation index at adolescent and adult visit were 72.7±13 and 72.3±13 (P=0.78). Mean gait velocity at the adolescent visit was 85±27 and 79±31 cm/s at adult visit (P=0.02). Both gait deviation index and gait velocity change were clinically insignificant. Fifty-seven adults (81 limbs, 54%) had mild residual deformities. Residual hip internal rotation, pes

planovalgus, and crouch gait were common. Severe deformities impacting function or causing pain were present in 11 participants (14 limbs, 10%). Seven of the 11 adults with severe deformities were worse compared with their adolescent evaluation; 4 were unchanged. Conclusions: Correcting deformities before adulthood has lasting stability with little functional loss in most ambulatory young adults with CP. Increasing deformity after adolescence can occur in young adults but is uncommon. Level of evidence: Level III.

PMID: 35067603

5. Hip Surveillance for Children with Cerebral Palsy: A Survey of Orthopaedic Surgeons in India
Jacqueline Li, Dhiren Ganjwala, Ashok Johari, Stacey Miller, Emily K Schaeffer, Kishore Mulpuri, Alaric Aroojis

Indian J Orthop. 2021 Jun 7;56(1):58-65. doi: 10.1007/s43465-021-00432-3. eCollection 2022 Jan.

Background: The purpose of this study was to assess Indian orthopaedic surgeons' current practices and beliefs regarding hip surveillance for children with cerebral palsy (CP), to determine potential support for developing hip surveillance guidelines, and to identify knowledge gaps and key obstacles to guideline implementation in India. Methods: An anonymous, cross-sectional online survey was sent to approximately 350 Paediatric Orthopaedic Society of India (POSI) members who were queried on their practices and beliefs about hip surveillance for children with CP, as well as perceived challenges and requirements for the successful implementation of hip surveillance guidelines in the Indian context. Results: Out of 107 responses obtained from POSI members, almost all (96.2%) agreed that hip displacement requires standardized monitoring, using surveillance and surgery to prevent hip dislocation. Approximately half (51.5%) of respondents reported using existing hip surveillance guidelines, with most (41.2%) using the Australian guidelines. Almost all (97%) surgeons indicated that hip surveillance guidelines in India are needed, with 100% expressing interest in following guidelines specific to India. Respondents most frequently indicated late referrals to orthopaedics (81.2%), loss of patients to follow-up (78.2%), and lack of resources (43.6%) as challenges to successful hip surveillance in India. Perceived requirements for implementation included developing Indian-specific guidelines (83.2%) as well as educating surgeons (56.4%), physiotherapists/pediatricians (90.1%), and families (82.2%). Conclusion: Orthopaedic surgeons practicing in India understand the importance of preventing hip dislocations in children with CP through hip surveillance and timely surgical intervention. The results demonstrated strong support for the development of hip surveillance guidelines designed specifically for the Indian healthcare system.

PMID: 35070143

6. Prone vs Supine Positioning for Femoral Derotation Osteotomy: Kinematic and Physical Examination Outcomes Suggest Both Can Achieve Desired Results
Uri Givon, Lisa Drefus, Mary Murray-Weir, Mark Lenhoff, Jayme C Burket-Koltsov, Emily R Dodwell, David M Scher

HSS J. 2022 Feb;18(1):98-104. doi: 10.1177/1556331621997062. Epub 2021 Mar 20.

Background: Femoral derotation osteotomy (FDO) for correction of internal rotation gait resulting from cerebral palsy (CP) can be performed with the patient in the prone or supine position. It is not known whether patient positioning during FDO affects the change in hip rotation. Purpose/Questions: We sought to compare the change in hip rotation following FDO performed on patients with CP in the prone or supine position through kinematic analysis. Methods: We conducted a consecutive retrospective cohort study of children with CP, ages 3 to 18 years and with Gross Motor Function Classification System (GMFCS) levels I to III, who underwent prone or supine FDO and pre- and postoperative motion analysis. The prone group included 37 patients (68 limbs) between 1990 and 1995. The supine group included 26 patients (47 limbs) between 2005 and 2015. The groups were matched for gender, age, and GMFCS level. The primary outcome was hip rotation in degrees during stance phase. Secondary outcomes included temporal-spatial parameters, hip abduction, hip and knee extension, and hip and knee passive range of motion (ROM). Results: The prone group had more bilateral patients (100%) than the supine group (81%). The supine group underwent more concomitant procedures. There was no difference between the prone and supine groups in postoperative stance hip rotation; both groups had significantly improved stance hip rotation, step width, and hip rotation passive ROM, pre- to postoperatively. Prone patients had improved postoperative hip extension, pelvic tilt, velocity, and cadence. Conclusions: There was no significant different in stance hip rotation between supine and prone FDO groups. Advocates of prone positioning for FDO suggest it allows more accurate assessment of rotation. Supine positioning may be more convenient when additional procedures are required. Based on our findings, either approach can achieve the desired result.

PMID: 35087339

7. Validated predictive equations based on tibial length in estimating height for children with cerebral palsy for 2-18 years, across all GMFCS levels
Mahnon Suria Mokhy, Rosita Jamaluddin, Abd Rasyid Ismail, Norhasmah Sulaiman, Siti Nur 'Asyura Adznam, Intan Hakimah Ismail, Malina Osman

J Nutr Sci. 2021 Dec 17;10:e108. doi: 10.1017/jns.2021.101. eCollection 2021.

Children with cerebral palsy (CP) typically suffer from congenital deformities, such as scoliosis and contractures, therefore, it is a challenge to measure the stature of CP children. Studies have suggested that predictive equations based on tibia length (TL) may be used as an alternative method in measuring the actual height or stature. The present study aimed to develop and validate predictive equations based on TL for CP children in Malaysia across all five levels of gross motor functions (GMFCS I to V) through a cross-sectional study. All subjects were recruited from Hospitals and Community-Based Rehabilitation (CBR) in the central and southern regions of Malaysia. Two predictive equation models were developed using multiple linear regression. For Model 1, the predictive equation was developed based on TL. On the other hand, Model 2 was developed based on TL with age was included. A flexible Seca measuring tape was used to measure the stature and TL. CP children aged 2-18 years were classified into the equation development group (EDG), n 177 and the validation group (VG), n 139. Model 1, Height = 32·3 + 3·14 (TL), demonstrated a strong correlation with the actual height (R 2 0·834), small SEE (1·42), and high intra correlation coefficient (0·929). The findings suggested that Model 1 was more accurate in estimating the height of CP children aged 2-18 years. This model was shown to suit the Malaysian population and applicable across all GMFCS levels.

PMID: 35059189

8. Outcomes of importance to children and young adults with cerebral palsy, their parents and health professionals following lower limb orthopaedic surgery: A qualitative study to inform a Core Outcome Set
Hajar Almoajil, Francine Toye, Helen Dawes, Jo Pierce, Andrew Meaney, Aziz Baklouti, Lara Poverini, Sally Hopewell, Tim Theologis

Health Expect. 2022 Jan 27. doi: 10.1111/hex.13428. Online ahead of print.

Introduction: Although several outcomes are commonly measured to assess the effect of surgery for young people with cerebral palsy (CP), these are selected mainly by health professionals and researchers. Including the perspectives of a broader range of stakeholders is an essential step towards determining important outcomes for assessment. This qualitative study involves the development of a core outcome set (COS) for lower limb orthopaedic surgery for ambulant children with CP. Objective: This study aimed to identify outcomes that matter to children and young people with CP, their parents and healthcare professionals following lower limb orthopaedic surgery. Methods: Semi-structured interviews were conducted with 10 healthcare professionals, 10 children and young people with CP and 8 parents. Interview data were analysed by content analysis supported by the International Classification of Functioning, Disability and Health (ICF-CY) supplemented by thematic analysis. Findings: Thirty-one outcomes were identified in total, which were linked to eleven second-level ICF-CY categories. There were differences between stakeholder groups in preferences and expectations from surgical outcomes. Healthcare professionals and children with their parents identified 31 and 25 outcomes, respectively. Health outcomes valued by participants were lower limb alignment and symmetry, flexibility and muscle strength, mental health, fatigue, pain, function in life, mobility, participation, being independent, quality of life and adverse events. Compared to previous published trials, 10 new outcomes were revealed by this study. Conclusion: The researchers identified outcomes that are important to all stakeholders following lower limb orthopaedic surgery for ambulant CP. Including these outcomes in future studies would promote patient-centred care for children and young adults with CP. Findings will be used to inform an international Delphi survey and develop a COS in this field. Patient and public contribution: This study was informed by an advisory group including a young adult with CP and a parent of a child with CP. This group engaged in the design of the study and the information material to support the interview (information sheet and interview topic guide).

PMID: 35083830

9. Kinematic and Kinetic Gait Parameters Can Distinguish between Idiopathic and Neurologic Toe-Walking
Andreas Habersack, Stefan Franz Fischerauer, Tanja Kraus, Hans-Peter Holzer, Martin Svehlik

Int J Environ Res Public Health. 2022 Jan 12;19(2):804. doi: 10.3390/ijerph19020804.

The differentiation between mild forms of toe-walking (equinus) in cerebral palsy (CP) and idiopathic toe-walking (ITW) is often clinically challenging. This study aims to define kinematic and kinetic parameters using 3D gait analysis to facilitate and

secure the diagnosis of "idiopathic toe-walking". We conducted a retrospective controlled stratified cohort study. 12 toe-walking subjects per group diagnosed as ITW or CP were included and stratified according to age, gender and maximal dorsiflexion in stance. We collected kinematic and kinetic data using a three-dimensional optical motion analysis system with integrated floor force plates. Pairwise comparison between ITW and CP gait data was performed, and discriminant factor analysis was conducted. Both groups were compared with typically developing peers (TD). We found kinematic and kinetic parameters having a high discriminatory power and sensitivity to distinguish between ITW and CP groups (e.g., knee angle at initial contact (91% sensitivity, 73% specificity) and foot progression angle at midstance (82% sensitivity, 73% specificity)). The strength of this study is a high discriminatory power between ITW and CP toe-walking groups. Described kinematic parameters are easy to examine even without high-tech equipment; therefore, it is directly transferable to everyday praxis.

PMID: 35055626

10. A test of the effort equalization hypothesis in children with cerebral palsy who have an asymmetric gait
Juha-Pekka Kulmala, Piia Haakana, Jussi Nurminen, Elina Ylitalo, Tuula Niemelä, Essi Marttinen Rossi, Helena Mäenpää, Harri Piitulainen

PLoS One. 2022 Jan 21;17(1):e0262042. doi: 10.1371/journal.pone.0262042. eCollection 2022.

Healthy people can walk nearly effortlessly thanks to their instinctively adaptive gait patterns that tend to minimize metabolic energy consumption. However, the economy of gait is severely impaired in many neurological disorders such as stroke or cerebral palsy (CP). Moreover, self-selected asymmetry of impaired gait does not seem to unequivocally coincide with the minimal energy cost, suggesting the presence of other adaptive origins. Here, we used hemiparetic CP gait as a model to test the hypothesis that pathological asymmetric gait patterns are chosen to equalize the relative muscle efforts between the affected and unaffected limbs. We determined the relative muscle efforts for the ankle and knee extensors by relating extensor joint moments during gait to maximum moments obtained from all-out hopping reference test. During asymmetric CP gait, the unaffected limb generated greater ankle (1.36±0.15 vs 1.17±0.16 Nm/kg, $p = 0.002$) and knee (0.74±0.33 vs 0.44±0.19 Nm/kg, $p = 0.007$) extensor moments compared with the affected limb. Similarly, the maximum moment generation capacity was greater in the unaffected limb versus the affected limb (ankle extensors: 1.81±0.39 Nm/kg vs 1.51±0.34 Nm/kg, $p = 0.033$; knee extensors: 1.83±0.37 Nm/kg vs 1.34±0.38 Nm/kg, $p = 0.021$) in our force reference test. As a consequence, no differences were found in the relative efforts between unaffected and affected limb ankle extensors (77±12% vs 80±16%, $p = 0.69$) and knee extensors (41±17% vs 38±23%, $p = 0.54$). In conclusion, asymmetric CP gait resulted in similar relative muscle efforts between affected and unaffected limbs. The tendency for effort equalization may thus be an important driver of self-selected gait asymmetry patterns, and consequently advantageous for preventing fatigue of the weaker affected side musculature.

PMID: 35061756

11. Foot-to-Foot Contact Among Initial Goal-Directed Movements Supports the Prognostic Value of Fidgety Movements in HIE-Cooled Infants
Fabrizio Ferrari, Luca Bedetti, Natascia Bertoncelli, Maria Federica Roversi, Elisa Della Casa, Isotta Guidotti, Luca Ori, Roberto D'Amico, Lara Valeri, Licia Lugli, Laura Lucaccioni, Alberto Berardi

Front Pediatr. 2022 Jan 5;9:731021. doi: 10.3389/fped.2021.731021. eCollection 2021.

Background: Few studies conducted to date have observed general movements in infants affected by hypoxic-ischemic encephalopathy (HIE) who underwent therapeutic hypothermia. We investigated whether foot-to-foot contact (FF) could support the predictive value of fidgety movements (FMs) in infants affected by HIE and treated with brain cooling. Methods: Spontaneous motility was video recorded for 3-5 min at 12 weeks post-term age in 58 full-term newborn infants affected by perinatal asphyxia who were cooled due to moderate to severe HIE. FF and FMs were blindly scored by three independent observers. At 24 months, each patient underwent a neurological examination by Amiel-Tison and Grenier. Results: At 24 months, 47 infants had developed typically at neurological examination, eight had developed mild motor impairment, and three developed cerebral palsy (CP). At 12 weeks, 34 (58.6%) infants had shown normal FMs, four of whom developed mild motor impairment. Twenty-four infants (41.4%) exhibited abnormal or no FMs, four of whom developed mild motor impairment and three developed CP. FF was present in 20 infants (34.5%), two of whom developed mild motor impairment. FF was absent in 38 infants (65.5%), six of whom developed mild motor impairment and three developed CP. Both FMs and FF, considered separately, were 100% sensitive for predicting CP at 24 months, but only 61 and 36%, respectively, were specific. Summing the two patterns together, the specificity increases to 73%, considering only CP as an abnormal outcome, and increases to 74% when considering CP plus mild motor impairment. Unexpectedly, fidgety movements were absent in 24 infants with typical motor outcomes, 17 of whom showed a typical motor outcome. Conclusions: FF is already part of motor repertoire at 12 weeks and allows a comparison of spontaneous non-voluntary movements (FMs) to pre-voluntary movements (FF). FF supports FMs for both sensitivity and specificity. A second video recording at 16-18 weeks, when pedipulation is present in healthy infants, is

suggested: it may better define the presence or absence of goal-directed motility.

PMID: 35071123

12. Variation in Functional Mobility Within Gross Motor Function Classification System Levels
Susan A Rethlefsen, Alison M Hanson, Eva Ciccodicola, Tishya A L Wren, Robert M Kay

J Pediatr Orthop. 2022 Jan 28. doi: 10.1097/BPO.0000000000002060. Online ahead of print.

Background and objective: Variation in walking performance within Gross Motor Function Classification System (GMFCS) levels for patients with cerebral palsy (CP) is often unrecognized. The Functional Mobility Scale (FMS) rates mobility at household, school, and community distances. This study evaluated the variability of walking performance within GMFCS levels as measured by the FMS. Methods: Retrospective review of gait analysis records for ambulatory patients with CP. FMS rating distribution at each distance was examined for GMFCS levels I-IV within age groups (below 12 or above 12 y) and compared among levels using $\chi 2$ tests. Results: A total of 788 patients (499 male; age 11.2, SD 3.9 y) were included. FMS score distribution differed significantly among GMFCS levels for all distances ($P<0.001$). Gmfcs level: I-Children walked independently on all surfaces at home and school distances at all ages. In all, 5% to 7% used wheeled mobility in the community. II-Most walked at home and school distances. Some younger children crawled at home, and 5% to 8% of all subjects used walls and furniture. Approximately 50% of subjects in both age groups used some form of walking aids or a stroller/wheelchair in the community. III-Twenty-five percent to 30% walked unaided at home, requiring walking aids or wheeled mobility at school or in the community. Forty-five percent of younger and 18% of older subjects crawled at home. Eight percent of younger and 28% of older subjects used wheelchairs at school. Seventy-three percent to 75% of all subjects used strollers/wheelchairs in the community. IV-Sixty-two percent of younger and 43% of older subjects crawled at home. Approximately 15% of all subjects did some aided walking at home. Twenty-seven percent of younger children did some aided walking at school, while only 1 older subject did so. All used strollers/wheelchairs in the community. Conclusion: Mobility function varies within each GMFCS level with the most variability in GMFCS II at school and community distances and GMFCS III at household distances. These findings highlight the importance of using both the GMFCS and FMS when assessing functional mobility in children with CP. Level of evidence: Level III-retrospective study.

PMID: 35089878

13. Effect of Equine-Assisted Activities and Therapies on Cardiorespiratory Fitness in Children with Cerebral Palsy: A Randomized Controlled Trial
Min-Hwa Suk, Jeong-Yi Kwon

J Integr Complement Med. 2022 Jan;28(1):51-59. doi: 10.1089/jicm.2021.0158.

Objectives: To determine the effects of an equine-assisted activities and therapies (EAAT) program on cardiorespiratory fitness (CRF) in children with cerebral palsy (CP). Design: An evaluator-blinded, parallel, two-arm, randomized controlled clinical trial with 1:1 randomization. Settings/Location: A tertiary university hospital and a local arena. Subjects: Forty-six children with CP (24 boys and 22 girls) classified as Gross Motor Function Classification System levels I, II, or III were included. Interventions: The EAAT program was conducted for 40 min twice a week for 16 weeks (32 lessons). Outcome measures: Clinical global impression scales, motor capacity, cardiopulmonary fitness, and habitual physical activity was measured on both groups before and after the 16-week period. Results: Changes in the Clinical Global Impression-Severity scale and Clinical Global Impression-Improvement scale scores were not different between the groups after the intervention. Analysis of covariance revealed statistically significant differences in Gross Motor Function Measure 66 (GMFM 66) ($p < 0.05$) and Pediatric Balance Scale ($p < 0.001$) in motor capacity and resting heart rate (HRrest) ($p < 0.001$) in CRF, between the EAAT group and the control group. Subgroup analysis using multiple linear regression analysis revealed that the GMFM 66 changes had a statistically significant effect on the HRrest changes in the EAAT group ($p < 0.05$). Conclusions: The present study showed decreased HRrest in children with CP after completing the 16-week EAAT program. This improvement was explained by the improvement of GMFM 66 in the EAAT group. Thus, EAAT may be among the endurance training programs that could be offered to children with CP to improve their CRF. Clinical Trial Registration number: NCT03870893.

PMID: 35085017

14. Assessing the usefulness of an mHealth strategy to support implementation of multi-faceted adaptive feeding interventions by community-based rehabilitation workers
Sutanuka Bhattacharjya, James Lenker, Rabi Ghosh

Assist Technol. 2022 Jan 21. doi: 10.1080/10400435.2022.2028936. Online ahead of print.
Objective: To assess the usefulness of an mHealth strategy to support assimilation of adaptive feeding interventions into daily practices of community-based rehabilitation (CBR) workers. Methods: The mHealth strategy was evaluated in a 4-week field test. At baseline, all participants received a 1-hour, hands-on training on adaptive feeding techniques. The intervention group (n=12) subsequently received smartphones pre-loaded with training and demonstration videos; control group members (n=12) did not. All were instructed to recommend adaptive feeding interventions to families on their caseload when appropriate. Both groups received weekly calls to monitor progress and discussed their experiences in post-study focus groups. Results: The intervention group saw over twice the number of families with a child with cerebral palsy compared to the control group. For intervention group members, on-demand access to the videos increased their overall usefulness in everyday practice, enhanced their self-confidence, clarified their recommendations, and increased credibility with caregivers. In contrast, control group members implemented the adaptive feeding strategies less frequently and less confidently. Conclusion: mHealth strategies are a promising option for supporting geographically dispersed CBR workers implementing multi-faceted assistive technology interventions. The portability of video content reinforced learning, increased implementation of the adaptive feeding interventions, and enhanced communication with consumer.

PMID: 35061976

15. A Pragmatic Approach to the Management of Severe Awake Bruxism in an Adolescent with Cerebral Palsy and Global Developmental Delay
N Ismail, S H Hamzah, I Wan Mokhtar

Case Rep Dent. 2022 Jan 13;2022:5288515. doi: 10.1155/2022/5288515. eCollection 2022.

Cerebral palsy is a neurological and motor condition characterised by muscle balance and posture impairments. Bruxism and malocclusion were frequently observed in patients with cerebral palsy, in contrast to other oral anomalies. The report outlines how severe awake bruxism is managed in a 16-year-old Korean boy who has nonverbal spastic cerebral palsy and global developmental delay. The treatment protocol involved the fabrication of soft occlusal splints of three and four millimetres in thickness, followed by the placement of stainless-steel crowns on all first permanent molars whilst video recording and a bruxism diary was kept. Fixed restorations demonstrate increased endurance in withstanding bruxism force in persons who are dependent on their caretaker.

PMID: 35070457

16. Defining usual physiotherapy care in ambulant children with cerebral palsy in the UK: A mixed methods consensus study
Rachel Rapson, Jos M Latour, Jonathan Marsden, Harriet Hughes, Bernie Carter

Child Care Health Dev. 2022 Jan 26. doi: 10.1111/cch.12977. Online ahead of print.

Background: Ambulant children with cerebral palsy (CP) undertake physiotherapy to improve balance and walking. However, there are no relevant clinical guidelines to standardise usual physiotherapy care in the UK. A consensus process can be used to define usual physiotherapy care for children with cerebral palsy (CP). The resulting usual care checklist can support the development of clinical guidelines and be used to measure fidelity to usual care in the control groups of trials for children with CP. Methods: Twelve expert physiotherapists were recruited. In Phase 1, statements on usual care were developed using a survey and two nominal groups. Phase 2 included a literature review to support usual physiotherapy interventions. Phase 3 used a confirmatory survey, which also captured changes to provision during the COVID-19 pandemic. Consensus was calculated by deriving the mean of the deviations from the median score (MDM). High consensus was deemed to be where MDM<0.42. Results: Physiotherapists reached high consensus on five outcome measures (MDM range 0-0.375) and nine areas of assessment (MDM range 0-0.25). Physiotherapists reached moderate consensus on task specific training (MDM=0.75), delivered at weekly intensity for 4-6 weeks (MDM=0.43). There was high consensus (MDM=0) that children should participate in modified sport and fitness activities and that children with Gross Motor Function Classification System level III should be monitored on long-term pathways (MDM= 0.29). Conclusions: Physiotherapists reached consensus on two usual care interventions and a checklist was developed to inform the control groups of future randomised controlled trials. Further consensus work is required to establish clinical guidelines to standardise usual physiotherapy care in the UK.

PMID: 35080029

17. Tracking and Classification of Head Movement for Augmentative and Alternative Communication Systems
Carlos Wellington P Gonçalves, Rogério A Richa, Antonio P L Bo

Sensors (Basel). 2022 Jan 7;22(2):435. doi: 10.3390/s22020435.

The use of assistive technologies can mitigate or reduce the challenges faced by individuals with motor disabilities to use computer systems. However, those who feature severe involuntary movements often have fewer options at hand. This work describes an application that can recognize the user's head using a conventional webcam, track its motion, model the desired functional movement, and recognize it to enable the use of a virtual keyboard. The proposed classifier features a flexible structure and may be personalized for different user need. Experimental results obtained with participants with no neurological disorders have shown that classifiers based on Hidden Markov Models provided similar or better performance than a classifier based on position threshold. However, motion segmentation and interpretation modules were sensitive to involuntary movements featured by participants with cerebral palsy that took part in the study.

PMID: 35062395

18. Muscle Contractures in Adults With Cerebral Palsy Characterized by Combined Ultrasound-Derived Echo Intensity and Handheld Dynamometry Measures
Christian Svane, Christian Riis Forman, Aqella Rasul, Jens Bo Nielsen, Jakob Lorentzen

Ultrasound Med Biol. 2022 Jan 19;S0301-5629(21)00526-3. doi:10.1016/j.ultrasmedbio.2021.12.012. Online ahead of print.

We used ultrasound-derived echo intensity and hand-held dynamometry to characterize plantar flexor muscle contractures in adults with cerebral palsy (CP). Eleven adults with CP (aged 41 ± 12 y, Gross Motor Function Classification System I-II) and 11 neurologically intact adults (aged 35 ± 10 y) participated in the study. Echo intensity was measured from the medial gastrocnemius muscle using brightness mode ultrasound. Hand-held dynamometry was used to quantify plantar flexor passive muscle stiffness and ankle joint passive range of motion (pROM). Echo intensity correlated with both passive muscle stiffness ($r = 0.57$, $p = 0.006$) and pROM ($r = -0.56$, $p = 0.006$). Ultrasound echo intensity ($p = 0.02$, standardized mean difference [SMD] = 1.13) and passive muscle stiffness ($p < 0.001$, SMD = 1.99) were higher and ankle joint pROM ($p < 0.001$, SMD = 2.69) was lower in adults with CP than in neurologically intact adults. We conclude that combined ultrasound-derived echo intensity and hand-held dynamometry may be used to provide an objective characterization of muscle contractures.

PMID: 35065812

19. Predicting the impact of intraoperative halo-femoral traction from preoperative imaging in neuromuscular scoliosis
Thomas Bane, Scott J Luhmann

Spine Deform. 2022 Jan 25. doi: 10.1007/s43390-021-00461-w. Online ahead of print.

Purpose: Intraoperative traction (ITx) has been demonstrated to be a useful adjunct intervention at the time of posterior spinal fusion (PSF) for the treatment of severe neuromuscular scoliosis (NMS) to improve the coronal spinal deformity and pelvic obliquity. The purpose of this study is to determine if preoperative flexibility radiographs can predict the amount of spinal deformity and pelvic obliquity correction at final follow-up. Methods: This was a retrospective analysis of a single-surgeon series who underwent PSF to the pelvis with adjunct ITx for NMS. Database query identified 76 NMS patients, of which 41 met inclusion criteria. Demographic, radiographic and operative data were analyzed. Results: Of the 41 study patients, 56% (n = 23) were male and mean age at surgery was 13.6 years. Mean follow-up of 4.1 years (minimum follow-up 2 years). 35 patients had cerebral palsy, 5 patients were syndromic, and 1 patient had myelomeningocele. The average preoperative weight was 35 kg and all were wheelchair ambulators. Total traction applied on average was 49% of the preoperative body weight. Mean preoperative coronal deformity was 91° which improved to 43° at final follow-up (53% correction). Push-supine imaging had the strongest correlation to major coronal deformity outcome at final follow-up ($r2 = 0.87$, $p \leq 0.0001$). Compared to push-supine imaging, there was a mean greater coronal deformity correction of 18 ± 10° ($p \leq 0.0001$) at final follow-up. To predict the final coronal deformity, the regression equation was final Cobb angle = 1.13085 + preop push-supine Cobb angle × 0.68830. Mean preoperative pelvic obliquity was 34° which improved to 12° at final follow-up (65% correction). Push-supine imaging had the strongest correlation to pelvic obliquity outcome at final follow-up ($r2 = 0.59$, $p = 0.0001$). Compared to push-supine imaging, there was a mean greater pelvic obliquity correction of 3 ± 10° ($p = 0.0857$) at final follow-up. The regression equation was final POB = 6.42096 + preop push-supine POB × 0.36675. Mean preoperative kyphosis was 70° and 52° at final follow-up (26% correction). Conclusion: The results of this study demonstrated for preoperative planning that the push-supine flexibility radiograph is most predictive of the coronal deformity and of the pelvic obliquity correction. At final follow-up in this NMS population, there was a mean greater improvement of 18° for coronal deformity versus preoperative push-supine imaging and 3° for pelvic obliquity versus preoperative push-supine imaging. At the time of PSF, ITx is an effective adjunct

technique to improve coronal deformity and POB for NMS producing 53% coronal correction, 65% POB correction, and 26% kyphosis correction. Level of evidence: IV.

PMID: 35076899

20. Effects of Vagus Nerve Stimulation on Sustained Seizure Clusters: A Case Report
Galih Ricci Muchamad, Ryosuke Hanaya, Shinsuke Maruyama, Chihiro Yonee, Hiroshi Hosoyama, Yusei Baba, Masanori Sato, Nozomi Sano, Toshiaki Otsubo, Koji Yoshimoto

NMC Case Rep J. 2021 Apr 29;8(1):123-128. doi: 10.2176/nmccrj.cr.2020-0137. eCollection 2021.

Seizure clusters (SCs) are acute repetitive seizures with acute episodes of deterioration during seizure control. SCs can be defined as a series of grouped seizures with short interictal periods. Vagus nerve stimulation (VNS) is a treatment option for drug-resistant epilepsy. We present a case where VNS suppressed epileptic SCs, which had persisted for several months. A 13-year-old boy with congenital cerebral palsy and mental retardation had drug-resistant epilepsy with daily jerking movements and spasms in both sides of his body. The seizures were often clustered, and he experienced two sustained SC episodes that persisted for a few months even with prolonged use of continuous intravenous midazolam (IV-MDZ). The patient underwent VNS device placement at the second sustained SC and rapid induction of VNS. Because the tapering of IV-MDZ did not exacerbate the SC, midazolam was discontinued 4 weeks after VNS initiation. Non-refractory SCs also disappeared 10 months after VNS. The seizure severity was improved, and the frequency of seizures reduced from daily to once every few months. The epileptic activity on electroencephalography (EEG) significantly decreased. This case highlights VNS as an additional treatment option for SC. VNS may be a therapeutic option if SC resists the drugs and sustains. Additional studies are necessary to confirm our findings and to investigate how device implantation and stimulation parameters affect the efficacy of VNS.

PMID: 35079453

21. Home mechanical ventilation for children with severe neurological impairment: Parents' perspectives on clinician counselling
Jori F Bogetz, Vasu Munjapara, Carrie M Henderson, Jessica C Raisanen, Nicholas A Jabre, Kelly J Shipman, Benjamin S Wilfond, Renee D Boss

Dev Med Child Neurol. 2022 Jan 26. doi: 10.1111/dmcn.15151. Online ahead of print.

Aim: To retrospectively explore the perspectives of parents of children with severe neurological impairment (SNI), such as those with severe cerebral palsy, epilepsy syndromes, and structural brain differences, on clinician counseling regarding home mechanical ventilation (HMV). Method: Inductive thematic analysis was performed on data from telephone interviews with parents who chose for and against HMV for their child with SNI at three academic children's hospitals across the USA. Results: Twenty-six parents/legal guardians of 24 children were interviewed. Fourteen children had static encephalopathy, 11 received HMV, and 20 were alive at the time of parent interviews. Themes included how HMV related to the child's prognosis, risk of death, and integration with goals of care. Although clinicians voiced uncertainty about how HMV would impact their child, parents felt this was coupled with prescriptive/intimidating examples about the child's end of life and judgments about the child's quality of life. Interpretation: While prognositc uncertainty exists, this study suggests that parents of children with SNI seek clinician counseling about HMV that considers their goals of care and views on their child's quality of life.

PMID: 35080259

22. Prevalence, pattern and impact of sleep disturbance on quality of life and exercise participation among children with cerebral palsy in Kano city
Umaru M Badaru, Aliya M Hassan, Rufai Y Ahmad, Jibril M Nuhu, Isa U Lawal

Sleep Sci. Jan-Mar 2021;14(4):348-356. doi: 10.5935/1984-0063.20200108.

Introduction: Sleep disturbance (SD) could have negative impact on the general well-being of children with cerebral palsy (CWCP). Objectives: The purpose of this study was to assess the prevalence of SD and its impact on quality of life and exercise participation among CWCP. Material and methods: In the cross-sectional study, CWCP and their siblings were recruited from secondary and tertiary hospitals in Kano City. SD, gross motor function (GMF), spasticity and quality of life were assessed with SD scale, GMF classification system, modified Ashworth scale and pediatric quality of life inventory,

respectively. Data was analyzed with Mann-Whitney U and chi-square tests, linear and hierarchical regressions using SPSS version 20.0. Results: There were 200 CWCP (aged 4.35±8.03 years) and 200 siblings (aged 5.89±3.06 years). The prevalence of SD in CWCP was 31.5%. CWCP suffered more SD than their siblings ($p<0.001$). SD in CWCP is influenced by GMF level (ß=0.378, $p<0.001$) and gender (ß=0.16, $p<0.05$). SD has negative influence on quality of life (ß=-0.18, $p<0.001$), active participation in home-based (ß=-0.23, $p<0.000$), and clinic-based exercises (ß=-0.24, $p<0.00$). GMF levels (ß=-0.505, $p<0.0001$), hamstring spasticity (ß=-0.250, $p<0.005$), and age (ß=-0.207, $p<0.001$) also have influenced on quality of life. Conclusion: One-third of the CWCP suffered pathologic SD, which has negative impact on their quality of life and the ability to actively participate in both home and clinic-based exercises. Aside SD, other factors such as child's age, spasticity level and severity of motor impairment also affected their quality of life negatively. Enhancing the motor abilities of CWCP may improve their quality of sleep and quality of life.

PMID: 35087632

23. Severe Outcomes, Readmission, and Length of Stay Among COVID-19 Patients with Intellectual and Developmental Disabilities
Alain K Koyama, Emilia H Koumans, Kanta Sircar, Amy Lavery, Joy Hsu, A Blythe Ryerson, David A Siegel

Int J Infect Dis. 2022 Jan 22;S1201-9712(22)00048-0. doi: 10.1016/j.ijid.2022.01.038. Online ahead of print.

No abstract available

PMID: 35077878

24. Impact of COVID Pandemic on the Children with Cerebral Palsy
Atul R Bhaskar, Mayuri V Gad, Chasanal M Rathod

Indian J Orthop. 2022 Jan 18;1-6. doi: 10.1007/s43465-021-00591-3. Online ahead of print.

Background: The COVID pandemic has been raging across the world for the past 18 months and has severely impacted healthcare and resources. Children with special needs have been adversely affected by the COVID pandemic, due to lack of formal schooling, access to rehabilitation and limited physical and social activity. The aim of this online survey was to understand the effect of the pandemic on the children with Cerebral Palsy (CP). Methods: An online survey was conducted using a nine parts questionnaire comprising 26 questions. Survey included questions pertaining to demographic data, ambulatory status, lack of access to physiotherapy, orthotic adjustment, surgery, deterioration of function, and behaviour. A simple binary answer was sought to cover all social strata of society. Results: Responses were received from 101 caregivers who participated in an online questionnaire. 25.7% had no therapy sessions, 74.2% were on therapy of which 23.7% had online sessions. The lockdown restrictions coupled with lack of rehabilitation and orthotic support led to deterioration in physical function in 54 children and worsening of deformity in 34. Changes in behavioural pattern was observed in 45 children. Conclusion: The survey revealed major disruptions in the care of Children with CP. The parents reported difficulties in managing the child therapy at home. There is always a possibility that the pandemic will result in a lockdown again, and hence our approach toward physical therapy assessment and rehabilitation needs to be towards home-based and family-centred care.

PMID: 35068545

25. Mendelian etiologies identified with whole exome sequencing in cerebral palsy
Maya Chopra, Dustin L Gable, Jamie Love-Nichols, Alexa Tsao, Shira Rockowitz, Piotr Sliz, Elizabeth Barkoudah, Lucia Bastianelli, David Coulter, Emily Davidson, Claudio DeGusmao, David Fogelman, Kathleen Huth, Paige Marshall, Donna Nimec, Jessica Solomon Sanders, Benjamin J Shore, Brian Snyder, Scellig S D Stone, Ana Ubeda, Colyn Watkins, Charles Berde, Jeffrey Bolton, Catherine Brownstein, Michael Costigan, Darius Ebrahimi-Fakhari, Abbe Lai, Anne O'Donnell-Luria, Alex R Paciorkowski, Anna Pinto, John Pugh, Lance Rodan, Eugene Roe, Lindsay Swanson, Bo Zhang, Michael C Kruer, Mustafa Sahin, Annapurna Poduri, Siddharth Srivastava

Ann Clin Transl Neurol. 2022 Jan 24. doi: 10.1002/acn3.51506. Online ahead of print.

Objectives: Cerebral palsy (CP) is the most common childhood motor disability, yet its link to single-gene disorders is under-characterized. To explore the genetic landscape of CP, we conducted whole exome sequencing (WES) in a cohort of patients with CP. Methods: We performed comprehensive phenotyping and WES on a prospective cohort of individuals with

cryptogenic CP (who meet criteria for CP; have no risk factors), non-cryptogenic CP (who meet criteria for CP; have at least one risk factor), and CP masqueraders (who could be diagnosed with CP, but have regression/progressive symptoms). We characterized motor phenotypes, ascertained medical comorbidities, and classified brain MRIs. We analyzed WES data using an institutional pipeline. Results: We included 50 probands in this analysis (20 females, 30 males). Twenty-four had cryptogenic CP, 20 had non-cryptogenic CP, five had CP masquerader classification, and one had unknown classification. Hypotonic-ataxic subtype showed a difference in prevalence across the classification groups ($p = 0.01$). Twenty-six percent of participants (13/50) had a pathogenic/likely pathogenic variant in 13 unique genes (ECHS1, SATB2, ZMYM2, ADAT3, COL4A1, THOC2, SLC16A2, SPAST, POLR2A, GNAO1, PDHX, ACADM, ATL1), including one patient with two genetic disorders (ACADM, PDHX) and two patients with a SPAST-related disorder. The CP masquerader category had the highest diagnostic yield (n = 3/5, 60%), followed by the cryptogenic CP category (n = 7/24, 29%). Fifteen percent of patients with non-cryptogenic CP (n = 3/20) had a Mendelian disorder on WES. Interpretation: WES demonstrated a significant prevalence of Mendelian disorders in individuals clinically diagnosed with CP, including in individuals with known CP risk factors.

PMID: 35076175

26. Genome-wide analysis of circular RNAs and validation of hsa_circ_0086354 as a promising biomarker for early diagnosis of cerebral palsy
Yuanyuan Hu, Xuzhao Bian, Chao Wu, Yan Wang, Yang Wu, Xiaoqin Gu, Suyan Zhuo, Shiquan Sun

BMC Med Genomics. 2022 Jan 21;15(1):13. doi: 10.1186/s12920-022-01163-6.

Background: Cerebral palsy (CP) is a spectrum of non-progressive motor disorders caused by brain injury during fetal or postnatal periods. Current diagnosis of CP mainly relies on neuroimaging and motor assessment. Here, we aimed to explore novel biomarkers for early diagnosis of CP. Methods: Blood plasma from five children with CP and their healthy twin brothers/sisters was analyzed by gene microarray to screen out differentially expressed RNAs. Selected differentially expressed circular RNAs (circRNAs) were further validated using quantitative real-time PCR. Receiver operating characteristic (ROC) curve analysis was used to assess the specificity and sensitivity of hsa_circ_0086354 in discriminating children with CP and healthy controls. Results: 43 up-regulated circRNAs and 2 down-regulated circRNAs were obtained by difference analysis (fold change > 2, $p < 0.05$), among which five circRNAs related to neuron differentiation and neurogenesis were chosen for further validation. Additional 30 pairs of children with CP and healthy controls were recruited and five selected circRNAs were further detected, showing that hsa_circ_0086354 was significantly down-regulated in CP plasma compared with control, which was highly in accord with microarray analysis. ROC curve analysis showed that the area under curve (AUC) to discriminate children with CP and healthy controls using hsa_circ_0086354 was 0.967, the sensitivity was 0.833 and the specificity was 0.966. Moreover, hsa_circ_0086354 was predicted as a competitive endogenous RNA for miR-181a, and hsa_circ_0086354 expression was negatively correlated to miR-181a expression in children with CP. Conclusion: Hsa_circ_0086354 was significantly down-regulated in blood plasma of children with CP, which may be a novel competent biomarker for early diagnosis of CP.

PMID: 35062922

27. Early cerebral hypoxia in extremely preterm infants and neurodevelopmental impairment at 2 year of age: A post hoc analysis of the SafeBoosC II trial
Anne Mette Plomgaard, Christoph E Schwarz, Olivier Claris, Eugene M Dempsey, Monica Fumagalli, Simon Hyttel-Sorensen, Petra Lemmers, Adelina Pellicer, Gerhard Pichler, Gorm Greisen

PLoS One. 2022 Jan 24;17(1):e0262640. doi: 10.1371/journal.pone.0262640. eCollection 2022.

Background: The SafeBoosC II, randomised clinical trial, showed that the burden of cerebral hypoxia was reduced with the combination of near infrared spectroscopy and a treatment guideline in extremely preterm infants during the first 72 hours after birth. We have previously reported that a high burden of cerebral hypoxia was associated with cerebral haemorrhage and EEG suppression towards the end of the 72-hour intervention period, regardless of allocation. In this study we describe the associations between the burden of cerebral hypoxia and the 2-year outcome. Methods: Cerebral oxygenation was continuously monitored from 3 to 72 hours after birth in 166 extremely preterm infants. At 2 years of age 114 of 133 surviving children participated in the follow-up program: medical examination, Bayley II or III test and the parental Ages and Stages Questionnaire. The infants were classified according to the burden of hypoxia: within the first three quartiles (n = 86, low burden) or within in the 4th quartile (n = 28, high burden). All analyses were conducted post hoc. Results: There were no statistically significant differences between the quantitative assessments of neurodevelopment in the groups of infants with the low burden of cerebral hypoxia versus the group of infants with the high burden of cerebral hypoxia. The infants in the high hypoxia burden group had a higher-though again not statistically significant-rate of cerebral palsy (OR 2.14 (0.33-13.78)) and severe developmental impairment (OR 4.74 (0.74-30.49). Conclusions: The burden of cerebral hypoxia was not significantly

associated with impaired 2-year neurodevelopmental outcome in this post-hoc analysis of a feasibility trial.

PMID: 35073354

28. Reliability of the Gross Motor Function Measure-66 scale in the evaluation of children with cerebral palsy: validation for Colombia
Diana M Rivera-Rujana, Diana I Muñoz-Rodríguez, Maite C Agudelo-Cifuentes

Bol Med Hosp Infant Mex. 2022;79(1):33-43. doi: 10.24875/BMHIM.21000094.

Background: Infantile cerebral palsy is the leading cause of physical disability in childhood and generates different alterations in motor development that prevent the child's independence. The Gross Motor Function Measure (GMFM) scale is considered the gold standard for this measurement in children with infantile cerebral palsy. In Colombia, its use is delayed due to its original language (English) and no studies on its validity in this specific field. This study aimed to determine whether cultural equivalence allows maintaining the reliability characteristics of the instrument to favor its use in the clinical setting. Methods: We conducted a cross-sectional study that included 330 children with infantile cerebral palsy from three departments of Colombia, to whom the GMFM-66 scale was applied. Reliability was evaluated from interobserver consistency by estimating intraclass correlation coefficients and internal consistency with the omega coefficient (w) or McDonald's test. Results: The scale demonstrates consistency and stability in its measurements in terms of reliability. The internal consistency was satisfactory only for the first dimension, Lying and rolling (w = 0.91). For the other dimensions, the w-value was always > 0.95. Good agreement was found among the experts in 83.3% of the items and dimensions evaluated. Conclusions: The GMFM -66 scale in Spanish and for the Colombian context demonstrates good psychometric properties and provides a better understanding of the motor development of children with infantile cerebral palsy so that it can be recommended for use in the Colombian context.

PMID: 35086134

29. A study of Reiki therapy on unpleasant symptoms in children with cerebral palsy
Lamara Love, Avery M Anderson, Victoria von Sadovszky, Julie Kusiak, Jodi Ford, Garey Noritz

Complement Ther Clin Pract. 2022 Jan 19;46:101529. doi: 10.1016/j.ctcp.2021.101529. Online ahead of print.

Children with Cerebral Palsy (CP) commonly experience unpleasant symptoms such as pain, anger, and sadness. The purpose of this quasi-experimental study, guided by the Theory of Unpleasant Symptoms (TOUS), was to examine the practicality and impact of delivering Reiki Therapy (RT) in homes over an 8-week intervention phase to children with CP. Thirteen pediatric participants were recruited, ranging in age from 5 to 16 years. Reiki Therapy was administered by a Level 3 Reiki Therapist in the home for 8 consecutive weeks. Parents completed on-line questionnaires addressing their children's unpleasant symptoms. Hair cortisol was measured as an indicator of stress. Nearly all study procedures were completed by the participants, indicating that the methods are feasible for a larger study. Reiki Therapy significantly decreased pain while lying down (3.09 vs. 2.00; p = .002) but not while sitting (2.55 vs. 2.09; p = .40). Anger symptoms showed a trend towards improvement in the participants. These preliminary findings demonstrate that Reiki is a therapeutic modality worthy of further investigation in the CP pediatric population.

PMID: 35074604

30. Motivators and barriers to research participation for individuals with cerebral palsy and their families
Kristina M Zvolanek, Vatsala Goyal, Alexandra Hruby, Carson Ingo, Theresa Sukal-Moulton

PLoS One. 2022 Jan 26;17(1):e0262153. doi: 10.1371/journal.pone.0262153. eCollection 2022.

Objective(s): Our objective was to investigate the motivators and barriers associated with the individual or family decision to participate in cerebral palsy research. Based on this information, we offer suggestions to increase the likelihood of participation in future CP studies. Methods: A digital survey was administered to stakeholders affected by cerebral palsy across the US. Our analysis focused on variables related to personal interests, travel, and study-specific elements. Statistical tests investigated the effects of responder type, cerebral palsy type, and Gross Motor Function Classification System level on travel and study-specific element variables. Recommendations were informed by responses reflecting the majority of respondents. Results:

Based on 233 responses, we found that respondents highly valued research participation (on average 88.2/100) and compensation (on average 62.3/100). Motivators included the potential for direct benefit (62.2%) and helping others (53.4%). The primary barriers to participation were schedule limitations (48.9%) and travel logistics (32.6%). Schedule limitations were especially pertinent to caregivers, while individuals with more severe cerebral palsy diagnoses reported the necessity of additional items to comfortably travel. Conclusions: Overall, we encourage the involvement of stakeholders affected by cerebral palsy in the research process. Researchers should consider offering flexible study times, accommodating locations, and compensation for time and travel expenses. We recommend a minimum compensation of $15/hour and a maximum time commitment of 4 hours/day to respect participants' time and increase likelihood of research participation. Future studies should track how attitudes toward research change with time and experience.

PMID: 35081120

31. Life expectancy in cerebral palsy and its importance in modern law
Daniel Gardner

Dev Med Child Neurol. 2022 Jan 26. doi: 10.1111/dmcn.15154. Online ahead of print.

No abstract available

PMID: 35080772