Cerebral palsy research news

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Interventions and Management

1. Comparison of classic constraint-induced movement therapy and its modified form on upper extremity motor functions and psychosocial impact in hemiplegic cerebral palsy
Mamoona Tasleem Afzal, Imran Amjad, Misbah Ghous

Randomized Controlled Trial J Pak Med Assoc. 2022 Jul;72(7):1418-1421. doi: 10.47391/JPMA.1392.

A prospective randomised control trial (RCT) was conducted in National Institute of Rehabilitation Medicine (NIRM), Islamabad, on 40 children with hemiplegic cerebral palsy (HCP). Children between the ages of four and12 years with ipsilateral, bilateral or severely asymmetrical impairments who had wrist extension (20°) and fingers flexion (10°) were included. The outcomes tools, Box and Block Test, Quality of Upper Extremity Skill Test, CP (Quality of Life) and Kid screen were used at baseline, mid- and post- treatment assessment. Both the treatment approaches (CCIMT AND MCIMT) equally improved upper limb motor functions and psychosocial life of the children with HCP. On Quest tool, results of dissociated movement were significant (p=0.021) and on CPQOL tool two domains (participation & physical health and family health) showed significant difference (p=0.042, p=0.025). But no significant difference was noted regarding other domains of the tools. The study concluded that both the treatment approaches (CCIMT AND MCIMT) are effective in enhancing the upper limb motor functions and psychosocial life of children with HCP.

PMID: 36156571

2. Somatosensation and motor performance in the less-affected and more-affected hand of unilateral cerebral palsy children: a cross-sectional study
Patricia Jovellar-Isiegas, César Cuesta García, Diego Jaén-Carrillo, Rocío Palomo-Carrión, Christian Peña Alonso, Luis Enrique Roche-Seruendo

Disabil Rehabil. 2022 Sep 28;1-11. doi: 10.1080/09638288.2022.2127938. Online ahead of print.

Purpose: This study aimed to examine motor performance and somatosensory processing of unilateral cerebral palsy (UCP) children in both the less-affected hand and the more-affected hand. This study is also aimed at analysing the somatosensory proccessing in the more-affected hand in relation to age and damaged hemisphere. Materials and methods: Forty-seven children aged from 6 to 15 years (UCP = 23; TD = 24) were recruited. Grip strength, pinch strength, Box and Block Test and Jebsen Taylor Hand Function Test were used to analyse motor performance. A comprehensive somatosensory assessment battery was included: tactile registration, unilateral, bilateral and spatio-temporal perception, haptic recognition, texture perception, proprioception, pressure pain threshold and functional sensitivity. Results: UCP children exhibited lower performance in all aspects of motor performance measured in both the less-affected hand and the more-affected hand, except grip strength in the less-affected hand. Significant differences were found for all tests included in the somatosensory

assessment in both the less-affected hand and the more-affected hand, except unilateral perception tests in the less-affected hand. Conclusions: UCP children present difficulties in motor performance and somatosensory processing not only in the more -affected hand, but also in the less-affected hand. Somatosensation may be a critical driver of functional performance. Implications for rehabilitation The less-affected hand of children with unilateral cerebral palsy should be included in both assessment and intervention programmes. Somatosensory processing should be assessed through a comprehensive battery, both in the less-affected hand and in the more-affected hand of unilateral cerebral palsy children. Somatosensory treatment must be taken into account if functional performance in the activities of daily living of unilateral cerebral palsy children is to be improved.

PMID: 36172643

3. Safety and effects of transcranial direct current stimulation on hand function in preschool children with hemiplegic cerebral palsy: A pilot study

Wenjie He, Yuan Huang, Lu He, Liru Liu, Peishan Zeng, Huiying Qiu, Xiaoyue Wang, Hongyu Zhou, Zhaofang Chen, Yi Xu, Jingyi Zhao, Wenda Wang, Hongmei Tang, Kaishou Xu

Front Behav Neurosci. 2022 Sep 9;16:925122. doi: 10.3389/fnbeh.2022.925122. eCollection 2022.

Transcranial direct current stimulation (tDCS) has shown a promising prospect in improving function and spasticity in school-aged children with cerebral palsy, but little is known in preschool children. The aim of this study was to explore the safety and effects of tDCS on hand function in preschool children (aged 3-6 years) with hemiplegic cerebral palsy (HCP). We designed a crossover, single-blind, sham-controlled study in 30 preschool children with HCP, who were recruited to receive one session of sham and one session of active anodal tDCS (1.5 mA, 20 min) on the primary motor cortex of the affected hemisphere, with a 24-h interval between the two sessions. Questionnaire was completed by each participant and their attendants immediately, 90 min, and 24 h after each session to monitor common adverse events of tDCS, such as skin irritation, skin erythema, burning sensation, headache, dizziness, etc. Box and Block Test, Selective Control of the Upper Extremity Scale, Modified Ashworth Scale, and Melbourne Assessment 2 were conducted at baseline, immediately, and 90 min after each session. No severe adverse event occurred during the study and only a few of them felt transient and slight discomfort. Results also showed that all participants performed better at Box and Block Test of the hemiplegic hand immediately after a single anodal tDCS ($P < 0.05$) and this improvement lasted at least 90 min and more than 24 h. However, there was no significant improvement in Selective Control of the Upper Extremity Scale of both hands, Box and Block Test of the non-hemiplegic hand, Modified Ashworth Scale, and Melbourne Assessment 2 of the hemiplegic upper limb ($P > 0.05$). Shortly, this study supported the safety and effects of a single anodal tDCS on improving the manual dexterity of the hemiplegic hand for preschool children with HCP. Further researches with larger samples about the optimal dose and treatment cycle of tDCS for preschool children with HCP are warranted. This study gained the approval of ethics committee of the organization and was registered at chictr.org (ChiCTR2000031141).

PMID: 36160682

4. The impact of brain lesion characteristics and the corticospinal tract wiring on mirror movements in unilateral cerebral palsy

Cristina Simon-Martinez, Lisa Decraene, Ingar Zielinski, Brian Hoare, Jacqueline Williams, Lisa Mailleux, Bert Steenbergen, Els Ortibus, Hilde Feys, Katrijn Klingels

Sci Rep. 2022 Sep 29;12(1):16301. doi: 10.1038/s41598-022-19920-z.

Mirror movements (MM) influence bimanual performance in children with unilateral cerebral palsy (uCP). Whilst MM are related to brain lesion characteristics and the corticospinal tract (CST) wiring pattern, the combined impact of these neurological factors remains unknown. Forty-nine children with uCP (mean age 10y6mo) performed a repetitive squeezing task to quantify similarity (MM-similarity) and strength (MM-intensity) of the MM activity. We used MRI data to evaluate lesion type (periventricular white matter, N = 30; cortico-subcortical, N = 19), extent of ipsilesional damage, presence of bilateral lesions, and damage to basal ganglia, thalamus and corpus callosum. The CST wiring was assessed with Transcranial Magnetic Stimulation (17 CSTcontralateral, 16 CSTipsilateral, 16 CSTbilateral). Data was analyzed with regression analyses. In the more-affected hand, MM-similarity and intensity were higher with CSTbilateral/ipsilateral. In the less-affected hand, MM-similarity was higher in children with (1) CSTcontra with CSC lesions, (2) CSTbilat/ipsi with PVL lesions and (3) CSTbilat/ipsi with unilateralized lesions. MM-intensity was higher with larger damage to the corpus callosum and unilateral lesions. A

complex combination of neurological factors influences MM characteristics, and the mechanisms differ between hands.

PMID: 36175439

5. Definitive fusions are better than growing rod procedures for juvenile patients with cerebral palsy and scoliosis: a prospective comparative cohort study
Arun R Hariharan, Suken A Shah, Paul D Sponseller, Burt Yaszay, Michael P Glotzbecker, George H Thompson, Patrick J Cahill, Tracey P Bastrom, Pediatric Spine Study Group; Harms Study Group

Spine Deform. 2022 Sep 26. doi: 10.1007/s43390-022-00577-7. Online ahead of print.

Purpose: This study compared the outcomes of juvenile patients with cerebral palsy (CP) and scoliosis who underwent spinal fusion (SF) versus growing rod (GR) surgery. Methods: Two prospective multicenter registries were queried for patients 8-10 years old with minimum 2-year follow-up who underwent SF or GR surgery (no MCGR). Demographics, radiographs, complications, and outcome scores were recorded. Results: There were 35 patients in the SF and 15 in the GR group. The mean age at surgery was 10 and 9.3 years in the SF and GR groups, respectively ($p = 0.004$). In the SF group preoperatively, the major curve measured 86° and 80° in the GR group ($p = 0.40$). "Definitive" surgery in the GR group consisted of SF in 10, implant retention in three, and implant removal in two. The SF group had 60.8% and the GR group had 45.0% correction following "definitive" surgery ($p = 0.03$). In the SF group, 8 patients and in the GR group, 9 patients (SF = 22.9%, GR = 60.0%) had a complication ($p = 0.01$). In the SF group, two patients (5.7%) had reoperations for infection; eight patients (53.3%) in the GR group had reoperations for infection and implant complications ($p < 0.001$). In the SF group, 23/30 parents (76.6%) noted that the child's life "improved a lot." In the GR group, 3/6 parents (50.0%) noted they were "neutral" about their child's ability to do things, 2/6 (33.3%) were "very dissatisfied." Conclusions: SF treatment for juvenile patients with CP and scoliosis resulted in fewer complications and unplanned reoperations and better radiographic outcomes compared with GR. Quality of life improvements were also better in the SF group. Level of evidence: Level III.

PMID: 36156790

6. A non-invasive method for scoliosis assessment-A new mathematical concept using polar angle
Susmita Roy, Alexander T D Grünwald, Renée Lampe

PLoS One. 2022 Sep 30;17(9):e0275395. doi: 10.1371/journal.pone.0275395. eCollection 2022.

Scoliosis is one of the most common pediatric spinal diseases that leads to a three-dimensional deformity of the spine and has a high risk of progression during growth. Regular clinical monitoring and follow-up X-rays are needed to providing proper treatment at that time. Repetitive X-rays can results in an increased risk of radiation related health problems. We present a non-invasive, ionizing radiation-free method for assessing scoliosis and its progression from the 3D images of the body torso, captured by a body scanner. A new concept is introduced based on a mathematical method in polar coordinate system to quantify and characterize the deformities in the torso from 2D transverse cross-sections of the 3D torso images at example cases for a healthy individual and for two patients with scoliosis. To capture quantitatively the characteristics of scoliosis, and to verify them at the example cases two asymmetry parameters and a linear fitting parameter are calculated: a) back side area asymmetry, b) left right area asymmetry, and c) coefficient of determination (R2). Within the analyzed patients, both the area asymmetries are maximum at the apex of scoliosis, and increase with the severity of scoliosis. R2 values are smaller in the case of patients compared with the healthy. Furthermore, the parameters show a trend when compared with the Cobb angle from the X-ray and the findings match with clinical examination. Therefore, the quantities are able to capture, certain characteristics associated with scoliosis. These quantities can be compared as a measure of deformities of torso, during the follow-up examinations in the future, without ionizing radiations.

PMID: 36178916

7. Long-term follow-up of patients with cerebral palsy undergoing catheterizable channel creation without concurrent bladder augmentation
Molly E DeWitt-Foy, Rachael Gotlieb, Sean P Elliott

Urology. 2022 Sep 25;S0090-4295(22)00807-X. doi: 10.1016/j.urology.2022.09.008. Online ahead of print.

Objective: To characterize long-term outcomes for adults with cerebral palsy who have undergone catheterizable channel creation without concurrent bladder augmentation. Methods: Retrospective review was conducted of patients who underwent catheterizable channel creation without augmentation by the senior author. Variables of interest included development of de novo neurogenic detrusor overactivity, change in continence, escalation in therapy, and upper tract changes. Descriptive statistics were conducted using t-tests and chi-squared tests as appropriate. Results: Nine patients were followed for an average of 70 months. Prior to surgery two patients were on regular clean intermittent catheterization (CIC), six were not on CIC, and one was on occasional CIC. Patients not on CIC preoperatively were more likely to develop de novo neurogenic detrusor overactivity (83% v 0%, p=0.02), and have statistically significant decreases in average compliance (p=0.04 v p=0.31). They were also more likely to require escalation in bladder therapy (83% v 50%) and have worsening of incontinence (67% v 0%), though these did not reach statistical significance (p=0.34, 0.1). Five patients underwent repeat urodynamics an average of 46 months after initial post-operative study because of persistent urgency - 4 of 5 had stable urodynamic findings and one demonstrated >50% reduction in compliance and capacity. Conclusions: Adults with cerebral palsy who are not on CIC prior to creation of a catheterizable channel are at high risk for development of de novo neurogenic detrusor overactivity and decrease in bladder compliance. Prophylactic augmentation should be considered in this group.

PMID: 36170904

8. Effects of 8 weeks functional training programme on posture control and functional mobility in spastic hemiplegic cerebral palsy
Aeysha Gulzar, Misbah Waris, Qurat Ul Ain

Randomized Controlled Trial J Pak Med Assoc. 2022 Jul;72(7):1278-1281. doi: 10.47391/JPMA.3476.

Objective: To determine the impacts of functional training versus conventional training on posture control and functional mobility in spastic hemiplegic cerebral palsy children. Methods: The randomised clinical trial was conducted at the Rehab Cure physiotherapy centre, Lahore, Pakistan, from January to September 2020, and comprised children of either gender aged 4-14 years, diagnosed with cerebral palsy, gross motor functional classification system level II or III, and no mental retardation. The subjects were randomised into conventional therapy group A and functional training group B. Intensity of exercises was gradually increased each week, starting from 10 reps to 20 reps. The subjects received treatment 3 times a week for 8 weeks, and each session lasted 45-60 min. Paediatric Balance Scale, Trunk Control Measurement Scale, Five Times Sit to Stand Test and Timed-Up-and-Go test were used at baseline and post-intervention. Data was analysed using SPSS 21. Results: Of the 14 subjects, there were 7(50%) in each of the two groups. Overall, there were 8(57.14%) males and 6(42.86%) females with a mean age of 7.57±1.86 years. Significant improvement was noted in both groups post-intervention ($p<0.05$), but intergroup differences were not significant ($p>0.05$). Conclusions: Both functional training and conventional therapy significantly improved postural control and functional mobility in spastic cerebral palsy children, but intergroup differences were not significant. Clinical trial number: IRCT20200909048676N1.

PMID: 36156543

9. Real-time daily fatigue, sleep, physical activity, and health-related fitness in adults with cerebral palsy
Olaf Verschuren, Joyce L Benner, Astrid C J Balemans, Herwin Horemans, Rita Johanna G Van Den Berg-Emons, Wilma M A Van Der Slot

Dev Med Child Neurol. 2022 Sep 26. doi: 10.1111/dmcn.15421. Online ahead of print.

Aim: To explore whether subgroups of adults with cerebral palsy (CP) with different fatigue diurnal profiles can be discerned, and to explore whether sleep, physical activity, or health-related fitness are associated with these profiles. Method: Thirty-two adults (median age 29 years 8 months; range 20-54 years; 11 males, 21 females) with spastic CP (Gross Motor Function

Classification System levels I-III) with physical activity-related fatigue complaints participated. Real-time fatigue and physical activity were assessed for 7 consecutive days by short message service text four times during the day and by wearing an accelerometer respectively. Sleep was assessed by the Pittsburgh Sleep Quality Index, and fitness by assessing body composition and aerobic capacity. Latent class growth modelling was used to classify subgroups according to their diurnal profiles of real-time fatigue. Univariable multinomial logistic regression analysis explored whether participant characteristics, sleep, physical activity, or health-related fitness were associated with diurnal profiles. Results: Three distinct fatigue diurnal profiles were identified: stable low (n = 10), increasing (n = 14), and stable high (n = 8). Only aerobic capacity was associated with fatigue profiles (odds ratio 1.15, 95% confidence interval 1.00-1.34; p = 0.05). Interpretation: Fatigue in adults with CP may be low or high stable or may increase during the day. These findings indicate the relevance of assessing fatigue variability.

PMID: 36155917

10. The effect of neurologic music therapy in patients with cerebral palsy: A systematic narrative review
Seoyon Yang, Jee Hyun Suh, SuYeon Kwon, Min Cheol Chang

Front Neurol. 2022 Sep 13;13:852277. doi: 10.3389/fneur.2022.852277. eCollection 2022.

Background: Cerebral palsy (CP) is one of the most common causes of disability in children. It is characterized by impairment in motor function and coordination and difficulties in performing daily life activities. Previous research supports that neurologic music therapy (NMT) was effective in improving motor function, cognition, and emotional wellbeing in patients with various neurologic disorders. However, the benefit of NMT in patients with CP have not yet been thoroughly investigated. The aim of this review was to investigate the potential effect of NMT motor rehabilitation techniques for patients. Materials and methods: We searched articles published up to May 24, 2022 in PubMed, Embase, Scopus, Cochrane library, Web of science, and Ovid MEDLINEdatabases. We included studies that investigated the effect of NMT in patients with CP. Results: After search, 4,117 articles were identified using the search terms. After reading the titles and abstracts, 4,089 articles that did not meet our inclusion criteria were excluded. The remaining 28 articles which were assessed for eligibility. Finally, 15 studies were included in this systematic review. Among 15 studies that investigated the effect of NMT on patients with CP, 7 studies were on rhythmic auditory stimulation (RAS), 6 studies were on therapeutic instrumental music performance (TIMP), and 2 studies were on patterned sensory enhancement (PSE). Conclusions: Various techniques of NMT brings beneficial effects for gross and fine motor improvements in patients with CP. NMT techniques, such as RAS, TIMP, and PSE, may be a potential alternative rehabilitation strategy to enhance gross and fine motor skills for patients with CP.

PMID: 36176557

11. Remotely monitored transcranial direct current stimulation in pediatric cerebral palsy: open label trial protocol
Emma A Simpson, Catarina Saiote, Ellen Sutter, Daniel H Lench, Chrysanthy Ikonomidou, Melissa A Villegas, Bernadette T Gillick

BMC Pediatr. 2022 Sep 29;22(1):566. doi: 10.1186/s12887-022-03612-8.

Background: Pediatric applications of non-invasive brain stimulation using transcranial direct current stimulation (tDCS) have demonstrated its safety with few adverse events reported. Remotely monitored tDCS, as an adjuvant intervention to rehabilitation, may improve quality of life for children with cerebral palsy (CP) through motor function improvements, reduced treatment costs, and increased access to tDCS therapies. Our group previously evaluated the feasibility of a remotely monitored mock tDCS setup in which families and children successfully demonstrated the ability to follow tDCS instructional guidance. Methods and design: Here, we designed a protocol to investigate the feasibility, safety, and tolerability of at-home active transcranial direct current stimulation in children with CP with synchronous supervision from laboratory investigators. Ten participants will be recruited to participate in the study for 5 consecutive days with the following sessions: tDCS setup practice on day 1, sham tDCS on day 2, and active tDCS on days 3-5. Sham stimulation will consist of an initial 30-second ramp up to 1.5 mA stimulation followed by a 30-second ramp down. Active stimulation will be delivered at 1.0 - 1.5 mA for 20 minutes and adjusted based on child tolerance. Feasibility will be evaluated via photographs of montage setup and the quality of stimulation delivery. Safety and tolerability will be assessed through an adverse events survey, the Box and Blocks Test (BBT) motor assessment, and a setup ease/comfort survey. Discussion: We expect synchronous supervision of at-home teleneuromodulation to be tolerable and safe with increasing stimulation quality over repeated sessions when following a tDCS setup previously determined to be feasible. The findings will provide opportunity for larger clinical trials exploring efficacy and illuminate the potential of remotely monitored tDCS in combination with rehabilitation interventions as a means of

pediatric neurorehabilitation. This will demonstrate the value of greater accessibility of non-invasive brain stimulation interventions and ultimately offer the potential to improve care and quality of life for children and families with CP. Trial registration: October 8, 2021(https://clinicaltrials.gov/ct2/show/NCT05071586).

PMID: 36175848

12. Individuals with cerebral palsy show altered responses to visual perturbations during walking
Ashwini Sansare, Maelyn Arcodia, Samuel C K Lee, John Jeka, Hendrik Reimann

Front Hum Neurosci. 2022 Sep 8;16:977032. doi: 10.3389/fnhum.2022.977032. eCollection 2022.

Individuals with cerebral palsy (CP) have deficits in processing of somatosensory and proprioceptive information. To compensate for these deficits, they tend to rely on vision over proprioception in single plane upper and lower limb movements and in standing. It is not known whether this also applies to walking, an activity where the threat to balance is higher. Through this study, we used visual perturbations to understand how individuals with and without CP integrate visual input for walking balance control. Additionally, we probed the balance mechanisms driving the responses to the visual perturbations. More specifically, we investigated differences in the use of ankle roll response i.e., the use of ankle inversion, and the foot placement response, i.e., stepping in the direction of perceived fall. Thirty-four participants (17 CP, 17 age-and sex-matched typically developing controls or TD) were recruited. Participants walked on a self-paced treadmill in a virtual reality environment. Intermittently, the virtual scene was rotated in the frontal plane to induce the sensation of a sideways fall. Our results showed that compared to their TD peers, the overall body sway in response to the visual perturbations was magnified and delayed in CP group, implying that they were more affected by changes in visual cues and relied more so on visual information for walking balance control. Also, the CP group showed a lack of ankle response, through a significantly reduced ankle inversion on the affected side compared to the TD group. The CP group showed a higher foot placement response compared to the TD group immediately following the visual perturbations. Thus, individuals with CP showed a dominant proximal foot placement strategy and diminished ankle roll response, suggestive of a reliance on proximal over distal control of walking balance in individuals with CP.

PMID: 36158616

13. [Complex diagnostics and treatment of cognitive dysfunctions in cerebral palsy][Article in Russian]
S A Nemkova, V G Boldyrev

Zh Nevrol Psikhiatr Im S S Korsakova. 2022;122(9. Vyp. 2):51-61. doi: 10.17116/jnevro202212209251.

The article details modern approaches to the comprehensive diagnosis and treatment of cognitive dysfunctions in children with cerebral palsy. It is shown that cognitive disorders in cerebral palsy are diverse and are represented by disorders of perception, memory, attention, visual-motor coordination, intelligence and speech. Diagnosis of cognitive dysfunctions in patients with cerebral palsy is a difficult task, due to their diverse combination with motor, speech and sensory pathology, which requires an integrated approach. The article highlights in detail the modern directions of complex rehabilitation (including medical, social, psychological and pedagogical correction) of cognitive dysfunctions in children with cerebral palsy, in accordance with modem clinical recommendations and treatment standards.

PMID: 36170100

14. Neurological examination at 32-weeks postmenstrual age predicts 12-month cognitive outcomes in very preterm-born infants
Isabel U Huf, Emmah Baque, Paul B Colditz, Mark D Chatfield, Robert S Ware, Roslyn N Boyd, Joanne M George

Pediatr Res. 2022 Sep 23. doi: 10.1038/s41390-022-02310-6. Online ahead of print.

Background: To determine the diagnostic accuracy of Hammersmith Neonatal Neurological Examination (HNNE) at 30-32 weeks postmenstrual age (PMA, 'Early') and term equivalent age (TEA) in infants born <31 weeks PMA to predict cognitive outcomes at 12 months corrected age (CA). Methods: Prospective cohort study of 119 infants (73 males; median 28.4 weeks gestational age at birth) who underwent Early and TEA HNNE. At 12 months CA, 104 participants completed Bayley Scales of Infant and Toddler Development, 3rd Edition, (Bayley-III). Optimum cut-off points for each HNNE subscale were determined to establish diagnostic accuracy for predicting adverse cognitive outcomes on the Bayley-III Cognitive Composite Scale (≤85). Results: The best diagnostic accuracy for HNNE total score at 30-32 weeks PMA predicting cognitive impairment occurred at cut-off ≤16.7 (sensitivity (Se) = 71%, specificity (Sp) = 51%). The Abnormal Signs subscale demonstrated the best balance of sensitivity/specificity combination (Se = 71%, Sp = 71%; cut-off ≤1.5). For HNNE at TEA, the total score at cut-off ≤24.5 had Se = 71% and Sp = 47% for predicting cognitive impairment. The Tone Patterns subscale demonstrated the strongest diagnostic accuracy at TEA (Se = 71%, Sp = 63%; cut-off ≤3). Conclusions: Early and TEA HNNE demonstrated moderate diagnostic accuracy for cognitive outcomes at 12-months CA in infants born <31 weeks gestational age. Clinical trial registration: Australian New Zealand Clinical Trials Registry; Trial Registration Number: ACTRN12613000280707; web address of trial: http://www.ANZCTR.org.au/ACTRN12613000280707.aspx . Impact: Early Hammersmith Neonatal Neurological Examination (HNNE) assessment at 30-32 weeks postmenstrual age has moderate diagnostic accuracy for cognitive outcomes at 12 months corrected age in infants born <31 weeks gestation. Early HNNE at 30-32 weeks has stronger predictive validity than HNNE at term equivalent age. Early HNNE may provide an early marker for risk-stratification to optimise the planning of post-discharge support and follow-up services for infants born preterm.

PMID: 36151299

15. Body experience influences lexical-semantic knowledge of body parts in children with hemiplegic cerebral palsy
Thalita Karla Flores Cruz, Deisiane Oliveira Souto, Korbinian Moeller, Patrícia Lemos Bueno Fontes, Vitor Geraldi Haase

Front Psychol. 2022 Sep 7;13:955939. doi: 10.3389/fpsyg.2022.955939. eCollection 2022.

Background: Disorders in different levels of body representation (i.e., body schema, body structural description, and body image) are present in hemiplegic cerebral palsy (HCP). However, it remains unclear whether the body image develops from aspects of body schema and body structural description, and how this occurs in children with HCP. Objective and methods: In a cross-sectional study, we investigated 53 children with HCP (mean age about 10 years) and 204 typically developing (TD) control children to qualitatively evaluate whether and how body schema (related sensorimotor experiences) and body structural description (related visuospatial experiences) affect the development of children's body image and whether this development is delayed through HCP. Graph analysis was used to create a lexical-semantic map of body representation from data of a semantic word fluency task. Results: Results indicated a similar qualitative pattern of influences of sensorimotor and visuospatial experiences on lexical-semantic knowledge of body parts, with a delayed developmental course in children with HCP compared to TD children. Conclusion: These findings suggest that children's body image seemed to be influenced by body schema and body structural descriptions as indicated by poorer lexical-semantic knowledge of body parts in children with HCP due to missing physical experiences of the affected body parts. This might imply that "body talk" may beneficially complement physical therapy for children with HCP to promote body image development.

PMID: 36160501

16. Determining optimal mobile neurofeedback methods for motor neurorehabilitation in children and adults with non-progressive neurological disorders: a scoping review
Ahad Behboodi, Walker A Lee, Victoria S Hinchberger, Diane L Damiano

Review J Neuroeng Rehabil. 2022 Sep 28;19(1):104. doi: 10.1186/s12984-022-01081-9.

Background: Brain-computer interfaces (BCI), initially designed to bypass the peripheral motor system to externally control movement using brain signals, are additionally being utilized for motor rehabilitation in stroke and other neurological disorders. Also called neurofeedback training, multiple approaches have been developed to link motor-related cortical signals to assistive robotic or electrical stimulation devices during active motor training with variable, but mostly positive, functional outcomes reported. Our specific research question for this scoping review was: for persons with non-progressive neurological injuries who have the potential to improve voluntary motor control, which mobile BCI-based neurofeedback methods demonstrate or are associated with improved motor outcomes for Neurorehabilitation applications? Methods: We searched PubMed, Web of Science, and Scopus databases with all steps from study selection to data extraction performed independently

by at least 2 individuals. Search terms included: brain machine or computer interfaces, neurofeedback and motor; however, only studies requiring a motor attempt, versus motor imagery, were retained. Data extraction included participant characteristics, study design details and motor outcomes. Results: From 5109 papers, 139 full texts were reviewed with 23 unique studies identified. All utilized EEG and, except for one, were on the stroke population. The most commonly reported functional outcomes were the Fugl-Meyer Assessment (FMA; n = 13) and the Action Research Arm Test (ARAT; n = 6) which were then utilized to assess effectiveness, evaluate design features, and correlate with training doses. Statistically and functionally significant pre-to post training changes were seen in FMA, but not ARAT. Results did not differ between robotic and electrical stimulation feedback paradigms. Notably, FMA outcomes were positively correlated with training dose. Conclusion: This review on BCI-based neurofeedback training confirms previous findings of effectiveness in improving motor outcomes with some evidence of enhanced neuroplasticity in adults with stroke. Associative learning paradigms have emerged more recently which may be particularly feasible and effective methods for Neurorehabilitation. More clinical trials in pediatric and adult neurorehabilitation to refine methods and doses and to compare to other evidence-based training strategies are warranted.

PMID: 36171602

17. The Use of Serious Gaming to Improve Sensorimotor Function and Motivation in People with Cerebral Palsy: A Systematic Review
Kayley Crebbin, Tiffany Grisbrook, Catherine Elliott, Ashleigh Thornton

Review Games Health J. 2022 Sep 26. doi: 10.1089/g4h.2022.0112. Online ahead of print.

The aim of this systematic review was to review the evidence for serious gaming interventions in improving sensorimotor function in children and adults with cerebral palsy (CP). Seven databases were searched with terms related to serious gaming and CP. Articles were evaluated according to the Downs and Black rating scale and important principles of serious gaming defined by Whyte et al. Extracted data included the population, intervention, serious gaming elements, outcomes, and authors' conclusions. Fifty-seven articles were identified for inclusion. Participants' ages ranged from 3 to 57 years. Interventions tested included commercial videogames as well as specially designed games. Most interventions had themed content, short-term goals, rewards, feedback, and multiple games. Outcome measures and study designs were inconsistent between studies. Sensorimotor function results of noncomparative studies were positive or neutral overall, but results of comparative studies were more mixed. We concluded that serious gaming interventions may be a useful adjunct to treatment as they are noninvasive, were not associated with deterioration in most cases, and may improve compliance. More comparative studies need to be completed to assess compliance and treatment outcomes. Future games should also aim to adhere more closely to the principles of serious gaming.

PMID: 36161972

18. Design of a compliant, stabilizing wrist mechanism for a pediatric hand exoskeleton
Jan Dittli, Christos Vasileiou, Hidajet Asanovski, Jan Lieber, Jeremy B Lin, Andreas Meyer-Heim, Hubertus J A Van Hedel, Roger Gassert, Olivier Lambercy

IEEE Int Conf Rehabil Robot. 2022 Jul;2022:1-6. doi: 10.1109/ICORR55369.2022.9896550.

Children affected by hand impairment due to cerebral palsy or stroke experience serious difficulties when performing activities of daily life (ADL), which reduces their quality of life and development. Wearable robots such as hand exoskeletons have been proposed to support people with hand impairment in therapy as well as daily tasks. While numerous actuated wearable robots have been developed, few designs support both fingers and wrist function, despite being mutually relevant for reach-to-grasp tasks. A recent feasibility study investigating the use of PEXO, a lightweight and fully wearable pediatric hand exoskeleton, showed that a wrist fixed in a slightly extended position may limit the user's ability to reach and grasp during ADL and restrict the user group. These insights and further interactions with clinicians inspired a novel design of PEXO that features an additional degree of freedom in the wrist. In this paper, we present a compliant wrist mechanism extending the existing leaf spring finger mechanism of the device. The novel design provides both wrist motion capability of 60° in flexion and extension and wrist stabilization at the same time while actively supporting finger motion. Preliminary results suggest that the adjustability in the wrist enables a larger variety of grasping gestures. The implemented wrist support has the potential to allow for a more versatile use of PEXO and increase the potential target user group.

PMID: 36176168

19. How Ankle Exoskeleton Assistance Affects the Mechanics of Incline Walking and Stair Ascent in Cerebral Palsy
Ying Fang, Zachary F Lerner

IEEE Int Conf Rehabil Robot. 2022 Jul;2022:1-6. doi: 10.1109/ICORR55369.2022.9896476.

Graded terrains, like slopes and stairs, are particularly challenging for people with neurological disorders like cerebral palsy (CP) due to increased selective muscle control and muscle strength requirements. Lower-limb exoskeletons may be able to assist individuals with CP when navigating graded terrains. This study sought to determine the effects of untethered ankle exoskeleton assistance on lower-limb joint angles, moments, and muscle activity during up-incline walking and up-stair stepping in CP (n=7). We hypothesized that powered assistance would result in improved ankle mechanics (i.e., increased total ankle moments) across both terrains. During incline walking, we found that peak ankle dorsiflexion angle increased by 7^{o}(p=0.006) during walking with ankle assistance compared to walking without the device (Shod). Compared to without the device, the peak total ankle plantarflexor moment increased by 8% (p=0.022) while peak biological ankle plantarflexor moment decreased by 17% (p< 0.001). Incline walking with ankle assistance reduced stance phase muscle activity of the soleus (20%, p=0.010) and vastus lateralis (18%, p=0.004), and swing phase tibialis activity (19%, p=0.028) compared to Shod. During stair ascent with the device, the peak total ankle plantarflexor moment increased by 17% (p=0.011) and the peak knee extensor moment increased by 40% (p=0.018) compared to Shod. These findings provide insight into the biomechanical benefits of ankle exoskeleton assistance during incline and stair walking. This work aims to advance the use of robotic assistive technology to improve mobility for people with CP.

PMID: 36176104

20. Improving Ankle Muscle Recruitment via Plantar Pressure Biofeedback during Robot Resisted Gait Training in Cerebral Palsy
Benjamin C Conner, Zachary F Lerner

IEEE Int Conf Rehabil Robot. 2022 Jul;2022:1-6. doi: 10.1109/ICORR55369.2022.9896581.

Neurological impairment from stroke or cerebral palsy often presents with diminished ankle plantar flexor function during the propulsive phase of gait. This deficit often results in slow, energy-expensive walking patterns that limit community mobility. Robotic gait training interventions may prove effective in improving functional outcomes, including exoskeleton resistance used to provide targeted neuromuscular recruitment. However, these interventions to date have required regular verbal cues and coaching for proper plantar flexor engagement with resistance, particularly for pediatric applications. In this validation study, we sought to address the need for automating and improving the effectiveness of facilitating user engagement with robotic resistance. Specifically, our main goal was to compare changes in plantar flexor activity between walking with plantar flexor resistance alone vs plantar flexor resistance combined with plantar pressure biofeedback in individuals with cerebral palsy. We recruited 8 ambulatory adolescents with cerebral palsy between the ages of 11-18 years old to participate in this cross-sectional feasibility study. Supporting our hypothesis, we observed a 36 ± 36% and 46 ± 39% increase in mean and peak soleus activity, respectively, between resistance plus biofeedback vs resistance alone (both $p < 0.05$). Compared to other biofeedback sensing modalities like assessment of muscle activity via surface electrodes, integrating the plantar pressure-based system within the wearable robotic devices minimizes barriers to clinical implementation by reducing cost, complexity, and setup time. With these positive feasibility results, our future work will explore longer-term training effects of ankle resistance combined with plantar pressure biofeedback.

PMID: 36176108

21. Survival of individuals with cerebral palsy in Victoria, Australia: A longitudinal cohort study spanning four decades
Gina L Hinwood, Hayley Loftus, Daisy A Shepherd, Angela Guzys, Dinah S Reddihough, Susan M Reid

Dev Med Child Neurol. 2022 Sep 26. doi: 10.1111/dmcn.15420. Online ahead of print.

Aim: To provide an updated description of the rates, trends, and predictors of mortality of individuals with cerebral palsy (CP), born in the Australian state of Victoria between 1970 and 2012. Method: Data were extracted for 4807 individuals (2091 females; 2716 males). The probability of survival to 30th June 2017 was calculated using the Kaplan-Meier method. Mortality

rates were calculated per 1000 person-years using age strata and compared with population mortality rates to produce mortality ratios. Cox proportional hazards regression was used to calculate hazard ratios for selected demographic and clinical characteristics and to estimate the effect of birth epoch on 15-year survival. Results: There were 666 recorded deaths. Compared to the general population, mortality was higher for all persons with CP and highest for children aged 1 to 15 years (45-62 times). We observed 35% improvement in the probability of survival to 15 years for births in the 2000s relative to the 1970s (hazard ratio 0.65, 95% confidence interval [CI] 0.49, 0.86), but only 4% improvement for the subgroup with complex CP (hazard ratio 0.96, 95% CI 0.69, 1.33). Interpretation: The observed improvements in survival for those born in the 2000s is likely related predominantly to a proportional reduction in complex CP within the cohort.

PMID: 36161450

22. The panorama of cerebral palsy in Sweden part XIII shows declining prevalence in birth-years 2011-2014
Kate Himmelmann, Magnus Påhlman

Acta Paediatr. 2022 Sep 25. doi: 10.1111/apa.16548. Online ahead of print.

Aim: To describe epidemiology and characteristics of cerebral palsy (CP) in western Sweden 1954-2014. Methods: Population-based study covering 105 935 live births in the area in 2011-2014. Birth characteristics, neuroimaging findings and outcome were analysed and prevalence calculated. Non-parametric methods were used for group comparisons. Results: CP was diagnosed in 192 children. Crude prevalence had decreased to 1.81 per 1000 live births ($p = 0.0067$). Gestational age-specific prevalence for <28 gestational weeks was 74.8 per 1000 live births, 46.6 for 28-31 weeks, 5.8 for 32-36 weeks and 1.1 per 1000 for >36 weeks of gestation. Hemiplegia, found in 36.2%, had declined ($p = 0.03$). Diplegia was found in 36.2% and tetraplegia 5.3%. Dyskinetic CP accounted for 18.6% and ataxia for 3.7%. Neuroimaging revealed maldevelopments in 14%, white matter lesions in 44%, cortical/subcortical lesions in 13% and basal ganglia lesions in 17%. Prenatal aetiology was considered in 34%, peri- or neonatal in 48%, while in 18% aetiological period remained unclassified. Motor outcome in children who needed neonatal care had improved ($p = 0.04$). Motor function in dyskinetic CP had improved compared to previous cohorts ($p = 0.008$). Conclusion: The prevalence of CP has declined, mainly in term-born and in hemiplegia, and motor severity has changed compared to previous cohorts.

PMID: 36153696

23. Physical characteristics and upper-limb treatment with botulinum neurotoxin A in children with cerebral palsy: A population-based study
Jenny Hedberg-Graff, Fredrik Granström, Lena Krumlinde-Sundholm

Dev Med Child Neurol. 2022 Sep 30. doi: 10.1111/dmcn.15426. Online ahead of print.

Aim: To describe the use of upper-limb botulinum neurotoxin A (BoNT-A) treatment in a population-based sample of children with cerebral palsy (CP), by investigating whether factors may be related to a first upper-limb BoNT-A treatment and whether passive range of motion (ROM) is related to a first BoNT-A treatment after adjustment for confounders. Method: Data from five regions in Sweden, in the national registry and follow-up programme for CP (CPUP), were collected for children with spastic or dyskinetic CP assessed between 2000 and 2017. CP subtypes, functional classification levels, and traffic-light-based passive ROM categories were investigated. Data were analysed with logistic regression (odds ratios). Results: Of a total of 496 children (317 males, 179 females; median 2 years, interquartile range 1-5 years, range 1-15 years at first measurement occasion), 22% (n = 108) had received upper-limb BoNT-A treatment, 45% of whom by 1 to 3 years of age. Those classified in Manual Ability Classification System levels IV and V showed the highest crude odds ratio for a first upper-limb BoNT-A treatment. Children with full passive ROM with tightness at the end of the movement range were most likely to receive an upper-limb BoNT-A treatment, also after adjustment for confounders. Thumb and forearm muscles were the most targeted at the first upper-limb BoNT-A treatment. Interpretation: Full passive ROM with tightness at the end of the movement range increases the likelihood of a first upper-limb BoNT-A treatment. This new traffic-light category is an aspect to consider in the dialogue about upper-limb BoNT-A.

PMID: 36177964

24. Risk factors evaluation of cerebral palsy in Hazara division Khyber Pakhtunkhwa Pakistan: A cross-sectional survey

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J Pak Med Assoc. 2022 Jul;72(7):1315-1319. doi: 10.47391/JPMA.1669.

Objective: To evaluate the prevalence of risk factors of cerebral palsy in the mothers of children with cerebral palsy. Methods: The cross-sectional study was conducted in 2018 at the Helping Hand Institute of Rehabilitation Sciences, Mansehra, Pakistan, and comprised mothers of cerebral palsy children aged 1-18 years from the Hazara Division. Data was collected by using a modified form of Surveillance of cerebral palsy in Europe questionnaire regarding prenatal, natal and postal natal risk factors. Data was analysed using SPSS 21. Results: Of the 300 children, 190(63.3%) were males and 110(36.7%) were females. The mean age of the children was 5.43±3.63 years and that of their mothers at the time of delivery was 26.16±5.11 years. Among the prenatal risk factors, anaemia was the leading factor 179(59.6%), while delayed crying 187(63.3%) was the major postnatal factor. Consanguinity was reported by 200(66.7%) mothers. Majority of the deliveries 201(67%) had taken place at hospitals. Conclusion: Anaemia and delayed crying were the major risk factors identified in mothers and children, respectively, in the study sample.

PMID: 36156552

25. Early care and support for young children with developmental disabilities and their caregivers in Uganda: The Baby Ubuntu feasibility trial

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Front Pediatr. 2022 Sep 13;10:981976. doi: 10.3389/fped.2022.981976. eCollection 2022.

Background: Early care and support provision for young children with developmental disabilities is frequently lacking, yet has potential to improve child and family outcomes, and is crucial for promoting access to healthcare and early education. We evaluated the feasibility, acceptability, early evidence of impact and provider costs of the Baby Ubuntu participatory, peer-facilitated, group program for young children with developmental disabilities and their caregivers in Uganda. Materials and methods: A feasibility trial, with two parallel groups, compared Baby Ubuntu with standard care. Caregivers and children, aged 6-11 months with moderate-severe neurodevelopmental impairment, were recruited and followed for 12 months. Quantitative and qualitative methods captured information on feasibility (ability to recruit), acceptability (satisfactory attendance), preliminary evidence of impact (family quality of life) and provider costs. Results: One hundred twenty-six infants (median developmental quotient, 28.7) were recruited and randomized (63 per arm) over 9 months, demonstrating feasibility; 101 (80%) completed the 12-month follow-up assessment (9 died, 12 were lost to follow up, 4 withdrew). Of 63 randomized to the intervention, 59 survived (93%); of these, 51 (86%) attended ≥6 modules meeting acceptability criteria, and 49 (83%) completed the 12 month follow-up assessment. Qualitatively, Baby Ubuntu was feasible and acceptable to caregivers and facilitators. Enabling factors included community sensitization by local champions, positive and caring attitudes of facilitators toward children with disability, peer support, and the participatory approach to learning. Among 101 (86%) surviving children seen at 12 months, mixed methods evaluation provided qualitative evidence of impact on family knowledge, skills, and attitudes, however impact on a scored family quality of life tool was inconclusive. Barriers included stigma and exclusion, poverty, and the need to manage expectations around the child's progress. Total provider cost for delivering the program per participant was USD 232. Conclusion: A pilot feasibility trial of the Baby Ubuntu program found it to be feasible and acceptable to children, caregivers and healthcare workers in Uganda. A mixed methods evaluation provided rich programmatic learning including qualitative, but not quantitative, evidence of impact. The cost estimate represents a feasible intervention for this vulnerable group, encouraging financial sustainability at scale. Clinical trial registration: [https://doi.org/10.1186/ISRCTN44380971], identifier [ISRCTN44380971].

PMID: 36177453

26. How have we developed? The history of developmental and rehabilitation services for children in Israel [Article in Hebrew]
Yehuda Senecky, Gary Diamond, Edith Posener

Harefuah. 2022 Sep;161(9):577-580.

Public health and welfare organizations, as well as governmental agencies in Israel, charged with the provision of services for children with special needs and their families, have reached a timely watershed. This large network finds its roots at the dawn of the last century in the history of the notable efforts made by idealistic individuals who immigrated to the country and in the many Jewish philanthropic community organizations, charged with helping others less fortunate. Beginning with services for the handicapped, who were either victims of polio or suffering from cerebral palsy, the gamut of providers blossomed to encompass many others in need, which today number in the hundreds of thousands each year, suffering from a wide range of impairments, and with a multitude of needs. We found it incumbent upon us to undertake a prodigious review of those pioneering individuals and organizations, contributing to the current wealth of services available to the public.

PMID: 36168162

27. Intra-amniotic inflammation in the mid-trimester of pregnancy is a risk factor for neuropsychological disorders in childhood
Maria Teresa Gervasi, Roberto Romero, Elisa Cainelli, Paola Veronese, Maria Rosa Tran, Eunjung Jung, Manaphat Suksai, Mariachiara Bosco, Francesca Gotsch

J Perinat Med. 2022 Sep 29. doi: 10.1515/jpm-2022-0255. Online ahead of print.

Objectives: Intra-amniotic inflammation is a subclinical condition frequently caused by either microbial invasion of the amniotic cavity or sterile inflammatory stimuli, e.g., alarmins. An accumulating body of evidence supports a role for maternal immune activation in the genesis of fetal neuroinflammation and the occurrence of neurodevelopmental disorders such as cerebral palsy, schizophrenia, and autism. The objective of this study was to determine whether fetal exposure to mid-trimester intra-amniotic inflammation is associated with neurodevelopmental disorders in children eight to 12 years of age. Methods: This is a retrospective case-control study comprising 20 children with evidence of prenatal exposure to intra-amniotic inflammation in the mid-trimester and 20 controls matched for gestational age at amniocentesis and at delivery. Amniotic fluid samples were tested for concentrations of interleukin-6 and C-X-C motif chemokine ligand 10, for bacteria by culture and molecular microbiologic methods as well as by polymerase chain reaction for eight viruses. Neuropsychological testing of children, performed by two experienced psychologists, assessed cognitive and behavioral domains. Neuropsychological dysfunction was defined as the presence of an abnormal score (<2 standard deviations) on at least two cognitive tasks. Results: Neuropsychological dysfunction was present in 45% (9/20) of children exposed to intra-amniotic inflammation but in only 10% (2/20) of those in the control group (p=0.03). The relative risk (RR) of neuropsychological dysfunction conferred by amniotic fluid inflammation remained significant after adjusting for gestational age at delivery [aRR=4.5 (1.07-16.7)]. Of the 11 children diagnosed with neuropsychological dysfunction, nine were delivered at term and eight of them had mothers with intra-amniotic inflammation. Children exposed to intra-amniotic inflammation were found to have abnormalities in neuropsychological tasks evaluating complex skills, e.g., auditory attention, executive functions, and social skills, whereas the domains of reasoning, language, and memory were not affected in the cases and controls. Conclusions: Asymptomatic sterile intra-amniotic inflammation in the mid-trimester of pregnancy, followed by a term birth, can still confer to the offspring a substantial risk for neurodevelopmental disorders in childhood. Early recognition and treatment of maternal immune activation in pregnancy may be a strategy for the prevention of subsequent neurodevelopmental disorders in offspring.

PMID: 36173676

28. Epidermal nevus syndrome with the mutation of PTCH1 gene and cerebral infarction: a case report and review of the literature
QingQing Deng, Yan Li, ZhanLi Liu, JieLin Zhou, LingWei Weng

Review J Med Case Rep. 2022 Sep 28;16(1):343. doi: 10.1186/s13256-022-03547-9.

Background: Epidermal nevus syndrome is a group of congenital neuroectodermal and/or mesodermal disorders characterized by the epidermal nevi in common association with cerebral, eye, skeletal, cardiovascular, and renal abnormalities. Epidermal nevus syndrome is a rare syndrome, and epidermal nevus syndrome with the mutation of PTCH1 gene and cerebral infarction is even rarer and has not been reported to the best of our knowledge. Case presentation: We report the case of a 10-month-old Chinese female patient who presented to our pediatric neurologic department, University of Wenzhou medical teaching Hospital, Hangzhou. She has mobility disorders on the right limbs and recurrent seizures. She had congenital disorder accompanied by brownish-black and verrucose plaques on the right side of the face as well as extensive brownish-black plaques and brown nevi on the right side of the trunk and the right arm. Epidermal nevus syndrome was diagnosed on the basis of her symptoms. Somatic sebaceous nevi and hypoplastic defects of skin, cerebra, eyes, skeleton, and cardiovascular and renal system were observed. However, in addition to the typical clinical characteristics, the patient also has a mutation (c.109G > T) in PTCH1 gene and cerebral infarction. We present a novel case report and literature review. Conclusion: To our knowledge, epidermal nevus syndrome with a mutation of PTCH1 gene and cerebral infarction has not been reported previously. This case report may contribute to characterizing the phenotype of epidermal nevus syndrome, help clinicians be aware of the association of this condition with PTCH1 gene and cerebral infarction, raise clinical suspicion, and improve early therapy.

PMID: 36171624

29. Heart Rate and Pulse Oximetry Dynamics in the First Week after Birth in Neonatal Intensive Care Unit Patients and the Risk of Cerebral Palsy
Lisa Letzkus, Karen Fairchild, Genevieve Lyons, Harshini Pyata, Sarah Ratcliffe, Doug Lake

Am J Perinatol. 2022 Sep 29. doi: 10.1055/s-0042-1756335. Online ahead of print.

Objective: Infants in the neonatal intensive care unit (NICU) are at high risk of adverse neuromotor outcomes. Atypical patterns of heart rate (HR) and pulse oximetry (SpO2) may serve as biomarkers for risk assessment for cerebral palsy (CP). The purpose of this study was to determine whether atypical HR and SpO2 patterns in NICU patients add to clinical variables predicting later diagnosis of CP. Study design: This was a retrospective study including patients admitted to a level IV NICU from 2009 to 2017 with archived cardiorespiratory data in the first 7 days from birth to follow-up at >2 years of age. The mean, standard deviation (SD), skewness, kurtosis and cross-correlation of HR and SpO2 were calculated. Three predictive models were developed using least absolute shrinkage and selection operator regression (clinical, cardiorespiratory and combined model), and their performance for predicting CP was evaluated. Results: Seventy infants with CP and 1,733 controls met inclusion criteria for a 3.8% population prevalence. Area under the receiver operating characteristic curve for CP prediction was 0.7524 for the clinical model, 0.7419 for the vital sign model, and 0.7725 for the combined model. Variables included in the combined model were lower maternal age, outborn delivery, lower 5-minute Apgar's score, lower SD of HR, and more negative skewness of HR. Conclusion: In this study including NICU patients of all gestational ages, HR but not SpO2 patterns added to clinical variables to predict the eventual diagnosis of CP. Identification of risk of CP within the first few days of life could result in improved therapy resource allocation and risk stratification in clinical trials of new therapeutics. Key points: · SD and skewness of HR have some added predictive value of later diagnosis of CP. · SpO2 measures do not add to CP prediction. · Combining clinical variables with early HR measures may improve the prediction of later CP.

PMID: 36174590

30. Dexmedetomidine in patient with cerebral palsy - Changing anesthesia practice
Divya Gahlot, Bharti Wadhwa, Kirti Nath Saxena

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No abstract available

PMID: 36171951

31. A Road Map for Academic Developmental-Behavioral Pediatric Practices to Increase Access
Dinah L Godwin, Jennifer Cervantes, Jennifer Y Torres, Kathryn K Ostermaier, Leandra N Berry, Robert G Voigt

J Dev Behav Pediatr. 2022 Sep 27. doi: 10.1097/DBP.0000000000001132. Online ahead of print.

There are currently at least 19 million children and adolescents in the United States with disorders of development (learning disorders, attention-deficit/hyperactivity disorder, intellectual disabilities, autism, motor incoordination/cerebral palsy, etc.) and only approximately 800 board-certified developmental-behavioral pediatricians (DBPs) practicing nationally. Given the astronomical mismatch between the number of children and adolescents with developmental disorders and the number of board -certified DBPs, developmental-behavioral pediatric consultations are likely the most inaccessible in all of medicine. With the goal of increasing access to these consultations, an academic developmental-behavioral practice in a large urban hospital system developed a longitudinal "Road Map," led by our team of social workers, which is designed to provide such services while continuing to focus DBP efforts on initial consultative evaluation and diagnosis of as many children as possible. The programs that this new Road Map has provided have allowed the DBP practice not only to increase access to developmental evaluations but also to provide more holistic and targeted care from the point of being added to the waiting list and then throughout the life span at vital transition periods. Especially given the extreme mismatch between the scarce number of practicing DBPs and the prodigious number of pediatric patients with disorders of development, our hope is that other centers will consider replicating this innovative care model to address the ever-growing need for specialized DBP consultation and longitudinal wraparound care for our patients and families.

PMID: 36170013