# Cerebral palsy research news

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## Interventions and Management

**1. Post-operative steroids in patients with patients with severe cerebral palsy undergoing posterior spinal fusion**
Tracy Ruska, Thomas M Austin, Robert W Bruce Jr, Nicholas D Fletcher

Spine Deform. 2022 Oct 19. doi: 10.1007/s43390-022-00603-8. Online ahead of print.

Introduction: Posterior spinal fusion (PSF) represents a large physiologic challenge for children with neuromuscular scoliosis (NMS). Perioperative complications are numerous with many occurring in the post-operative period due to pain and relative immobilization. This study assessed the impact of steroids on patients undergoing PSF for NMS. Methods: A retrospective review of consecutive patients managed at a single center with PSF for NMS was reviewed. Clinical and radiographic analysis was used to evaluate baseline demographics, curve characteristics, and post-operative course. Results: Eighty-nine patients who underwent PSF for NMS were included. Fifty-seven of these patients did not receive post-operative steroids (NS) while 32 patients were treated with post-operative steroids (dexamethasone, WS) for a median of 3 doses (median 6.0 mg/dose every 8 h after surgery). The demographic variables of the cohorts were similar with no difference in curve magnitude, number of vertebrae fused, number of osteotomies, or EBL between groups. A 70% decrease in the median post-operative morphine equivalents was observed in the steroid cohort (0.50 mg/kg WS vs 1.65 mg/kg NS, p value < 0.001). There was an association between post-operative morphine equivalents and length of stay (Spearman's rho = 0.22, p value = 0.04). There was no difference in wound healing, infection, and pulmonary or gastrointestinal complications between groups. No difference was found in pain at discharge, 30-day ED returns, or 30-day OR returns between groups. Conclusions: Post-operative dexamethasone resulted in a 70% decrease in morphine equivalent use after PSF for NMS without any increase in perioperative wound infections. Level of evidence: Level 3: case-control series.

PMID: 36260207

**2. Impact of Occupational Therapy on Self-Care After Selective Dorsal Rhizotomy Among Children With Cerebral Palsy**
Heather Forst, Tonye Sylvanus

Am J Occup Ther. 2022 Nov 1;76(6):7606205040. doi: 10.5014/ajot.2022.049267.

Importance: Selective dorsal rhizotomy (SDR) is an established treatment for spastic cerebral palsy (CP). The effects and predictors of occupational therapy's benefit for self-care after SDR in children with CP have not been thoroughly investigated. Objective: To identify changes in self-care after occupational therapy post-SDR and determine whether changes were affected by age, Gross Motor Function Classification System (GMFCS) level, and number of occupational therapy dressing sessions. Design: In this retrospective cohort study, we collected outcomes pre-SDR, at discharge, and at 1-yr follow-up. Paired t tests and regression analysis were performed. Setting: Commission on Accreditation of Rehabilitation Facilities-accredited

pediatric inpatient rehabilitation facility. Participants: Seventy-three children (GMFCS Levels I-III, ages 4-17 yr) diagnosed with spastic CP who underwent SDR from 2014 to 2018. Intervention: After having SDR, each child received an average of twice daily occupational therapy for an average of 37.3 days. Outcomes and measures: The Pediatric Evaluation of Disability Inventory Computer Adaptive Test (PEDI-CAT) and Functional Independence Measure for Children® (WeeFIM) were used to assess self-care performance. Results: The mean WeeFIM dressing (upper and lower body) and mean PEDI-CAT daily activities scores from baseline to discharge and mean WeeFIM lower body dressing at 1-yr follow-up improved significantly. The improvement in lower body dressing correlated with GMFCS level and the number of occupational therapy dressing sessions. Conclusions and relevance: The improvement in upper and lower extremity dressing and PEDI-CAT daily activities scores suggests that inpatient occupational therapy post-SDR may provide benefits. What This Article Adds: Children diagnosed with CP may undergo surgical interventions to improve their ability to walk. This article demonstrates the benefit of occupational therapy services after SDR to improve upper and lower body dressing skills.

PMID: 36255304

**3. Temporary internal distraction for severe scoliosis: two-year minimum follow-up**
Daniel Badin, Arjun Gupta, David L Skaggs, Paul D Sponseller

Spine Deform. 2022 Oct 20. doi: 10.1007/s43390-022-00602-9. Online ahead of print.

Purpose: Temporary internal distraction (TID) is a surgical technique used to correct severe scoliosis. We sought to evaluate the long-term outcomes associated with temporary internal distraction (TID) for severe scoliosis. Methods: Scoliosis patients who underwent TID from 2006 to 2019 at a single institution were identified. Patients with coronal Cobb angles ≥ 90° or congenital scoliosis, and ≥ 2-year follow-up were included. Clinical and imaging data were reviewed for patient and operative characteristics and complications. Patient-reported outcomes were also analyzed. Results: 51 patients (37 female) were included. Mean age at surgery was 14.3 ± 3.5 years. Mean follow-up was 5.8 ± 3.0 years. Eighteen (35%) curves were idiopathic, 24 (47%) were cerebral palsy (CP) related, and 9 (18%) were congenital. Mean Cobb angle was 103° preoperatively and 20° at final follow-up, with an intermediate angle of 55º in staged procedures. Intraoperative neuromonitoring changes occurred in 13 (25.4%) cases, but all returned to baseline with immediate lessening of distraction. Overall, three (5.8%) cases of wound dehiscence, five (9.7%) cases of deep infections, one (2%) case of screw protrusion, and one (2%) case of delayed extremity weakness occurred. Patient-reported outcomes significantly improved at final follow-up. Conclusion: Our findings suggest that TID is a valuable adjunct for correcting severe scoliosis. The mean Cobb reduction achieved (81%) was higher than that reported for halo-traction and was sustained over long-term follow-up. TID also allowed a shorter a hospital stay. While intraoperative neuromonitoring changes were not uncommon, they were reversible. However, care must always be exercised as major corrections may rarely result in delayed neurologic deficits despite intact neuromonitoring. Level of evidence: Therapeutic-Level III.

PMID: 36264539

**4. Evaluating Postoperative Immobilization Following Hip Reconstruction in Children With Cerebral Palsy**
Sean Tabaie, Alana Sadur, Aribah Shah

Cureus. 2022 Oct 13;14(10):e30270. doi: 10.7759/cureus.30270. eCollection 2022 Oct.

Objectives Currently, there is no standardized protocol for postoperative immobilization techniques in patients with cerebral palsy undergoing hip reconstructive procedures. The purpose of this study was to evaluate the effects of several methods of postoperative immobilization and to determine which postoperative immobilization technique has the fewest complications. Materials and methods A retrospective cohort study of pediatric patients with cerebral palsy who underwent hip reconstructive procedures, in which a hip spica cast, Petrie cast, or abduction pillow was placed for postoperative hip immobilization, was conducted. Patients who underwent revision surgery and those without cerebral palsy were excluded from the analysis. The final cohort consisted of 70 cases. Demographics, laterality of surgery, procedure type, hip immobilization technique, and 30-day postoperative complications were recorded. Complications were defined as those related to casting immobilization, such as re-dislocation or loss of surgical fixation, and soft tissue complications, such as pressure ulcers or any superficial or deep wound infection. Results Of the 70 patients, 27 received spica casting, 28 received Petrie casting, and 15 received an abduction pillow. The complication rates, as defined in the methods section, were 14.8% for the spica cast group, 17.9% for Petrie cast, and 26.7% for abduction pillow. There was no significant difference in complication rates among spica cast, Petrie cast, or

abduction pillow groups (P=0.76). Conclusions There was no significant difference in length of stay, pain control duration, or complication rates among the three methods of immobilization. Clinicians should be advised of the comparable outcomes among the postoperative immobilization techniques.

PMID: 36258807

**5. Progressive resistance training for children with cerebral palsy: A randomized controlled trial evaluating the effects on muscle strength and morphology**
Britta Hanssen, Nicky Peeters, Nathalie De Beukelaer, Astrid Vannerom, Leen Peeters, Guy Molenaers, Anja Van Campenhout, Ellen Deschepper, Christine Van den Broeck, Kaat Desloovere

Front Physiol. 2022 Oct 4;13:911162. doi: 10.3389/fphys.2022.911162. eCollection 2022.

Children with spastic cerebral palsy often present with muscle weakness, resulting from neural impairments and muscular alterations. While progressive resistance training (PRT) improves muscle weakness, the effects on muscle morphology remain inconclusive. This investigation evaluated the effects of a PRT program on lower limb muscle strength, morphology and gross motor function. Forty-nine children with spastic cerebral palsy were randomized by minimization. The intervention group (n participants = 26, age: 8.3 ± 2.0 years, Gross Motor Function Classification System [GMFCS] level I/II/III: 17/5/4, n legs = 41) received a 12-week PRT program, consisting of 3-4 sessions per week, with exercises performed in 3 sets of 10 repetitions, aiming at 60%-80% of the 1-repetition maximum. Training sessions were performed under supervision with the physiotherapist and at home. The control group (n participants = 22, age: 8.5 ± 2.1 year, GMFCS level I/II/III: 14/5/3, n legs = 36) continued usual care including regular physiotherapy and use of orthotics. We assessed pre- and post-training knee extension, knee flexion and plantar flexion isometric strength, rectus femoris, semitendinosus and medial gastrocnemius muscle morphology, as well as functional strength, gross motor function and walking capacity. Data processing was performed blinded. Linear mixed models were applied to evaluate the difference in evolution over time between the control and intervention group (interaction-effect) and within each group (time-effect). The α-level was set at $p = 0.01$. Knee flexion strength and unilateral heel raises showed a significant interaction-effect ($p \leq 0.008$), with improvements in the intervention group ($p \leq 0.001$). Moreover, significant time-effects were seen for knee extension and plantar flexion isometric strength, rectus femoris and medial gastrocnemius MV, sit-to-stand and lateral step-up in the intervention group ($p \leq 0.004$). Echo-intensity, muscle lengths and gross motor function showed limited to no changes. PRT improved strength and MV in the intervention group, whereby strength parameters significantly or close to significantly differed from the control group. Although, relative improvements in strength were larger than improvements in MV, important effects were seen on the maintenance of muscle size relative to skeletal growth. In conclusion, this study proved the effectiveness of a home-based, physiotherapy supervised, PRT program to improve isometric and functional muscle strength in children with SCP without negative effects on muscle properties or any serious adverse events. Clinical Trial Registration: ClinicalTrials.gov, identifier NCT03863197.

PMID: 36267577

**6. Effects of intermittent aerobic training on exercise capacity, pulmonary functions, and gait parameters in asthmatic children with cerebral palsy: a randomized controlled trial**
G S Soliman, A R Azab, W K Abdelbasset

Randomized Controlled Trial Eur Rev Med Pharmacol Sci. 2022 Oct;26(19):6911-6918. doi: 10.26355/eurrev_202210_29871.

Objective: There is no evidence that exercise training program is effective in improving aerobic capacity, musculoskeletal abnormalities, and quality of life in asthmatic children with cerebral palsy (CP). Therefore, the effects of intermittent aerobic training on exercise capacity, pulmonary function, and gait parameters in asthmatic CP children have been evaluated in the current study. Patients and methods: This clinical trial included thirty-six asthmatic CP children between January and December 2021. Their ages were between 7 and 12 years old. They were randomly allocated to the intermittent aerobic exercise group (IAEG) and a control group (CG), with 18 per each group. The children have been recruited for the 10-week interventional program. The 6-minute walk test (6MWT), forced vital capacity (FVC), forced expiratory volume in one second (FEV1), stride length, cadence, gait speed, and pediatric asthma quality of life (PAQLQ) were all measured before and after treatment. Results: Pre-post analysis in the IAEG showed noteworthy changes (6MWT, $p=0.005$; FVC, $p=0.002$; FEV1, $p<0.001$; overall score of PAQLQ, $p<0.001$; stride length, $p<0.001$; cadence, $p<0.001$; and gait speed, $p<0.001$), while the control group showed non-significant changes ($p>0.05$). There were noteworthy differences between IAEG and CG post-treatment (6MWT, $p=0.019$; FVC, $p=0.031$; FEV1, $p<0.001$; overall score of PAQLQ, $p=0.031$; stride length, $p<0.001$;

cadence, p=0.009; and gait speed, p<0.001) in favor of the IAEG. Conclusions: Depending on the study findings, 10 weeks of intermittent aerobic exercise may improve exercise capacity, pulmonary function, gait parameters, and quality of life in asthmatic CP children. Based on what we found, this protocol should be used in pulmonary rehabilitation programs for children with CP who have breathing problems.

PMID: 36263570

**7. Psychiatric symptoms in adult patients with cerebral palsy: A cohort study**
Silvia Pizzighello, Marianna Uliana, Martina Michielotto, Alda Pellegri, Matteo G F Vascello, Sara Piccoli, Michela Martinuzzi, Andrea Martinuzzi

Front Neurol. 2022 Sep 27;13:998922. doi: 10.3389/fneur.2022.998922. eCollection 2022.

Background: Patients with cerebral palsy (CP) have an increased risk of developing mental health disorders. Aims: This paper is aimed to investigate the occurrence of psychiatric symptoms in adults with CP and to explore the relation between clinical and psychosocial variables. Methods and procedures: We included 199 adults with a diagnosis of CP. The chi-square and the Mann-Whitney U tests were used to compare clinical and psychosocial variables, the level of perceived disability, and the type of observed parental style in patients with and without psychiatric symptoms. Logistic regression analysis was used to identify variables that could predict the occurrence of mental health disorders. Outcome and results: Anxiety and psychosis were the most represented disorders. Age, living status, assumption of drugs, motor, manual, and global impairment were significantly different between patients with and without psychiatric symptoms. Similarly, a different parental style was observed between the two groups. Logistic regression indicated that living status, prescribed drugs, parental style, and the perceived disability in getting along with others predicted the occurrence of psychiatric symptoms. Conclusions and implications: Results suggest that patients with and without psychiatric symptoms have different clinical and psychosocial characteristics. Some variables should be considered as potentially affecting the mental health of patients with CP.

PMID: 36247792

**8. Augmented Reality driven Steady-State Visual Evoked Potentials for Wheelchair Navigation**
V Sakkalis, M Krana, C Farmaki, C Bourazanis, D Gaitatzis, M Pediaditis

IEEE Trans Neural Syst Rehabil Eng. 2022 Oct 21;PP. doi: 10.1109/TNSRE.2022.3215695. Online ahead of print.

Medically oriented Brain Computer Interfaces (BCIs) have been proposed as a promising approach addressed to individuals suffering from severe paralysis. Steady-State Visual Evoked Potentials (SSVEPs) in particular have been proven successful in many different applications, achieving high information throughput with short or even no training. However, efficient electric wheelchair navigation combining high accuracy and comfort is still not demonstrated. In this paper, we propose the use of an SSVEP-based universal control system featuring augmented reality (AR) glasses in an attempt to increase ease of use and patient acceptability without making compromises on BCI performance. The system received positive user-feedback, reaching a mean accuracy of 90%. Merits and pitfalls of the system proposed are also addressed.

PMID: 36269910

**9. Risk factors, types, and neuroimaging findings in Children with Cerebral Palsy**
Sabeen Abid Khan, Sidra Talat, Munir Iqbal Malik

Pak J Med Sci. 2022 Sep-Oct;38(7):1738-1742. doi: 10.12669/pjms.38.7.6175.

Objectives: Cerebral palsy is a major cause of neurodisability in children in Pakistan. The study aims to evaluate the risk factors, types and neuroimaging findings in children with cerebral palsy. Methods: All children diagnosed with cerebral palsy, between 1-16 years presenting to Shifa community health center were enrolled from January 2020 to July 2021. Informed

consent was taken from parents. Results: A total of 89 patients were included, 62 (69.7%) male and 27 (30.3%) females. Mean age was 4.4 ± 2.8 years. Majority of babies were born at term 74 (84%) and 15 were preterm (16%). Most of the patients were born in hospital 55 (62%), 13 (14%) were born at home. Mean birth weight was 2.3 ± 0.3. Consanguinity was present in 56 (62.9%). Birth asphyxia 38 (42.7%) was the most common cause of cerebral palsy. Maternal antenatal risk factors identified were anemia 13 (14.6%), PIH (9%) infections (6%) were significant risk factors (<0.05). Neuroimaging was done in 37 (38.7%) of the patients only. Conclusion: Male gender is more affected in our cohort. Maternal anemia, pregnancy induced hypertension and low birth weight are significant modifiable risk factors. Prevention of these can reduce the incidence of cerebral palsy.

PMID: 36246690

**10. Validation of eligibility criteria for the Japan Obstetric Compensation System for Cerebral Palsy in preterm infants: A case-control cohort study**
Satoshi Kusuda, Hidehiko Nakanishi, Hideaki Suzuki, Neonatal Research Network of Japan

J Obstet Gynaecol Res. 2022 Oct 21. doi: 10.1111/jog.15472. Online ahead of print.

Aim: To verify validity of the criteria used for the Japan Obstetric Compensation System for Cerebral Palsy (JOCS-CP) in preterm infants, the association between the criteria and the development of CP was studied using a neonatal database. Our hypothesis was that the criteria would not be sufficient due to the recent advances made in perinatal care. Methods: Preterm infants born between 2003 and 2019 and registered in the Neonatal Research Network of Japan database with a birth weight of 1500 g or less or a gestational age of less than 32 weeks were analyzed. The database included the clinical information of registered infants during their stay in NICUs and outcomes at 3 years of age. Results: The database included 73 615 infants. After excluding those with an unknown outcome at discharge, 73 464 infants were analyzed for short-term outcomes, including mortality and morbidities. The incidence of CP at 3 years of age was analyzed in 36 151 infants. Furthermore, 16 467 infants born between 28 and 31 weeks of gestation were examined in terms of the validity of the current eligibility criteria. The mortality and incidences of severe intraventricular hemorrhage and periventricular leukomalacia significantly decreased during the study period (Cochrane-Armitage test, $p < 0.01$). Furthermore, the eligibility criteria were not sufficiently nor strongly associated with indicators for detecting perinatal hypoxia-ischemia resulting in CP. Conclusion: The existing eligibility criteria of the JOCS-CP used for preterm infants born between 28 and 31 weeks were no longer suitable because of the advances in perinatal care in Japan.

PMID: 36268645

**11. Standardized quality control management improves rehabilitation of children with cerebral palsy in Ningbo City**
Keji Zhang, Fangchuan Chen, Hongxiang Xie, Yaling Wu, Ye Zhang

Am J Transl Res. 2022 Sep 15;14(9):6814-6822. eCollection 2022.

Objective: To investigate the effect of standardized quality control management on the rehabilitation of children with palsy in Ningbo City. Methods: In this retrospective study, a total of 400 pediatric patients requiring rehabilitation therapy admitted to Ningbo Rehabilitation Hospital from July 2017 to May 2021, were selected as the research subjects. Pediatric patients were divided into an observation group (standardized model) and a control group (routine model) based on the different quality management models. The rehabilitation efficacy, nursing quality, negative emotion, satisfaction, DQ scores, ADL scores, PDI scores, MDI scores, compliance rate, complaint rate of nursing, and incidence of adverse events were compared between the two groups. Results: The rehabilitation efficacy in the observation group was better than that in the control group (P<0.05). Compared to the control group, the nursing quality score and satisfaction rate were higher, and the negative emotion score was lower in the observation group (all P<0.05). DQ scores, ADL scores, PDI scores, and MDI scores in the observation group were higher than the control group (all P<0.05). The statistical differences were observed in the compliance rate, complaint rate in nursing, and incidence of adverse events between the two groups (all P<0.05). Conclusions: The standardized quality control management enhanced the rehabilitation efficacy, promoted the nursing quality, improved the clinical effects, increased the satisfaction rate, and decreased the negative emotions in pediatric patients.

PMID: 36247265

**12. Mobility impairment and life satisfaction in the Northern Region of Malawi**
Jared M Alswang, William B Belshe, Dexter Killi, Weston Bandawe, Erin S Silliman, Aaron C Bastian, Brooke K Upchurch, Megan F Bastian, Sierra M Pinal, Mark B Klein, Bertha Ndhlozi, Mauricio Silva, John Chipolombwe, Rachel M Thompson

Afr J Disabil. 2022 Sep 22;11:1013. doi: 10.4102/ajod.v11i0.1013. eCollection 2022.

Background: There exist many psychosocial sequelae associated with mobility impairment, especially in low-resource settings where access to mobility assistive devices is limited. Objectives: This study aims to (1) define the burden and presenting aetiologies of mobility impairment in the rural Northern Region of Malawi and (2) assess the relationship between physical disability, life satisfaction and access to mobility aids. Methods: At mobility device donation clinics throughout the Northern Region of Malawi, adults living with mobility impairment were surveyed with a demographic questionnaire and a series of validated surveys to assess their physical activity levels (Global Physical Activity Questionnaire [GPAQ]), degree of mobility impairment (Washington Group Extended Set Questions on Disability) and life satisfaction (patient-reported outcomes measurement information systems satisfaction with participation in social roles and general life satisfaction). Results: There were 251 participants who qualified for inclusion, of which 193 completed all surveys. Higher physical activity scores were positively correlated with increased life satisfaction: (1) satisfaction with participation in social roles (0.481, $p < 0.0001$) and (2) general life satisfaction (0.230, $p < 0.001$). Respondents who had previously used a formal mobility device reported 235.5% higher physical activity levels ([139.0%, 333.0%], $p = 0.006$), significantly higher satisfaction with participation in social roles ([0.21, 6.67], $p = 0.037$) and equivocally higher general life satisfaction ([-1.77, 3.84], $p = 0.470$). Conclusion: Disability and mental health do not exist in isolation from one another. Given the positive correlations between formal mobility device usage and both physical activity and life satisfaction, interventions that increase access to mobility-assistive devices in undertreated populations are imperative. Contribution: This study contributes to the understanding of the complex relationship between physical disability, access to mobility aids, and life satisfaction. Results from this study suggest the potential benefit that increasing access to mobility aids may have in improving the quality of life of mobility impaired persons in resource-limited settings, such as the Northern Region of Malawi.

PMID: 36262824

**13. The NESHIE and CP Genetics Resource (NCGR): A database of genes and variants reported in neonatal encephalopathy with suspected hypoxic ischemic encephalopathy (NESHIE) and consequential cerebral palsy (CP)**
Megan A Holborn, Graeme Ford, Sarah Turner, Juanita Mellet, Jeanne van Rensburg, Fourie Joubert, Michael S Pepper

Genomics. 2022 Oct 18;110508. doi: 10.1016/j.ygeno.2022.110508. Online ahead of print.

Neonatal encephalopathy (NE) with suspected hypoxic ischaemic encephalopathy (HIE) (NESHIE) is a complex syndrome occurring in newborns, characterised by altered neurological function. It has been suggested that genetic variants may influence NESHIE susceptibility and outcomes. Unlike NESHIE, for which a limited number of genetic studies have been performed, many studies have identified genetic variants associated with cerebral palsy (CP), which can develop from severe NESHIE. Identifying variants in patients with CP, as a consequence of NESHIE, may provide a starting point for the identification of genetic variants associated with NESHIE outcomes. We have constructed NCGR (NESHIE and CP Genetics Resource), a database of genes and variants reported in patients with NESHIE and CP (where relevant to NESHIE), for the purpose of collating and comparing genetic findings between the two conditions. In this paper we describe the construction and functionality of NCGR. Furthermore, we demonstrate how NCGR can be used to prioritise genes and variants of potential clinical relevance that may underlie a genetic predisposition to NESHIE and contribute to an understanding of its pathogenesis.

PMID: 36270382

**14. The association between congenital cytomegalovirus infection and cerebral palsy: A systematic review and meta-analysis**
Leong Tung Ong, Si Wei David Fan

Review J Paediatr Child Health. 2022 Oct 17. doi: 10.1111/jpc.16244. Online ahead of print.

Cytomegalovirus (CMV) is the most common cause of congenital infection, affecting 1% of all live births. Intrauterine infection such as CMV infection is a risk factor for developing cerebral palsy. This study aims to investigate the association

between congenital CMV infection and the development of cerebral palsy. A systematic literature search was conducted in PubMed, Web of Science and Ovid SP to identify relevant studies. The quality of studies was assessed using the Newcastle-Ottawa Scale. The random-effect model was used to calculate the pooled prevalence. The generic inverse variance method was used for statistical analysis. A total of 12 studies were included in this systematic review and meta-analysis. The overall pooled prevalence of cerebral palsy among patients diagnosed with congenital CMV infection was 26% (95% confidence interval (CI), 13-40%). The overall pooled prevalence of congenital CMV infection among patients with cerebral palsy was 10.9% (95% CI, 5-16%). Congenital CMV infection was significantly associated with the development of cerebral palsy in children. Routine follow-ups should be offered to screen for cerebral palsy.

PMID: 36250689

**15. Exposure to umbilical cord management approaches and death or neurodevelopmental impairment at 22-26 months' corrected age after extremely preterm birth**
Sara C Handley, Neha Kumbhat, Barry Eggleston, Elizabeth E Foglia, Alexis S Davis, Krisa Van Meurs, Satyan Lakshminrusimha, Michele Walsh, Kristi L Watterberg, Myra H Wyckoff, Abhik Das, Sara B DeMauro

Arch Dis Child Fetal Neonatal Ed. 2022 Oct 17;fetalneonatal-2022-324565. doi: 10.1136/archdischild-2022-324565. Online ahead of print.

Objective: To compare death or severe neurodevelopmental impairment (NDI) at 22-26 months' corrected age (CA) among extremely preterm infants following exposure to different forms of umbilical cord management. Design: Retrospective study. Setting: Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network registry. Patients: Infants born <27 weeks' gestation in 2016-2018 without severe congenital anomalies who received active treatment after birth and underwent neurodevelopmental assessments between 22 and 26 months' CA. Exposures: Immediate cord clamping (ICC), delayed cord clamping (DCC) or umbilical cord milking (UCM). Main outcomes and measure: Primary composite outcome of death or severe NDI at 22-26 months' CA, defined as severe cerebral palsy, Bayley-III cognitive/motor composite score <70, bilateral deafness or blindness; individual components were examined as secondary outcomes. Multivariable regression examined associations, adjusting for risk factors identified a priori and potential confounders. Mediation analysis explored the effect of severe intraventricular haemorrhage (IVH) on the exposure-outcome relationship. Results: Among 1900 infants, 64.1% were exposed to ICC, 27.8% to DCC and 8.1% to UCM. Compared with ICC-exposed infants, DCC-exposed infants had lower odds of death or severe NDI (adjusted OR 0.64, 95% CI 0.50 to 0.83). No statistically significant differences were observed when comparing UCM with either ICC or DCC, or between secondary outcomes across groups. Association between cord management and the primary outcome was not mediated by severe IVH. Conclusion: Compared with ICC, DCC exposure was associated with lower death or severe NDI at 22-26 months' CA among extremely preterm infants, which was not mediated by severe IVH.

PMID: 36253076

**16. Retinopathy of Prematurity Is a Biomarker for Pathological Processes in the Immature Brain**
Chao-Ching Huang, Chi-Hsiang Chu, Yen-Kuang Lin, Yung-Chieh Lin, Hsiu-Mei Huang, Ying-Chao Chang, Taiwan Premature Infant Follow-up Network

Neonatology. 2022 Oct 17;1-8. doi: 10.1159/000526652. Online ahead of print.

Introduction: Retinopathy of prematurity (ROP) is considered a neurovascular disease. We investigated whether ROP, mild or severe, is associated with neurodevelopmental impairment (NDI) in extremely preterm children. Methods: We conducted a multicenter retrospective cohort study in southern Taiwan. A total of 394 children <28 weeks of gestation who survived to discharge from 2011 to 2018 received neurodevelopmental assessment at corrected age of 24 months. Severe ROP was defined as ROP of stages 2 plus or worse, or recipients of retinal therapy, and mild ROP as stage 1 or 2 in at least one eye. NDI was defined as cognitive or motor impairment using the Bayley Scales of Infant and Toddler Development, moderate to severe cerebral palsy, or profound hearing loss.Results: Among the 374 children validated for analysis, 157 children (42%) had non-ROP, 145 (39%) mild ROP, and 72 (19%) severe ROP. As ROP severity increased progressively from non-ROP, to mild ROP, and to severe ROP, the rates of NDI increased from 25%, to 46%, and to 61%. The multivariable logistic regression showed that the model included three levels of ROP, and neonatal morbidities achieved better overall performance for NDI than the model that included neonatal morbidities alone. Compared with non-ROP, mild ROP and severe ROP had adjusted odds ratios of 1.90 (95% CI: 1.10-3.28) and 2.75 (95% CI: 1.33-5.67) for NDI, respectively. Conclusion: Mild ROP and severe ROP are

independent neonatal morbidities associated with NDI. Neurodevelopmental follow-up of extremely preterm children with any stage of ROP is needed.

PMID: 36252528

**17. General Movement Assessment in Prediction of Neurodevelopmental Disability and Cerebral Palsy**
Monica Juneja, Christa Einspieler, Megha Khosla

Indian Pediatr. 2022 Oct 15;59(10):755-756.

No abstract available

PMID: 36263493

**18. Increased Sensitivity to Serotonin Syndrome in Cerebral Palsy**
Adam Schindzielorz

Case Reports Case Rep Psychiatry. 2022 Sep 20;2022:5889506. doi: 10.1155/2022/5889506. eCollection 2022.

Serotonin syndrome is characterized by symptoms of neuromuscular and autonomic excitation and altered mental status. It is most often drug induced with antidepressants being the main precipitants. However, other classes have been implicated as well including antipsychotics, antiemetic and pain medications, and lithium. The syndrome is typically induced by the combination of two or more serotonergic agents; however, there have been instances of serotonin syndrome occurring while a patient is on a single medication. The literature is limited regarding the study of risk factors associated with the production of serotonin syndrome while on only monotherapy or otherwise atypically causative agents. One such risk factor may be underlying neuromuscular pathology. This study is the first case series to our knowledge reporting two separate cases of serotonin syndrome being induced in patients with cerebral palsy as an underlying common factor.

PMID: 36247225

**19. Telemedicine for neurologic diseases: A systematic review and meta-analysis**
Beatriz León-Salas, Yadira González Hernández, Diego Infante-Ventura, Aythami de Armas Castellano, Javier García García, Miguel García Hernández, Montserrat Carmona Rodríguez, Javier Olazarán, José Luis Dobato, Leticia Rodríguez-Rodríguez, María M Trujillo-Martín

Review Eur J Neurol. 2022 Oct 18. doi: 10.1111/ene.15599. Online ahead of print.

Background: To systematically review the effectiveness and safety of telemedicine combined with usual care (in-person visits) compared to usual care for the therapeutic management and follow-up assessment of neurologic diseases. Methods: The electronic databases MEDLINE, EMBASE, WOS, and Cochrane Central Register of Controlled Trials were searched (June 2021). We considered randomized controlled trials (RCTs) on patients of any age with neurologic diseases. Two reviewers screened and abstracted data in duplicate and independently and assessed risk of bias using the Cochrane risk-of-bias tool for randomized trials (RoB 2). When possible, pooled effect estimates were calculated. Results: Of a total of 3018 records initially retrieved, 25 RCTs (n=2335) were included: 11 (n=804) on stroke, 4 (n=520) on Parkinson's disease, 3 (n=110) on multiple sclerosis, 2 (n=320) on epilepsy, 1 (n=63) on dementia, 1 (n=23) on spina bifida, 1 (n=40) on migraine, 1 (n=22) on cerebral palsy, and 1 (n=433) on brain damage. Types of telemedicine assessed were: online visits (11 studies), tele-rehabilitation (7 studies), telephone calls (3), smartphone apps (2), and online computer software (2). The evidence was quite limited except for stroke. Compared to usual care alone, telemedicine plus usual care was found to improve depressive symptoms, functional status, motor function, executive function, generic quality of life, health care utilization, and healthy lifestyle in patients in post -stroke follow-up. Conclusions: Well-designed and executed RCTs are needed to confirm our findings on stroke and to have more scientific evidence available for the other neurologic diseases.

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# Prevention and Cure

**20. Umbilical cord blood cell clearance post-infusion in immune competent children with cerebral palsy**
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Umbilical cord blood cells have therapeutic potential for neurological disorders, through a paracrine mechanism of action. A greater understanding of the safety and immunological effects of allogeneic donor cord blood cells in the context of a healthy recipient immune system, such as in cerebral palsy, is needed. This study aimed to determine how quickly donor cord blood cells were cleared from the circulation in children with cerebral palsy who received a single intravenous infusion of 12/12 human leucocyte antigen (HLA) matched sibling cord blood cells. Twelve participants with cerebral palsy aged 2-12 years received cord blood cell infusions as part of a phase I trial of umbilical blood infusion for cerebral palsy. Digital droplet PCR analysis of DNA copy number variants specific to donor and recipient was used to assess donor DNA clearance at five timepoints post infusion, a surrogate measure of cell clearance. Donor cells were cleared from 3 months post-infusion in 11/12 participants. When detected, donor DNA was at a fraction of 0.01 - 0.31% of total DNA with no signs of graft-versus-host disease (GvHD) in any participant. The donor DNA clearance times provided by this study have important implications for understanding safety of allogeneic cord blood cell infusion for cerebral palsy and translational tissue engineering or regenerative medicine research in other disorders.

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