Cerebral palsy research news

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Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

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Interventions and Management

1. Development and content validation of the Upper Limb-Motor Learning Strategy Tool for cerebral palsy

Atefeh Taghizadeh, Kate E Webster, Anoo Bhopti, Brian Hoare

Disabil Rehabil. 2024 Jan 27:1-9. doi: 10.1080/09638288.2024.2307382. Online ahead of print.

Purpose: To describe the development and content validation of the Upper Limb-Motor Learning Strategy Tool (UL-MLST) that aims to guide clinicians on how to implement and document the motor learning strategies used in the upper limb therapy approaches for children with cerebral palsy. Methods: The study consists of two main stages (1) item generation and development and (2) content validation and refinement. The UL-MLST Online Training Program, Manual and Checklist were developed by the authorship group in stage one. In stage 2, two experts evaluated the UL-MLST regarding the Relevance, Coherence, and Significance of the individual strategies and whether the tool is Relevant, Comprehensive, and Clinically useful. Results: Of sixty-two strategies included in the UL-MLST, 52 strategies were rated as being either "Moderately" or "Highly" Relevant, Coherent, and Significant. Ten strategies did not achieve mutual agreement; however, they did not meet the criteria for deletion and were revised according to expert feedback. Overall, the UL-MST was judged to be Relevant, Comprehensive, and Clinically useful. Conclusions: The UL-MLST provides a valid tool to support clinicians in the implementation of the motor learning strategies for children with cerebral palsy.IMPLICATIONS FOR REHABILITATIONThe Upper Limb- Motor Learning Strategy Tool (UL-MLST) Online Training Program, Manual, and Checklist provide a comprehensive package of resources to support the application of motor learning strategies in upper limb therapy for children with cerebral palsy.The UL-MLST provides clinicians with a valid tool for self-appraising the implementation of motor learning-based therapies.The tool has the potential to improve fidelity, enhance the quality, and ensure consistency of evidence-based, task-focused approaches of therapy.

PMID: 38279790

2. Modified-constraint movement induced therapy versus neuro-developmental therapy on reaching capacity in children with hemiplegic cerebral palsy

Radwa S Abdul-Rahman, Nadia L Radwan, Bassam A El-Nassag, Wafaa Mahmoud Amin, Mostafa S Ali

Physiother Res Int. 2024 Jan;29(1):e2069. doi: 10.1002/pri.2069.

Background and objective: Upper extremity impairment is one of the complications in hemiplegic children. The purpose of modified constraint-induced movement therapy (mCIMT) is to improve the function of impaired arms and hands in these children. This study compared the efficacy of mCIMT and the approach of neurodevelopmental therapy (NDT) on reaching capacity in children with spastic hemiplegia. Methods: Fifty-two spastic hemiplegic children ranging in age from four to 6 years were selected for this study from an outpatient clinic and biomechanical lab (Prince Sattam bin Abdulaziz University, KSA). They were randomly divided into two experimental groups: group I received NDT and group II received mCIMT for the involved upper limb and restriction of the uninvolved arm movements for 12 weeks (three times per week). Both groups received a conventional exercise program in addition to experimental one. Active elbow extension range of motion and three-dimensional motion analysis of the reaching task were measured before and after 3 months of treatment. Results: Significant

enhancement in all pre-treatment and post-treatment outcomes was observed in both groups by a two-way mixed MANOVA; furthermore, Group II (mCIMT) showed the most significant improvement (elbow extension, percentage of reach to peak velocity, movement time and movement units) when comparing the post-treatment outcomes between the two groups ($p < 0.001$). Implication for physiotherapy practice: Addition of mCIMT to a conventional exercise was superior to adding NDT exercise therapy in promoting the performance of reaching pattern in hemiplegic children.

PMID: 38284468

3. Constraint-Induced Movement Therapy Promotes Myelin Remodeling and Motor Function by Mediating Sox2/Fyn Signals in Rats with Hemiplegic Cerebral Palsy

Chaoqiong Fu, Hongmei Tang, Liru Liu, Yuan Huang, Hongyu Zhou, Shiya Huang, Tingting Peng, Peishan Zeng, Xubo Yang, Lu He, Kaishou Xu

Phys Ther. 2024 Feb 1:pzae011. doi: 10.1093/ptj/pzae011. Online ahead of print.

Objective: Hypoxic-ischemic brain injury in infants often leads to hemiplegic motor dysfunction. The mechanism of their motor dysfunction has been attributed to deficiencies of the transcription factor SRY (sex-determining region) box 2 (Sox2) or the non-receptor-type tyrosine kinase Fyn (involved in neuronal signal transduction), which causes a defect in myelin formation. Constraint-induced movement therapy (CIMT) following cerebral hypoxia-ischemia may stimulate myelin growth by regulating Sox2/Fyn, Ras homolog protein family A (RhoA), and Rho-associated kinase 2 (ROCK2) expression levels. This study investigated how Sox2/Fyn regulates myelin remodeling following CIMT to improve motor function in rats with hemiplegic cerebral palsy (HCP). Methods: To investigate the mechanism of Sox2 involvement in myelin growth and neural function in rats with HCP, Lentivirus-Sox2 adeno-associated virus and negative control-Lenti-Sox2 adeno-associated virus were injected into the lateral ventricle. The rats were divided into a control group and an HCP group with different interventions (CIMT, Lenti-Sox2 [LS], or negative control-Lenti-Sox2 [NS] treatment), yielding the HCP, HCP plus CIMT (HCP + CIMT), HCP + LS, HCP + LS + CIMT, HCP + NS, and HCP + NS + CIMT groups. Front-limb suspension and RotaRod tests, Golgi-Cox staining, transmission electron microscopy, immunofluorescence staining, Western blotting, and quantitative polymerase chain reaction experiments were used to analyze motor function, dendrite/axon area, myelin ultrastructure, and the levels of expression of oligodendrocytes and Sox2/Fyn/RhoA/ROCK2 in the motor cortex. Results: The rats in the HCP + LS + CIMT group had better values for motor function, dendrite/axon area, myelin ultrastructure, oligodendrocytes, and Sox2/Fyn/RhoA/ROCK2 expression in the motor cortex than rats in the HCP and HCP + NS groups. The improvement of motor function and myelin remodeling, the expression of oligodendrocytes, and the expression of Sox2/Fyn/RhoA/ROCK2 in the HCP + LS group were similar to those in the HCP + CIMT group. Conclusion: CIMT might overcome RhoA/ROCK2 signaling by upregulating the transcription of Sox2 to Fyn in the brain to induce maturation and differentiation of oligodendrocytes, thereby promoting myelin remodeling and improving motor function in rats with HCP.Impact. The pathway mediated by Sox2/Fyn could be a promising therapeutic target for HCP.

PMID: 38302073

4. Comparison of 2 Models of Care for Children with Medical Complexity Following Spinal Fusion

Zachary Semenetz, Amanda M Lewis, Kamyar Arasteh, Tullis Liu, Matthew Demczko

Clin Pediatr (Phila). 2024 Jan 30:99228241228104. doi: 10.1177/00099228241228104. Online ahead of print.

We conducted a retrospective chart review of patients with neuromuscular scoliosis following spinal fusion surgery who were cared for post-operatively by either a hospitalist/orthopedics co-management team or a complex care clinic (CCC). Assignment to either treatment group was not random. To account for baseline differences between groups, we calculated propensity scores and used these as probability weights in generalized linear models. After matching, the CCC had a shorter length of stay (LOS, coefficient = -2.60; P = .04) without a significant difference in 30-day readmission rate (P = .62). For secondary outcomes, there were some significant resource utilization benefits favoring the complex care group without significant difference in complication outcomes between groups. In managing patients after spinal fusion surgery, both groups had similar LOS compared with prior studies of children after spinal fusion surgery. Management by the CCC may confer some outcome benefits for their patients.

PMID: 38288613

5. The relationship between hip displacement, scoliosis, and pelvic obliquity in 106 nonambulatory children with cerebral palsy: a longitudinal retrospective population-based study

Terje Terjesen, Svend Vinje, Thomas Kibsgård

Acta Orthop. 2024 Jan 30:95:55-60. doi: 10.2340/17453674.2024.39915.

Background and purpose: The relationship between hip displacement (HD), pelvic obliquity (PO), and scoliosis in nonambulatory children with cerebral palsy (CP) has not been clearly elucidated. The aims of this population-based study were to examine the prevalence and temporal sequence of these deformities in nonambulatory children with CP and to evaluate how probable it is that severe unilateral HD contributes to development of scoliosis. Patients and methods: This longitudinal study comprised 106 nonambulatory children, enrolled in a surveillance program. Pelvic radiographs for measurements of migration percentage (MP) and PO were taken once a year from the diagnosis of HD. Spine radiographs were taken in patients with clinically detected scoliosis. Radiographic follow-up continued until skeletal maturity. Results: Clinically significant scoliosis (Cobb angle ≥ 40°) occurred in 60 patients at a mean age of 11.8 years. 65 patients developed clinically significant HD (MP ≥ 40%) at a mean age of 4.8 years. 24 patients had no significant hip or spine deformities, 22 had HD only, 17 had scoliosis only, and 43 had both deformities. HD was diagnosed before scoliosis in all except 1 of the patients with both deformities. 14 of 19 patients with severe unilateral HD (MP ≥ 60%) had scoliosis convexity to the opposite side of the displaced hip. Conclusion: The combination of scoliosis and HD was frequent, and HD was diagnosed first in almost all the patients. HD might be a contributory cause of scoliosis in patients with severe, unilateral HD, PO, and later scoliosis with convexity to the opposite side.

PMID: 38288626

6. Musculoskeletal injections for palliative treatment of neuromuscular hip dysplasia patients: how I do it

Jason Zarahi Amaral, Rebecca J Schultz, Scott B Rosenfeld, J Herman Kan

Review Pediatr Radiol. 2024 Jan 30. doi: 10.1007/s00247-024-05858-z. Online ahead of print.

This review describes our institution's standardized technique as well as potential pitfalls for therapeutic steroid injections in children with symptomatic neuromuscular hip dysplasia. Symptomatic, painful neuromuscular hip dysplasia can dramatically affect quality of life. Steroid injections are used to identify the source of perceived pain, temporarily treat pain while awaiting surgical intervention, or for therapeutic management for nonoperative hip joints.

PMID: 38289399

7. Dorsal Rhizotomy in the Pediatric Patient

Gloria Galloway

Review J Clin Neurophysiol. 2024 Feb 1;41(2):134-137. doi: 10.1097/WNP.0000000000001041.

The majority of cases of dorsal rhizotomy surgeries in children are done to improve the spasticity associated with cerebral palsy, and more recent techniques are selective in nature and referred to as selective dorsal rhizotomy (SDR). The techniques applied to selective dorsal rhizotomy surgery has changed since it was first described and continues to undergo modifications. Approaches to surgery and monitoring vary slightly among centers. This article provides a review of the rationale, variety of surgical approaches, and intraoperative neurophysiologic monitoring methods used along with discussion of the risks, complications and outcomes in these surgeries.

PMID: 38306221

8. Immediate application of low-intensity electrical noise reduced responses to visual perturbations during walking in individuals with cerebral palsy

Ashwini Sansare, Maelyn Arcodia, Samuel C K Lee, John Jeka, Hendrik Reimann

J Neuroeng Rehabil. 2024 Jan 28;21(1):14. doi: 10.1186/s12984-023-01299-1.

No abstract available

PMID: 38281953

9. Update on the reliability of gait analysis interpretation in cerebral palsy: Inter-institution agreement

Susan A Rethlefsen, Alison Hanson, Eva Ciccodicola, Reiko Hara, Robert M Kay, Hank Chambers, Tishya A L Wren

Gait Posture. 2024 Jan 30:109:109-114. doi: 10.1016/j.gaitpost.2024.01.031. Online ahead of print.

Background: Studies have shown good reliability for gait analysis interpretation among surgeons from the same institution. However, reliability among surgeons from different institutions remains to be determined. Research question: Is gait analysis

interpretation by surgeons from different institutions as reliable as it is for surgeons from the same institution? Methods: Gait analysis data for 67 patients with cerebral palsy (CP) were reviewed prospectively by two orthopedic surgeons from different institutions in the same state, each with > 10 years' experience interpreting gait analysis data. The surgeons identified gait problems and made treatment recommendations for each patient using a rating form. Percent agreement between raters was calculated for each problem and treatment, and compared to expected agreement based on chance using Cohen's kappa. Results: For problem identification, the greatest agreement was seen for equinus (85% agreement), calcaneus (88%), in-toeing (89%), and out-toeing (90%). Agreement for the remaining problems ranged between 66-78%. Percent agreement was significantly higher than expected due to chance for all issues ($p \leq 0.01$) with modest kappa values ranging from 0.12 to 0.51. Agreement between surgeons for treatment recommendations was highest for triceps surae lengthening (89% agreement), tibial derotation osteotomy (90%), and foot osteotomy (87%). Agreement for the remaining treatments ranged between 72-78%. Percent agreement for all treatments was significantly higher than the expected values ($p \leq 0.002$) with modest kappa values ranging from 0.22 to 0.52. Significance: Previous research established that computerized gait analysis data interpretation is reliable for surgeons within a single institution. The current study demonstrates that gait analysis interpretation can also be reliable among surgeons from different institutions. Future research should examine reliability among physicians from more institutions to confirm these results.

PMID: 38295485

10. Development of GO Move: A Website for Children With Unilateral Cerebral Palsy

Angela Shierk, Heather Roberts, Youstina Habeeb, Nigar Dursun, Cigdem Cekmece, Marcin Bonikowski, Weronika Pyrzanowska, Jorge Carranza, Gabriela Granados Garcia, Nancy Clegg, Mauricio R Delgado

OTJR (Thorofare N J). 2024 Jan 28:15394492231225141. doi: 10.1177/15394492231225141. Online ahead of print.

It is unknown if an online tool is wanted by therapists and parents of individuals with unilateral cerebral palsy (UCP) to support implementation of goal-directed home programs, and if wanted, the recommended features for the tool. The objective was to explore the experiences of therapists and parents who have implemented home programs, seek guidance on translating a paper-based home program toolbox into a mobile website, and develop the website. Qualitative descriptive methodology guided data collection using semi-structured interviews and thematic analysis, validated with field notes and member checking. A team science, iterative approach was used to integrate the themes into the development of the mobile website. Five primary themes including recommendations for the functionality, features, content, and naming of the mobile website were identified. Parents and therapists value home programs. Participants provided recommendations regarding content and features, and the GO Move mobile website was developed based on the recommendations.

PMID: 38281146

11. Neurological assessment tool for screening infants during the first year after birth: The Brief-Hammersmith Infant Neurological Examination

Domenico M Romeo, Chiara Velli, Francesca Sini, Elisa Pede, Graziamaria Cicala, Frances M Cowan, Daniela Ricci, Claudia Brogna, Eugenio Mercuri

Dev Med Child Neurol. 2024 Jan 29. doi: 10.1111/dmcn.15871. Online ahead of print.

Aim: To develop a short version of the original Hammersmith Infant Neurological Examination (HINE) to be used as a screening tool (Brief-HINE) and to establish if the short examination maintains good accuracy and predictive power for detecting infants with cerebral palsy (CP). Method: Eleven items were selected from the original HINE ('visual response'; 'trunk posture'; 'movement quantity'; 'movement quality'; 'scarf sign'; 'hip adductor angles'; 'popliteal angle'; 'pull to sit'; 'lateral tilting'; 'forward parachute reaction'; 'tendon reflexes') identifying those items previously found to be more predictive of CP in both low- and high-risk infants. In order to establish the sensitivity of the new module, the selected items were applied to existing data, previously obtained using the full HINE at 3, 6, 9, and 12 months, in 228 infants with typical development at 2 years and in 82 infants who developed CP. Results: Brief-HINE scores showed good sensitivity and specificity, at each age of assessment, for detecting infants with CP. At 3 months, a score of less than 22 was associated with CP with a sensitivity of 0.88 and a specificity of 0.92; at 6, 9, and 12 months, the cut-off scores were less than 25 (sensitivity 0.93; specificity 0.87), less than 27 (sensitivity 0.95; specificity 0.81), and less than 27 (sensitivity 1; specificity 0.86) respectively. The presence of more than one warning sign, or items that are not optimal for the age of assessment, imply the need for a full examination reassessment. Interpretation: These findings support the validity of the Brief-HINE as a routine screening method and the possibility of its use in clinical practice.

PMID: 38287208

12. Development of gross motor capacity and mobility performance in children with cerebral palsy: A longitudinal study

No authors listed

Dev Med Child Neurol. 2024 Mar;66(3):e53-e54. doi: 10.1111/dmcn.15868. Epub 2024 Jan 29.

No abstract available

PMID: 38287480

13. Sleep Quality and Evening Salivary Cortisol Levels in Association with the Psychological Resources of Parents of Children with Developmental Disorders and Type 1 Diabetes

Marija Ljubičić, Sonja Šare, Ivana Kolčić

J Autism Dev Disord. 2024 Feb 1. doi: 10.1007/s10803-024-06269-7. Online ahead of print.

Background: Sleep deprivation can decrease parental well-being and degrade mental and physical health in parents of children with chronic illness. The aim of this study was to explore the associations of sleep quality, psychological stress perception, and evening salivary cortisol concentration with self-esteem, optimism and happiness in parents of children with type 1 diabetes and developmental disorders compared to parents of healthy, typically developing children. Methods: We studied 196 parents of children with chronic conditions, including autistic spectrum disorder (N = 33), cerebral palsy (N = 18), Down syndrome (N = 33), and diabetes mellitus type 1 (N = 40) and parents of healthy children (N = 72). We evaluated parental sleep quality, evening salivary cortisol levels, self-esteem, optimism and happiness. Multiple linear regression models were used to assess associations between variables. Results: Compared with those of the control group, the parents of children with autistic spectrum disorders had higher evening cortisol concentrations ($\beta = 0.17$; $p = 0.038$) and lower perceptions of happiness (β=-0.17; $p = 0.017$), while parents of children with type 1 diabetes had disrupted sleep quality ($\beta = 0.25$; $p = 0.003$). Optimism was negatively associated with the evening cortisol concentration (β=-0.18; $p = 0.023$) and sleep quality index (β=-0.20; $p = 0.012$). Conclusions: Public health programs aimed at lifestyle habit improvement, respite care, and relaxation for parents of children with chronic conditions would be useful for improving parental sleep quality, self-esteem, optimism and happiness.

PMID: 38300504

14. Pain and self-pressure relief in adolescents with cerebral palsy

S Ridilla, H Wang, L Sylvester, S Arnold

Assist Technol. 2024 Jan 30:1-7. doi: 10.1080/10400435.2024.2305972. Online ahead of print.

Adolescents with CP classified as Gross Motor Functional Classification System Level V attend school up to 8 h daily with limited ability to self-reposition. Despite pain reported within this population, perceived pain and self-pressure relief during prolonged classroom sitting is unknown. A case series design was used with a convenience sample of six students (13-18 years) with CP. Pain assessments were taken every 30 min for 5 h. Self-relief assessments using the SensiMATTM were recorded while students were in their wheelchairs. One student self-reported pain and three students proxy reported pain movements. All students had unrelieved pressure or did not self-relieve pressure for at least 1.5 consecutive hours. Four students increased their self-pressure relief movements after 3.5 h. This study provided preliminary data regarding perceived pain and self-pressure relief during prolonged sitting and demonstrated that the SensiMATTM can capture pressure relief movements in sitting of students with severe CP. Although there was no trend of reported pain, students may either be moving enough, as demonstrated by recorded pressure relief movements, to independently relieve pressure and pain, or current pain assessments may not be sensitive enough for those with the most severe disabilities.

PMID: 38289978

15. Predicting Neuromuscular Engagement to Improve Gait Training with a Robotic Ankle Exoskeleton

Karl Harshe, Jack R Williams, Toby D Hocking, Zachary F Lerner

IEEE Robot Autom Lett. 2023 Aug;8(8):5055-5060. doi: 10.1109/lra.2023.3291919. Epub 2023 Jul 3.

The clinical efficacy of robotic rehabilitation interventions hinges on appropriate neuromuscular recruitment from the patient. The first purpose of this study was to evaluate the use of supervised machine learning techniques to predict neuromuscular

recruitment of the ankle plantar flexors during walking with ankle exoskeleton resistance in individuals with cerebral palsy (CP). The second goal of this study was to utilize the predictive models of plantar flexor recruitment in the design of a personalized biofeedback framework intended to improve (i.e., increase) user engagement when walking with resistance. First, we developed and trained multilayer perceptrons (MLPs), a type of artificial neural network (ANN), utilizing features extracted exclusively from the exoskeleton's onboard sensors, and demonstrated 85-87% accuracy, on average, in predicting muscle recruitment from electromyography measurements. Next, our participants completed a gait training session while receiving audio-visual biofeedback of their personalized real-time planar flexor recruitment predictions from the online MLP. We found that adding biofeedback to resistance elevated plantar flexor recruitment by 24 16% compared to resistance alone. This study highlights the potential for online machine learning frameworks to improve the effectiveness and delivery of robotic rehabilitation systems in clinical populations.

PMID: 38283263

16. Selective dorsal rhizotomy using a 3D high definition exoscope

Jia Xu Lim, Wan Tew Seow, Zhi Min Ng, Sharon Y Y Low

Neurosurg Focus Video. 2024 Jan 1;10(1):V17. doi: 10.3171/2023.10.FOCVID23105. eCollection 2024 Jan.

Selective dorsal rhizotomy (SDR) is an established neurosurgical technique for children with spastic diplegia secondary to cerebral palsy. Meticulous intraoperative testing of individual nerve roots with electromyography in tandem with the on-site neurorehabilitation team is recommended for good clinical outcomes. The standard approach requires the neurosurgeons to spend extended time under the traditional operating microscope. In this video, the authors describe the use of a 3D exoscope system for SDR. Overall, the 3D exoscope improves ergonomics and reduces musculoskeletal fatigue for the operating neurosurgeons. Furthermore, it provides excellent visualization of important structures, allowing safe and efficient completion of the procedure. The video can be found here: https://stream.cadmore.media/r10.3171/2023.10.FOCVID23105.

PMID: 38283817

17. The Association between Assisted Reproductive Technologies and Neurodevelopmental Disorders in Offspring: An Overview of Current Evidence

Zhitao Zeng, Zhuoyi Wang, Pengfei Yu, Yuchen Wang, Yuqiang Pei, Yujuan Dai, Yanping Liu, Ye Yang

Review J Integr Neurosci. 2024 Jan 16;23(1):15. doi: 10.31083/j.jin2301015.

The utilization of assisted reproductive technologies (ART) is on the rise, resulting in a growing population of ART-conceived offspring. The health concerns of this unique population have attracted significant attention. During ART procedures, gametes and early-stage embryos are exposed to various non-physiological conditions, such as manipulation, culture media, and cryopreservation, which may disrupt embryonic development and potentially impact the health of offspring. Notably, the potential impact of ART on neurodevelopment and its association with an increased risk of neurodevelopmental disorders (NDD) later in life remains a subject of debate. This review aims to summarize the current research advancements concerning the effects of ART on neurodevelopment, specifically focusing on the evidence of the relationship between ART, epigenetic modifications, and NDD, including autism spectrum disorder, intellectual disability, attention deficit hyperactivity disorder, and cerebral palsy. Future studies should prioritize large sample sizes, rigorous adjustment for confounding factors, and the use of interdisciplinary approaches to effectively monitor the neurodevelopmental outcomes of ART-conceived children.

PMID: 38287848

18. Do children with cerebral palsy dream of electric legs? The effects of robot-assisted gait training

Christopher J Newman

Dev Med Child Neurol. 2024 Feb 1. doi: 10.1111/dmcn.15863. Online ahead of print.

No abstract available

PMID: 38303160

19. Training intensity of robot-assisted gait training in children with cerebral palsy

Ja Young Choi, Li Hua Jin, Min Soo Jeon, Min Hwan Kim, Shin-Seung Yang, Min Kyun Sohn

Dev Med Child Neurol. 2024 Feb 1. doi: 10.1111/dmcn.15834. Online ahead of print.

Aim: We compared three different intensities of robot-assisted gait training (RAGT) for achieving favourable outcomes in children with cerebral palsy (CP). Method: This study was conducted using a randomized controlled, single-blind design. Thirty children (19 males and 11 females; mean age 6 years 1 month, SD 2 years) with CP classified in Gross Motor Function Classification System levels II and III were assigned to three different RAGT intensity groups: high-intensity (fastest walking speed and lowest body weight support [BWS]), low-intensity (slowest speed and highest BWS), and comfortable intensity (intermediate speed and intermediate BWS). The RAGT intervention was performed three times a week for 6 weeks. Outcome measures included the 88-item Gross Motor Function Measure, stability index, spatiotemporal parameters of gait analysis, paediatric functional independence measure, and the Canadian Occupational Performance Measure. Results: The 88-item Gross Motor Function Measure was significantly improved after training in the high-intensity (D Δ8.3 ± 15.6; E Δ3.8 ± 4.1) and comfortable intensity (D Δ2.9 ± 3.1; E Δ1.2 ± 2.0) groups, whereas gait speed was improved in the comfortable intensity group, without statistically significant group differences. Only the low-intensity group showed improvement on the stability index (Δ -0.6 ± 0.9, p = 0.05). Everyday functional performance significantly improved in all three groups, with the comfortable intensity group showing the greatest improvement. Interpretation: Different training intensities produced improvement in different areas; individualized RAGT intensity adjustment is therefore needed based on the rehabilitation goal.

PMID: 38303153

20. Perinatal and childhood outcomes of children born to female cancer survivors in South Korea

Ju Hyun Jin, Tae Mi Youk, Jisun Yun, Ja Yoon Heo

Sci Rep. 2024 Jan 29;14(1):2418. doi: 10.1038/s41598-024-53088-y.

Despite the increasing number of female cancer survivors, uncertainty remains regarding potential adverse health outcomes for their offspring. Comprehensive population-based studies would be invaluable for female cancer survivors in making decisions about their future. This study uses the National Health Information Database to investigate perinatal and long-term outcomes of offspring born to mothers with a history of cancer. In a South Korean cohort of 95,264 women aged 15-40 diagnosed with cancer between 2007 and 2010, we evaluated the outcomes of 15,221 children born to 11,092, cancer survivors. We selected 147,727 women without a history of cancer and 201,444 children as a control group. Our study found that children of female cancer survivors have a significantly higher odds ratio of primary outcomes including preterm birth, low birth weight, neonatal intensive care unit admission, and death. While there was no difference in the rate of death within 1 year of birth between the two groups, the total death rate during the follow-up period was significantly higher in children born to mothers with cancer. After adjusting for gestational age and birth weight, there was no statistically significant increased hazard ratio of secondary outcomes including cancer, chromosomal abnormalities, cerebral palsy, delayed development, epilepsy, language disorder, or hearing impairment.

PMID: 38286860

21. Risk factors for cerebral palsy: Caution with data, and data interpretation

Kate Himmelmann

Dev Med Child Neurol. 2024 Jan 29. doi: 10.1111/dmcn.15872. Online ahead of print.

No abstract available

PMID: 38287484

22. Strategies for addressing the needs of children with or at risk of developmental disabilities in early childhood by 2030: a systematic umbrella review

Tracey Smythe, Nathaniel Scherer, Carol Nanyunja, Cally J Tann, Bolajoko O Olusanya

BMC Med. 2024 Feb 2;22(1):51. doi: 10.1186/s12916-024-03265-7.

Background: There are over 53million children worldwide under five with developmental disabilities who require effective interventions to support their health and well-being. However, challenges in delivering interventions persist due to various barriers, particularly in low-income and middle-income countries. Methods: We conducted a global systematic umbrella review to assess the evidence on prevention, early detection and rehabilitation interventions for child functioning outcomes related to developmental disabilities in children under 5 years. We focused on prevalent disabilities worldwide and identified evidence-based interventions. We searched Medline, Embase, PsychINFO, and Cochrane Library for relevant literature from 1st January 2013 to 14th April 2023. A narrative synthesis approach was used to summarise the findings of the included meta-analyses. The results were presented descriptively, including study characteristics, interventions assessed, and outcomes reported. Further, as part of a secondary analysis, we presented the global prevalence of each disability in 2019 from the Global Burden

of Disease study, identified the regions with the highest burden and the top ten affected countries. This study is registered with PROSPERO, number CRD42023420099. Results: We included 18 reviews from 883 citations, which included 1,273,444 children under five with or at risk of developmental disabilities from 251 studies across 30 countries. The conditions with adequate data were cerebral palsy, hearing loss, cognitive impairment, autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder. ASD was the most prevalent target disability (n = 8 reviews, 44%). Most reviews (n = 12, 67%) evaluated early interventions to support behavioural functioning and motor impairment. Only 33% (n = 10/30) of studies in the reviews were from middle-income countries, with no studies from low-income countries. Regarding quality, half of reviews were scored as high confidence (n = 9/18, 50%), seven as moderate (39%) and two (11%) as low. Conclusions: We identified geographical and disability-related inequities. There is a lack of evidence from outside high-income settings. The study underscores gaps in evidence concerning prevention, identification and intervention, revealing a stark mismatch between the available evidence base and the regions experiencing the highest prevalence rates of developmental disabilities.

PMID: 38302917

23. Factors affecting the health-related quality of life of children with cerebral palsy in Indonesia: a cross-sectional study

Ade Febrina Lestari, Mei Neni Sitaresmi, Retno Sutomo, Firda Ridhayani

Child Health Nurs Res. 2024 Jan;30(1):7-16. doi: 10.4094/chnr.2023.027. Epub 2024 Jan 31.

Purpose: Children with cerebral palsy (CP) and their parents experience various problems that can affect their quality of life. This study examined factors affecting the quality of life of children with CP. Methods: A cross-sectional study was conducted in Yogyakarta, Indonesia, from January to August 2019. The participants were consecutively recruited children with CP aged 2 to 18 years and their parents. Ninety-eight children with CP and their parents, specifically their mothers, were recruited. Children's health-related quality of life (HRQoL) was measured using the Pediatrics Quality of Life Cerebral Palsy. Parental HRQoL and stress were measured using the WHOQOL-BREF and Parenting Stress Index (PSI). Results: Functional level V was the most common category for both Gross Motor Function Classification System (GMFCS) and Bimanual Fine Motor Function (BFMF) (35% and 28%, respectively). Children's mean HRQoL was medium (49.81±20.35). The mean total PSI score was high (94.93±17.02), and 64% of parents experienced severe stress. Bivariate analysis showed that GMFCS, BFMF, number of comorbidities, presence of pain, and parental stress were significantly correlated with the total score for children's HRQoL ($p<.05$). Multiple linear regression analysis ($p<.05$) demonstrated that more severe GMFCS and parental stress were associated with lower mean HRQoL scores in children. Conclusion: Factors including the level of GMFCS and parental stress affected the HRQoL of children with CP. Parental stress management should be included in the comprehensive management of these children.

PMID: 38302268

24. Parents' lived experience of early risk assessment for cerebral palsy in their young child using a mobile application after discharge from hospital in the newborn period

Annemette Brown, Åsa B Tornberg, Inger Kristensson Hallström

Ann Med. 2024 Dec;56(1):2309606. doi: 10.1080/07853890.2024.2309606. Epub 2024 Feb 1.

Introduction: General Movement assessment (GMA) is considered the golden standard for early identification of infants with a high risk of developing cerebral palsy (CP). The aim of this study was to explore parents' lived experience of early risk assessment for CP using a mobile application for home video recording after discharge from hospital stay in the newborn period. Methods: An inductive qualitative design using a hermeneutical phenomenological approach was chosen, and fourteen parents with children at risk of CP were interviewed at home. The hermeneutical phenomenological approach describes humans' lived experiences of a specific phenomenon with a possibility of deeper understanding of the expressed statements. The interviews were analyzed using the fundamental lifeworld existential dimensions as guidelines for describing the parents' lived experience. Results: The overall understanding of the parents' experience was 'Finding control in an uncontrolled life situation'. During the often-long hospitalizations, the parents struggled with loss of control and difficulty in understanding what was going on. The use of the mobile application followed by a swift result made them feel in control and have a brighter view of the future. Conclusions: The findings suggest that the mobile application did not seem to worry the parents. Instead, it provided the parents with a sense of active participation in the care and treatment of their child. The mobile application should be accompanied with clear instructions and guidelines for the parents and details about how and when the result is given.

PMID: 38300887

25. Cerebral Palsy among Children Visiting the Outpatient Department of Pediatric Orthopaedics in a Tertiary Care Centre

Ayushi Awale, Bibek Banskota, Prakash Yadav, Ganga Shakya, Ashok Kumar Banskota

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Introduction: Cerebral palsy is a group of neurological disorders that appear in infancy or early childhood and occur as a result of anomalies in the developing brain that impair the brain's capacity to regulate movement, maintain posture, and maintain balance. Healthcare professionals can better predict the need for the medical, rehabilitative, and support services needed by people with cerebral palsy by using accurate prevalence statistics. The aim of the study was to find out the prevalence of cerebral palsy among children visiting the Outpatient Department of Pediatric Orthopaedics in a tertiary care centre. Methods: A descriptive cross-sectional study was conducted among patients visiting the Outpatient Department of Pediatric Orthopaedics in a tertiary care centre. Data from 1 January 2018 to 31 December 2019 was collected between 25 April 2023 to 5 May 2023 from medical records after obtaining ethical approval from the Institutional Review Committee. Convenience sampling method was used. The point estimate was calculated at a 95% Confidence Interval. Results: Among 6984 children, the prevalence of cerebral palsy was 545 (7.80%) (7.17-8.43, 95% Confidence Interval). The most common type of cerebral palsy was found to be spastic diplegia 219 (40.18%). Conclusions: The prevalence of cerebral palsy among children visiting the Outpatient Department of Pediatric Orthopaedic was found to be higher than in other studies done in similar settings.

PMID: 38289819

26. Association of Neonatal Antibiotic Exposure with Long-Term Growth Trajectory Faltering in Preterm-Birth Children

Yung-Chieh Lin, Chi-Hsiang Chu, Yen-Kuang Lin, Chih-Chia Chen, Li-Wen Chen, Chao-Ching Huang

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Introduction: Preterm neonates often receive a variety of duration of antibiotic exposure during admission. The aim of the study was to evaluate whether neonatal antibiotic exposure is relevant with longitudinal growth problems in preterm-birth children. Methods: This prospective study enrolled 481 infants who were born <32 weeks of gestation, discharged, and longitudinally followed from corrected age (CA) 6-60 months. After excluding 153 infants with blood culture-confirmed bacteremia, necrotizing enterocolitis, severe cerebral palsy, intestinal ostomy, and congenital anomaly, 328 infants were included for analysis. Covariates included perinatal demographics, neonatal morbidities, extrauterine growth restriction, and antibiotic exposure accumulated by term equivalent age. The primary outcome was the anthropometric trajectories in z-score of bodyweight (zBW), body height (zBH), and body mass index (zBMI) from CA 6-60 months. Results: Antibiotic exposure duration was significantly negatively associated with zBW and zBH at CA 6, 12, and 60 months, and zBMI at CA 60 months. Multivariate generalized estimating equation analyses showed antibiotic exposure duration had significantly faltering z-score increment from CA 6 to 60 months in zBW and zBH (adjusted mean [95% CI]; ΔzBW: -0.021 [-0.041 to -0.001], p = 0.042; ΔzBH: -0.019 [-0.035 to -0.002], p = 0.027) after adjustment. Children with neonatal antibiotic exposure duration >15 days were significantly lower in the mean anthropometric zBW, zBH, and zBMI at CA 6, 12, 24, and 60 months compared with children with neonatal antibiotic exposure ≤15 days (all p < 0.01). Conclusions: Growth increments were negatively associated with antibiotic exposure duration in preterm neonates implicating that antibiotic stewardship and growth follow-up for preterm neonates are thus warranted.

PMID: 38286129

27. Case report: Intensive rehabilitation program delivered before and after single-event multilevel surgery in a girl with diplegic cerebral palsy

Alessandra Crecchi, Alessandra Tozzini, Roberta Benedetti, Marco Maltinti, Luca Bonfiglio

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Introduction: Diplegic cerebral palsy (CP) is often associated with musculoskeletal disorders that contribute to worsen walking function. The standard care in these cases is single-event multilevel surgery (SEMLS) followed by rehabilitation. Our aim was to investigate whether a rehabilitation program starting even before SEML could add a benefit with respect to standard postoperative programs considered by previous research. Methods: From 2 months before to 13 months after SEMLS (except for the first month after surgery), the participant underwent a motor training focused on ROM exercises with tactile and kinaesthetic feedback. Walking performance, walking capacity, and quality-of-life were assessed before and after SEMLS at different follow-up times. Results: Walking capacity improved 3 months after SEMLS (i.e., earlier than in current literature) and walking performance improved 12 months after SEMLS (instead of simply returning to baseline as previously reported), with a positive impact on quality-of-life. Conclusions: This case suggests that a rehabilitation program starting even before

SEMLS could add benefits over walking function and quality-of-life of children with diplegic CP compared to postoperative programs only.

PMID: 38283677