Cerebral palsy research news

Monday 11 March 2024

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at cerebralpalsy.org.au/our-research

Professor Nadia Badawi AM
CP Alliance Chair of Cerebral Palsy Research

Subscribe to CP Research News

Interventions and Management

1. Pediatric Spastic Wrist Contractures Can Be Well Managed With Wrist Arthrodesis

Megan Cain, Paige Lemhouse, Cathleen Buckon, Krister P Freese

J Pediatr Orthop. 2024 Mar 7. doi: 10.1097/BPO.0000000000002648. Online ahead of print.

Background: Severe spastic wrist contractures secondary to cerebral palsy (CP) or alike can have significant implications for patient hand function, hygiene, skin breakdown, and cosmesis. When these contractures become rigid, soft tissue procedures alone are unable to obtain or maintain the desired correction. In these patients' wrist arthrodesis is an option-enabling the hand to be stabilized in a more functional position for hygiene, dressing, and general cosmesis, though are patients satisfied? Methods: All children who had undergone a wrist arthrodesis for the management of a severe wrist contracture at Shriners Hospital, Portland between January 2016 and January 2021 were identified (n=23). A chart review was undertaken to obtain data-demographic, operative, clinical, and radiographic. All patients were then contacted to participate in 2 patient-reported outcome questionnaires (74% response agreement), a numerical rating scale (NRS), based on the visual analog scale (VAS) and the disability analog scale (DAS). Results were assessed with the aid of descriptive statistics, means and percentages with the primary focus of determining overall patient satisfaction with the procedure. Results: Twenty-three patients were included in the review, and 74% took part in the prospective survey. Included were 10 patients with hemiplegia, 4 with triplegia, 7 with quadriplegia, 1 with a diagnosis of Rhett syndrome, and 1 with a history of traumatic brain injury. All patients achieved radiologic union by a mean of 8 weeks, and 87% obtained a neutral postoperative wrist alignment. The NRS showed 88% of patients were highly satisfied with their results; specifically, 82% had an improved appearance, 53% improved function, 71% improved daily cares, and 65% improved hygiene. The postoperative DAS score averaged 4.7 of 12 indicating mild disability. When looking at how a patient's diagnostic subtype affected outcome results, patients with triplegia reported less improvement and greater disability on the NRS and DAS, averaging 9.5 (severe disability on the DAS). The GMFCS classification had less correlation with outcomes. Conclusion: Wrist arthrodesis is a good option for the management of pediatric spastic wrist contractures, with limited complications and an overall high patient/carer satisfaction rate. Level of evidence: Level IV-case series.

PMID: 38450641

2. Telehealth Movement-to-Music With Arm-Based Sprint-Intensity Interval Training to Improve Cardiometabolic Health and Cardiorespiratory Fitness in Children With Cerebral Palsy: Protocol for a Pilot Randomized Controlled Trial

Byron Lai, Robert A Oster, Drew Davis, Larsen Bright, Gordon Fisher, Jereme Wilroy, Yumi Kim, Raven Young, Ashley Wright, Tanvee Sinha, James H Rimmer

JMIR Res Protoc. 2024 Mar 5:13:e56499. doi: 10.2196/56499.

Background: Children with mobility disabilities, including those with cerebral palsy, have limited options and limited time to exercise to manage their cardiometabolic health and cardiorespiratory fitness. Regular cardiovascular exercise during childhood is a critical health behavior for preventing health decline in adulthood. Thus, there is an urgent need for accessible,

age-appropriate, convenient exercise modalities in this group. Sprint-intensity interval training (SIT), combined with telehealth procedures, may be ideal for children with disabilities. SIT includes repetitive bouts of maximal exercise effort combined with rest periods, which can be effective in eliciting comparable results to moderate-exercise training with very short training durations. Objective: This phase 1 pilot feasibility randomized controlled trial aims to investigate the potential effects of a 12-week SIT program on indicators of cardiorespiratory fitness and cardiometabolic health among children with cerebral palsy. An ancillary aim is to evaluate the feasibility of the program through several process feasibility metrics. Methods: This study uses a 2-armed parallel group design. A total of 50 physically inactive children with cerebral palsy (aged 6-17 years) will be randomly allocated into 1 of 2 groups: a 12-week SIT or a waitlist control group that continues habitual activity for 12 weeks. The SIT prescription includes 3 tele-supervised sessions per week with 30 repeated sequences of 4 seconds of maximal arm exercise, with active recovery, warm-up, and cooldown periods (for an approximately 20-minute total session). SIT includes guided videos with child-themed arm routines and music. The exercise sessions will be remotely supervised through a web-based videoconference application and include safety monitoring equipment. Outcomes are measured at pre- and postintervention (weeks 0 and 13, respectively). Health outcome measures include peak oxygen consumption (VO2 peak), measured by a graded exercise test; high-sensitivity C-reactive protein and blood insulin, hemoglobin A1c, triglycerides, and cholesterol using a finger stick dried blood spot test; blood pressure, using a sphygmomanometer; and body composition (total mass, total lean mass, tissue % lean, and tissue % fat) using dual x-ray absorptiometry. Feasibility will be evaluated by the following metrics: adverse events or problems experienced throughout the intervention related to participant safety; perceived enjoyment; and recruitment, enrollment, and attrition rates. Results: Recruitment procedures started in November 2023. All data are anticipated to be collected by February 2025. Full trial results are anticipated to be analyzed and submitted for publication by March 2025. Secondary analyses of data will be subsequently published. Conclusions: This trial tests an accessible and low-cost exercise program that leverages principles of high-intensity exercise to provide a convenient program for children with physical disabilities. Knowledge obtained from this study will inform the development of a larger trial for improving the cardiometabolic health, cardiorespiratory fitness, and well-being of children with physical disabilities. Trial registration: ClinicalTrials.gov NCT05619211; https://clinicaltrials.gov/study/NCT05619211.

PMID: 38441939

3. A PRISMA-IPD systematic review and meta-analysis: does age and follow-up improve active range of motion of the wrist and forearm following pediatric upper extremity cerebral palsy surgery?

Amy X Song, Anthony Saad, Lauren Hutnik, Onrina Chandra, Aleksandra McGrath, Alice Chu

Review Front Surg. 2024 Feb 20:11:1150797. doi: 10.3389/fsurg.2024.1150797. eCollection 2024.

Purpose: Surgical treatments such as tendon transfers and muscle lengthening play a significant role in cerebral palsy management,but timing of upper extremity cerebral palsy surgery remains controversial. This study systematically reviews the current literature and investigates the correlation between age at surgery and follow-up time with surgical outcomes in pediatric upper extremity cerebral palsy patients. Methods: A comprehensive search of PubMed, Cochrane, Web of Science, and CINAHL databases was performed from inception to July 2020 and articles were screened using PRISMA guidelines to include full-text, English papers. Data analysis was performed using itemized data points for age at surgery, follow-up length, and surgery outcomes, reported as changes in active forearm and wrist motion. A 3D linear model was performed, to analyze the relationship between age, follow-up length, and surgery outcomes. Results: A total of 3,855 papers were identified using the search terms and a total of 8 studies with itemized patient data (n=126) were included in the study. The studies overall possessed moderate bias according to the ROBINS-I scale. Regression analysis showed that age is a significant predictor of change ($|t| > 2$) in active forearm supination (Estimate = -2.3465, Std. Error = 1.0938, t-value= -2.145) and wrist flexion (Estimate = -2.8474, Std. Error = 1.0771, t-value = -2.643) post-intervention, with older individuals showing lesser improvements. The duration of follow-up is a significant predictor of improvement in forearm supination (Estimate = 0.3664, Std. Error = 0.1797, t-value = 2.039) and wrist extension (Estimate = 0.7747, Std. Error = 0.2750, t-value = 2.817). In contrast, forearm pronation (Estimate = -0.23756, Std. Error = 0.09648, t-value = -2.462) and wrist flexion (Estimate = -0.4243, Std. Error=0.1859, t-value = -2.282) have a significant negative association with follow-up time. Conclusion: These results suggest that there is significant correlation between the age and follow up after surgery with range of motion gains. Most notably, increased age at surgery had a significant negative correlation with select active range of motion postoperative outcomes. Future research should focus on identifying other factors that could affect results of surgical treatment in upper extremity.

PMID: 38444901

4. Pediatric Constraint Induced Therapy: Checking Under the Hood Before Jumping on the Bandwagon

Stephen J Page, Peter Levine

J Pediatr. 2024 Feb 29:113998. doi: 10.1016/j.jpeds.2024.113998. Online ahead of print.

No abstract available

PMID: 38431195

5. Children with bilateral cerebral palsy use their hip joint to complete a step-up task

Vatsala Goyal, Keith E Gordon, Theresa Sukal-Moulton

Front Hum Neurosci. 2024 Feb 20:18:1343457. doi: 10.3389/fnhum.2024.1343457. eCollection 2024.

Performance in stair-climbing is largely associated with disruptions to mobility and community participation in children with cerebral palsy (CP). It is important to understand the nature of motor impairments responsible for making stairs a challenge in children with bilateral CP to clarify underlying causes of impaired mobility. In pediatric clinical populations, sensitive measurements of movement quality can be captured during the initial step of stair ascent. Thus, the purpose of this study was to quantify the lower limb joint moments of children with bilateral CP during the stance phases of a step-up task. Participants performed multiple stepping trials in a university gait laboratory. Outcome measures included extensor support moments (the sum of hip, knee, and ankle sagittal plane moments), hip abduction moments, and their timing. We recruited seven participants per group. We found that peak support and hip abduction moments were similar in the bilateral CP group compared to the typical development (TD) group. We also found that children with bilateral CP timed their peak moments closer together and increasingly depended on the hip joint to complete the task, especially in their more affected (MA) lower limb. Our investigation highlights some underlying causes that may make stair climbing a challenge for the CP population, including a loss of selective voluntary motor control (SVMC), and provides a possible treatment approach to strengthen lower limb muscles.

PMID: 38445098

6. Biomechanical gait parameters change with increasing virtual height in a child with spastic cerebral palsy: A case report

Regine Lohss, Rebecca Winter, Beat Göpfert, Rosa M S Visscher, Morgan Sangeux, Norbert Zentai, Elke Viehweger

Case Reports Clin Case Rep. 2024 Mar 3;12(3):e8548. doi: 10.1002/ccr3.8548. eCollection 2024 Mar.

Virtual height exposure coupled with motion capture is feasible to elicit changes in spatiotemporal, kinematic, and kinetic gait parameters in a child with cerebral palsy and should be considered when investigating gait in real-world-scenarios.

PMID: 38440770

7. The impact of hamstring lengthening on stance knee flexion at skeletal maturity in ambulatory cerebral palsy

Bidzina Kanashvili, Timothy A Niiler, Chris Church, Nancy Lennon, M Wade Shrader, Jason J Howard, Freeman Miller

J Pediatr Orthop B. 2024 Feb 26. doi: 10.1097/BPB.0000000000001174. Online ahead of print.

This study reports the long-term outcomes of hamstring lengthening to treat flexed knee gait in children with ambulatory cerebral palsy (CP) after skeletal maturity. This retrospective longitudinal observational study used instrumented gait analysis (GA) <8 and >15 years old in children with bilateral CP. The primary variable was knee flexion in stance phase. Eighty children (160 limbs) were included; 49% were male, 51% female. Mean age at first GA was 6.0 (SD: 1.2) years and 19.6 (SD: 4.5) years at final GA. Mean follow-up was 13.7 (SD: 4.7) years. Children were classified as Gross Motor Function Classification System I-8, II-46 and III-26. Average Gross Motor Function Measure Dimension D was 72% (SD: 20%). Hamstring lengthenings occurred once in 82, twice in 54 and three times in 10 limbs. From initial to final GA, average knee flexion in stance was unchanged, 27.8° (SD: 14.8°) to final 27.0° (SD: 11.2°; P = 0.54). Knee flexion at foot contact was 39.6° (SD: 13.0°), improving to final GA of 30.7° (SD: 10.6°; P < 0.001). Initial gait deviation index was 65.8 (SD: 31.9), improving to final 78.9 (SD: 28.2; P < 0.001). Older age, males and concomitant plantar flexor lengthening predicted change toward more flexed knee gait. Hamstring lengthening did not lead to back-kneeing gait at maturity while maintaining childhood stance phase knee flexion. A subgroup still developed significant flexed knee gait posture and may have benefited from more aggressive treatment options. This outcome may also be impacted by diverse functional levels, etiologies and treatments of flexed knee gait.

PMID: 38451810

8. Muscle synergy-informed neuromusculoskeletal modelling to estimate knee contact forces in children with cerebral palsy

Mohammad Fazle Rabbi, Giorgio Davico, David G Lloyd, Christopher P Carty, Laura E Diamond, Claudio Pizzolato

Biomech Model Mechanobiol. 2024 Mar 9. doi: 10.1007/s10237-024-01825-7. Online ahead of print.

Cerebral palsy (CP) includes a group of neurological conditions caused by damage to the developing brain, resulting in maladaptive alterations of muscle coordination and movement. Estimates of joint moments and contact forces during locomotion are important to establish the trajectory of disease progression and plan appropriate surgical interventions in children with CP. Joint moments and contact forces can be estimated using electromyogram (EMG)-informed neuromusculoskeletal models, but a reduced number of EMG sensors would facilitate translation of these computational methods to clinics. This study developed and evaluated a muscle synergy-informed neuromusculoskeletal modelling approach using EMG recordings from three to four muscles to estimate joint moments and knee contact forces of children with CP and typically developing (TD) children during walking. Using only three to four experimental EMG sensors attached to a single leg and leveraging an EMG database of walking data of TD children, the synergy-informed approach estimated total knee contact forces comparable to those estimated by EMG-assisted approaches that used 13 EMG sensors (children with CP, n = 3, R2 = 0.95 ± 0.01, RMSE = 0.40 ± 0.14 BW; TD controls, n = 3, R2 = 0.93 ± 0.07, RMSE = 0.19 ± 0.05 BW). The proposed synergy-informed neuromusculoskeletal modelling approach could enable rapid evaluation of joint biomechanics in children with unimpaired and impaired motor control within a clinical environment.

PMID: 38459157

9. Measurement properties of the backward walk test in people with balance and mobility deficits: A systematic review

Jie Hao, Yuqi Pu, Zhengting He, Andréas Remis, Zixuan Yao, Yanfei Li

Review Gait Posture. 2024 Mar 2:110:1-9. doi: 10.1016/j.gaitpost.2024.02.018. Online ahead of print.

Background: Backward walking is an indispensable component of activities of daily living. The backward walk test has been used to assess balance, mobility, and fall risk in different populations. This systematic review aimed to identify and synthesize measurement properties of the backward walk test in people with balance and mobility deficits. Methods: Three bibliographic databases, PubMed, Embase, and Scopus, were searched on June 18th, 2023. Cross-sectional or cohort studies assessing the measurement properties (reliability, validity, responsiveness) of the backward walk test were included. The COSMIN risk of bias checklist was used for methodological quality assessment. Study selection, data extraction, and quality assessment were completed by two reviewers independently and in duplicate. Results: A total of 786 records were identified from three databases. Fourteen studies published from 2019 to 2023 with a total of 853 participants were included. Two studies were rated inadequate in quality assessment, all other studies demonstrated adequate to very good quality. The participants population included patients with cerebral palsy, stroke, multiple sclerosis, Parkinson's disease, fibromyalgia, hip and knee arthroplasty, dementia, and community-dwelling older adults. Good interrater and intrarater reliability, and moderate to good concurrent validity of the backward walk test were demonstrated. Significance: The review demonstrates that the backward walk test appears to be a valid and reliable tool in different patient populations. The 3-meter backward walk time and 3-meter backward walk speed can be used as outcome measures in clinical practice to assess balance and mobility and track progress throughout the course of physical rehabilitation. Future studies with a prospective cohort design are required to provide information regarding the predictive validity of the backward walk test for fall risk assessment.

PMID: 38458049

10. Influence of musculoskeletal pain during gait on kinematics and selective motor control in individuals with spastic cerebral palsy: A pilot study

Gilad Sorek, Marije Goudriaan, Itai Schurr, Simon-Henri Schless

Clin Biomech (Bristol, Avon). 2024 Mar 5:113:106219. doi: 10.1016/j.clinbiomech.2024.106219. Online ahead of print.

Background: Individuals with cerebral-palsy commonly present with altered kinematics and selective-motor-control during gait, and may also experience musculoskeletal pain. This pilot study aims to investigate if the immediate experience of musculoskeletal pain during gait influences kinematics and selective-motor-control in individuals with spastic cerebral-palsy. Methods: Retrospective treadmill-based gait-analysis data for 145 individuals with spastic cerebral-palsy were screened. Participants were asked about experiencing lower-extremity musculoskeletal pain immediately during gait, with 26 individuals (18%) reporting this was the case (pain-group; mean 11.55 ± 3.15 years, Gross-Motor-Function-Classification-System levels I/II/III n = 5/13/8, Uni/bilateral involvement n = 11/15). Of the 77 individuals who did not report any pain, a no-pain group (n = 26) was individually matched. Kinematics were evaluated using the Gait-Profile-Score and spatiotemporal parameters (dimensionless-walking-speed, single-leg-support percentage and step-time). Selective-motor-control was assessed using the Walking-Dynamic-Motor-Control index. Findings: In the pain-group, 58% reported experiencing pain in their more-involved leg, 8% in the less-involved leg and 34% in both legs. Regarding the pain location, 38% of the pain-group reported experiencing pain in multiple locations. On a more specific level, 35%, 46% and 54% reported pain around the hip/thigh, knee/calf and ankle/ft, respectively. No significant differences were observed between the pain and no-pain groups for any of the outcome measures, in each leg or bilaterally. Interpretation: No significant differences in kinematics and selective-motor-control during gait were found between individuals with spastic cerebral-palsy, with and without musculoskeletal pain. This suggests that the individuals in this study may not present with obvious antalgic gait patterns, which may relate to the pre-existing altered kinematics and selective-motor-control.

PMID: 38458003

11. Clinical effects of equine-assisted therapeutic exercises in static and dynamic balance of children with cerebral palsy

A N Stergiou, D N Varvarousis, S Mattila-Rautiainen, M Tzoufi, S Doulgeri, A Ploumis

Rehabilitacion (Madr). 2024 Mar 7;58(3):100841. doi: 10.1016/j.rh.2024.100841. Online ahead of print.

Objective: To evaluate the efficacy of equine-assisted therapy for the static and dynamic balance in the rehabilitation of children and adolescents with cerebral palsy maintaining obtained improvement 8-weeks after the end of the intervention. Method: The study lasted 28 weeks, of which the intervention lasted 12 weeks. Measurements were taken before, in the middle, after the end of the intervention and follow-up after 12 weeks. Paediatric Balance Scale and dynamic plate were used to evaluate the balance. Wechsler Intelligence Scale for Children (3rd edition) was used to assess mental capacity, and the Gross Motor Function Classification System for the assessment of functional capacity for the participants. Exercises on the horseback were individualised for every participant. Results: The study comprised 27 participants with cerebral palsy. Statistically significant improvements were found for the Paediatric Balance Scale ($p<0.001$) and the mean dynamic plate pressure for both feet ($p<0.05$). The Paediatric Balance Scale results remained in the follow-up and were found clinically significant. Conclusions: The results suggest that this type of approach in rehabilitation can be beneficial with clinical significance for improving the motor dysfunctions and quality of life in cerebral palsy.

PMID: 38457869

12. Clinical effects of a novel deep learning-based rehabilitation application on cardiopulmonary function, dynamic and static balance, gait function, and activities of daily living in adolescents with hemiplegic cerebral palsy

Yeongsang An, Seunghwa Min, Chanhee Park

Medicine (Baltimore). 2024 Mar 8;103(10):e37528. doi: 10.1097/MD.0000000000037528.

Background: Adolescents with hemiplegic cerebral palsy undergo conventional physical therapy (CPT) to improve static and dynamic balance, activities of daily living and cardiopulmonary function. To overcome this problem, we developed an innovative deep learning-based rehabilitation application (DRA) to provide a motivational and chaffed platform for such individuals. DRA evaluates the patients' functional abilities and diagnosis an appropriate therapeutic intervention like CPT. Methods: We compared the effects of DRA and CPT on 6-minute walking test (6 MWT), Borg rating of perceived exertion scale, Berg balance scale, functional ambulation category, and modified Barthel index in adolescents with hemiplegic cerebral palsy. A convenience sample of 30 adolescents with hemiplegic cerebral palsy was randomized into either the DRA or CPT group. DRA and CPT were administered to the participants, with each session lasting 30 minutes and apportioned thrice a week for a total of 4 weeks. Results: Analysis of variance was performed and the level of significance was set at $P < .05$. The analysis indicated that DRA showed therapeutic effects on 6 MWT, Berg balance scale, and modified Barthel index compared to CPT. Conclusion: Our results provide evidence that DRA can improve cardiopulmonary function, balance, and activities of daily living more effectively than CPT in adolescents with hemiplegic cerebral palsy.

PMID: 38457533

13. Proteomic changes of botulinum neurotoxin injection on muscle growth in children with spastic cerebral palsy

Xubo Yang, Hongmei Tang, Lu He, Tingting Peng, Jinling Li, Jingbo Zhang, Liru Liu, Hongyu Zhou, Zhaofang Chen, Jingyi Zhao, Yage Zhang, Mengru Zhong, Mingshan Han, Mengqing Zhang, Huiran Niu, Kaishou Xu

Proteomics Clin Appl. 2024 Mar 8:e2300070. doi: 10.1002/prca.202300070. Online ahead of print.

Purpose: The study aims to explore the proteomic profile and specific target proteins associated with muscle growth in response to botulinum neurotoxin A (BoNT-A) treatment, in order to improve spasticity management in children with cerebral palsy (CP). Experimental design: A total of 54 participants provided 60 plasma samples for proteomic analysis. Among them, six children were sampled before and after receiving their first BoNT-A injection. In addition, 48 unrelated children were enrolled, among whom one group had never received BoNT-A injections and another group was sampled after their first BoNT -A injection. Differentially expressed proteins were identified using the data-independent acquisition (DIA) mass spectrometry approach. Gene Ontology (GO), protein-protein interaction network, and Kyoto Encyclopedia of Genes and Genome analysis were conducted to explore the function and relationship among differentially expressed proteins. The expression levels of target proteins were verified by quantitative real-time PCR and western blotting. Results: Analysis identified significant differential expression of 90 proteins across two time points, including 48 upregulated and 42 downregulated proteins. The upregulated thioredoxin, α-actinin-1, and aggrecan, and the downregulated integrin beta-1 may affect the growth of muscles affected by spasticity 3 months after BoNT-A injection. This effect is potentially mediated through the activation or inhibition of PI3K-Akt, focal adhesion, and regulation of actin cytoskeleton signaling pathways. Conclusion and clinical relevance: BoNT

-A injection could lead to a disruption of protein levels and signaling pathways, a condition subsequently associated with muscle growth. This finding might aid clinicians in optimizing the management of spasticity in children with CP.

PMID: 38456375

14. Correction to: The effectiveness of dual task exercise training on balance, mobility, physical performance, and quality of life in children with cerebral palsy: a single-blind randomized controlled trial

İsmail Uysal, Fatih Özden, İsmet Tümtürk, Ahmet İmerci

Published Erratum Ir J Med Sci. 2024 Mar 6. doi: 10.1007/s11845-024-03648-y. Online ahead of print.

No abstract available

Erratum for
The effectiveness of dual task exercise training on balance, mobility, physical performance, and quality of life in children with cerebral palsy: a single-blind randomized controlled trial. Uysal İ, Özden F, Tümtürk İ, İmerci A. Ir J Med Sci. 2023 Sep 30. doi: 10.1007/s11845-023-03530-3. Online ahead of print. PMID: 37777679

PMID: 38443527

15. Pain coping and catastrophizing in youth with and without cerebral palsy

Michael N Vinkel, Gija Rackauskaite, John R Østergaard, Nanna B Finnerup, Mark P Jensen

Observational Study Scand J Pain. 2024 Mar 7;24(1). doi: 10.1515/sjpain-2023-0062. eCollection 2024 Jan 1.

Objectives: The aim of this study is to compare the use of pain coping strategies and pain catastrophizing in youth with and without cerebral palsy (CP), and to examine how these two groups differ with respect to the associations between pain coping, catastrophizing, and measures of psychological function and sleep disturbance. Methods: Twenty-seven individuals with CP and 49 healthy controls aged 15-22 were included in this cross-sectional observational study. Pain was assessed using a semi-structured interviews and participants completed measures of pain coping, pain catastrophizing, psychological function, and sleep. Results: Youth with CP used information seeking and problem solving ($p = 0.003$, Cohen's d (d) = -0.80) and sought social support ($p = 0.044$, $d = -0.51$) less often, and used internalizing as a coping strategy more often ($p = 0.045$, $d = 0.59$) than healthy controls. The use of information seeking and problem solving correlated more strongly with measures of depression ($p = 0.023$, Cohen's f (f) = 0.08) and sleep disturbance ($p = 0.022$, $f = 0.08$), while behavioral distraction correlated more strongly with measures of anxiety ($p = 0.006$, $f = 0.11$) and sleep disturbance ($p = 0.017$, $f = 0.09$) in youth with CP, compared to healthy controls. Conclusions: The study findings raise the possibility that youth with CP may benefit more in terms of psychological function and sleep quality from coping training interventions that focus on behavioral distraction, information seeking, and problem solving. Research to test these ideas in additional samples of youth with CP is warranted.

PMID: 38451484

16. The psychosocial impact of eye-gaze assistive technology on everyday life of children and adults

Maria Andreassen, Maria Borgestig, Helena Hemmingsson

Ann Med. 2024 Dec;56(1):2318397. doi: 10.1080/07853890.2024.2318397. Epub 2024 Mar 5.

Purpose: This study investigates the psychosocial impact of eye-gaze assistive technology (EGAT) in both children and adults with long-term experience using eye-gaze assistive technology in everyday life, as well as the psychosocial impact as related to duration of use. Methods: In this descriptive comparative study, 34 adult and 27 child EGAT users participated in a structured individual interview using the Psychosocial Impact of Assistive Devices Scale (PIADS). Results: The participants' age ranged from 5-74 years, 50% were female and 52% had been diagnosed with cerebral palsy. The EGAT had a positive psychosocial impact on competence, adaptability, and self-esteem among adult and child users. Competence was the only subscale with a higher value for adults ($p = 0.038$), compared to children. The items with the highest impact for the psychosocial aspects were quality of life, ability to participate, and self-esteem. The adults had longer duration of use than children, but for high-, medium -, and low-duration users, the device showed a positive psychosocial impact. Conclusions: Participants considered EGAT to have high positive impacts for participation and quality of life. The study adds new knowledge in that high positive psychosocial impact may be found even among low-duration users of EGAT, which is important to consider for service providers.

PMID: 38442288

17. Status of Identification of Communication Disorder in Children in Current Scenario: A Survey from West Bengal

Nikita Chatterjee, Suman Kumar, Piyali Kundu

Indian J Otolaryngol Head Neck Surg. 2024 Feb;76(1):712-719. doi: 10.1007/s12070-023-04259-2. Epub 2023 Oct 16.

To find the status of age of suspicion and identification availed for children with different communication disorders. This cross-sectional survey study was conducted on 2081 children aged 0.5 to 15 years (mean: 5.41; S.D.: ±3.77) who came to the speech-language diagnostic department of AYJNISHD(D), RC, Kolkata for availing rehabilitation service at the institute. The information was gathered from the parents and caregivers of the children. After detailed evaluation by the interdisciplinary team, the developed 14-item questionnaire was administered, and data were recorded and tabulated. Findings suggested that average age of suspicion of presence of communication problem is 2 years (SD: ±0.98). The suspicion rate increased with increasing age with a saturation in suspicion rate after 5 years. Consultation of a medical professional, primarily an ENT specialist was availed by 2.8 years (SD: ±1.89) of age and 32% of the doctors during the first visit assured the parents not to worry as the child would learn language with age and only 43.4% were referred for rehabilitation. Among them, 42.8% of children were found hearing loss, 24.5% found to have autism spectrum disorder, 20.66% of children were diagnosed with developmental delay, 6.4% were diagnosed with intellectual disability, 4.7% were diagnosed with late language emergence and 0.86% were diagnosed with cerebral palsy. From the findings we can conclude perceived cause of delay in identification is lack of awareness, lack of proper guidance from the primary consultants, and tendency to follow wait-and-watch policy.

PMID: 38440664

18. Adults with cerebral palsy and functional decline: A cross-sectional analysis of patient-reported outcomes from a novel North American registry

Mary E Gannotti, Cristina A Sarmiento, Paul H Gross, Deborah E Thorpe, Edward A Hurvitz, Garey H Noritz, Susan D Horn, Michael E Msall, Henry G Chambers, Linda E Krach

Disabil Health J. 2024 Feb 29:101593. doi: 10.1016/j.dhjo.2024.101593. Online ahead of print.

Background: Adults with cerebral palsy (CP) have unique healthcare needs and risks, including high risk of functional decline. Understanding functional decline is an area of priority for CP research. Objective: Describe factors associated with patient-reported changes in function among adults with CP living in the community. Methods: Cross-sectional analysis of adult patient-reported outcomes collected by the CP Research Network (CPRN) Community Registry. Results: Participants included 263 respondents (76% female (n = 200); mean age 42 years (SD 14); 95% White (n = 249); 92% non-Hispanic (n = 241)). Many reported functional changes, most commonly a decline in gross motor function since childhood (n = 158, 60%). Prevalence of gross motor decline varied significantly by Gross Motor Function Classification System (GMFCS) level ($p < 0.001$), but neither hand function decline ($p = 0.196$) nor communication decline ($p = 0.994$) differed by GMFCS. All types of decline increased with increasing age, with statistically significant differences between age groups ($p < 0.001$ gross motor; $p = 0.003$ hand function; $p = 0.004$ communication). Those with spastic CP (n = 178) most commonly reported gross motor functional decline (n = 108/178, 60.7%). However, the prevalence of gross motor decline did not significantly differ between those with spastic CP and those without spastic CP ($p = 0.789$). Conclusions: Many adults in the CPRN Community Registry reported functional decline, most commonly in gross motor function. Functional decline across domains increased with age. Further research into risk stratification and preventive and rehabilitative measures is needed to address functional decline across the lifespan.

PMID: 38433033

19. NeuroMotion smartphone application for remote General Movements Assessment: a feasibility study in Nepal

Antti Juhani Kukka, Heléne E K Sundelin, Omkar Basnet, Prajwal Paudel, Kalpana Upadhyay Subedi, Katarina Svensson, Nick Brown, Helena Litorp, Rejina Gurung, Pratiksha Bhattarai, Johan Wrammert, Ashish Kc

BMJ Open. 2024 Mar 1;14(3):e080063. doi: 10.1136/bmjopen-2023-080063.

Objectives: To evaluate the feasibility of using the NeuroMotion smartphone application for remote General Movements Assessment for screening infants for cerebral palsy in Kathmandu, Nepal. Method: Thirty-one term-born infants at risk of cerebral palsy due to birth asphyxia or neonatal seizures were recruited for the follow-up at Paropakar Maternity and Women's Hospital, 1 October 2021 to 7 January 2022. Parents filmed their children at home using the application at 3 months' age and the videos were assessed for technical quality using a standardised form and for fidgety movements by Prechtl's General Movements Assessment. The usability of the application was evaluated through a parental survey. Results: Twenty families sent in altogether 46 videos out of which 35 had approved technical quality. Sixteen children had at least one video with approved technical quality. Three infants lacked fidgety movements. The level of agreement between assessors was acceptable (Krippendorf alpha 0.781). Parental answers to the usability survey were in general positive. Interpretation: Engaging parents in screening of cerebral palsy with the help of a smartphone-aided remote General Movements Assessment is possible in the

urban area of a South Asian lower middle-income country.

PMID: 38431302

20. Cerebral palsy of the child in rehabilitation environment: epidemiologic and clinical profile and therapeutic modalities

Rim Maaoui, Souad Karoui, Meriem Hfaidh, Najla Mouhli, Zied Ezzine, Imene Ksibi, Hajer Rahali, Hajer Barakizou, Khouloud Hamdi

Tunis Med. 2023 Jul 5;101(7):642-647.

Introduction: Cerebral palsy (CP) is a group of permanent disorders of the development of movement and posture causing activity limitation. Aim: To evaluate the epidemiological, clinical, and radiological profile of children with CP and to study the therapeutic modalities in daily clinical practice. Method: This was a retrospective, descriptive study, carried out in a physical medicine and rehabilitation department, including all the patients referred with the diagnosis of cerebral palsy between January 2000 and December 2016. We used pre-established records to collect data. The missing data were collected from the files of the pediatric department. To classify cerebral palsy, we used a motor impairment classification, topographic classification according to the affected limb and the GMFCS - ER. Results: Fifty patients were included with a gender ratio of 1.23. The mean age of patients was 7.8 years old. The risk factors for CP were mainly represented by perinatal asphyxia (55%) and prematurity (37%). The spastic form was predominant (74%). Quadriplegia was the most severe clinical form (61%). Neuro-orthopedic deformations were found in 78% of cases. Half of the children had GMFCS score between 1 and 2. Brain MRI lesions were dominated by anoxic-ischemic sequelae (34%). Physical therapy was prescribed for all patients. The most prescribed devices were the dynamic ankle foot orthosis (60%). Baclofen was prescribed in 5% of cases and botulinum toxin injection was performed in 30% of children. Conclusion: The cerebral palsy defines the clinical and functional disorders caused by non-progressive developmental damage to the brain of the infant which requires a multidisciplinary management.

PMID: 38445427

21. Predicting cerebral palsy: The importance of evidence-based screening programs appropriate for low- and middle-income countries

Gemunu Hewawitharana, John Phillips

Dev Med Child Neurol. 2024 Mar 7. doi: 10.1111/dmcn.15902. Online ahead of print.

No abstract available

PMID: 38451743

22. Effect of Placental Transfusion on Long-Term Neurodevelopmental Outcomes in Premature Infants: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

Zi-Ming Wang, Jia-Yu Zhou, Wan Tang, Ying-Ying Jiang, Rui Wang, Lai-Shuan Wang

Pediatr Neurol. 2024 Feb 1:154:20-25. doi: 10.1016/j.pediatrneurol.2024.01.018. Online ahead of print.

Background: The pathophysiology and the potential risks of placental transfusion (PT) differ substantially in preterm infants, necessitating specific studies in this population. This study aimed to evaluate the safety and efficacy of PT in preterm infants from the perspective of long-term neurodevelopmental outcomes. Methods: We conducted a systematic literature search using placental transfusion, preterm infant, and its synonyms as search terms. Cochrane Central Register of Controlled Trials, Medline, and Embase were searched until March 07, 2023. Two reviewers independently identified, extracted relevant randomized controlled trials, and appraised the risk of bias. The extracted studies were included in the meta-analysis of long-term neurodevelopmental clinical outcomes using fixed-effects models. Results: A total of 5612 articles were identified, and seven randomized controlled trials involving 2551 infants were included in our meta-analysis. Compared with immediate cord clamping (ICC), PT may not impact adverse neurodevelopment events. No clear evidence was found of a difference in the risk of neurodevelopmental impairment (risk ratio [RR]: 0.89, 95% confidence interval [CI]: 0.76 to 1.03, P = 0.13, I2 = 0). PT was not associated with the incidence of cerebral palsy (RR: 1.23, 95% CI: 0.59 to 2.57, P = 0.79, I2 = 0). Analyses showed no differences between the two interventions in cognitive, language, and motor domains of neurodevelopment. Conclusions: From the perspective of long-term neurodevelopment, PT at preterm birth may be as safe as ICC. Future studies should focus on standardized, high-quality clinical trials and individual participant data to optimize cord management strategies for preterm infants after birth.

PMID: 38452434

23. Analysis of Traditional Chinese Medicine Symptoms in Children with Spastic Cerebral Palsy: A Data Mining Study

Xing Wang, Fang Pang, Xiao-Gang Du

J Multidiscip Healthc. 2024 Mar 1:17:913-922. doi: 10.2147/JMDH.S451768. eCollection 2024.

Background: Cerebral palsy (CP) ranks as a major cause of motor disabilities in children, with spastic CP making up roughly 70-80% of all CP cases. The primary objective of our study is to identify characteristics of Traditional Chinese Medicine (TCM) symptom of spastic CP, thereby establishing correlations between the TCM symptom and the disease, providing a more scientific theoretical foundation for TCM treatments on spastic CP, enabling a deeper comprehension of clinical interventions, ultimately, improving rehabilitation outcomes in TCM treatment for spastic CP. Methods: We conducted a data mining study on TCM symptom of spastic CP children aged 4-14 years old treated at Xi'an Encephalopathy Hospital Affiliated to Shaanxi University of Chinese Medicine, from October 2021 to March 2023. The medical records of all eligible and complete spastic CP patients were extracted, processed for data cleansing, transformed, and subsequently analyzed to discern distinctive TCM symptom. K-Means Clustering Analysis and Association Rule Analysis were used for data mining. Results: Core symptoms identified for spastic CP encompassed "Motor Dysfunction", "Impaired Speech", "Delayed Development", "Limb Stiffness", "Rigidity in the limbs", "Intellectual Impairment", "Timidity and susceptibility to startle responses", "Muscle Wasting", and "Pale or Dull Complexion". Among the top-ranking associations of symptom, patterns emerge wherein "Motor dysfunction" intertwine with "Impaired speech", "Motor dysfunction" coexist with "Delayed development", and "Impaired speech" are accompanied by "Delayed development". Conclusion: This study identified the core symptom of spastic CP and tentatively suggests that the clinical manifestations of spastic CP are essentially consistent with the TCM pattern "liver exuberance and spleen weakness". This finding has facilitated the preliminary establishment of correlations between TCM pattern differentiation and the disease in medicine. It is anticipated that this correlation will bring tangible benefits to a larger number of children with spastic CP.

PMID: 38445067

24. Psychostimulant Medications for Physical Function and Spasticity in Children With Cerebral Palsy: Protocol for a Randomized Controlled Trial

Mansour Alotaibi, Anwar B Almutairi, Saleh Alhirsan, Afrah Alkazemi, Maha Alharbi, Naif Alrashdi, Ahmad Taqi, Bibi Alamiri, Laura Vogtle, Mohammed M Alqahtani

JMIR Res Protoc. 2024 Mar 5:13:e53728. doi: 10.2196/53728.

Background: Cerebral palsy (CP) is a prevalent nonprogressive disorder that leads to impaired movement (ie, spasticity), posture, and balance, which affects functions such as walking and upper extremity tasks. Current medical treatments show efficacy in improving motor performance but have considerable side effects. Emerging off-label use of central nervous system (CNS) medications for improving motor performance has shown promising results in children with CP and other populations. Objective: The aim of this study is to describe a protocol for a pilot randomized controlled trial (RCT) to examine the safety, tolerability, and efficacy of methylphenidate (MPH) and modafinil on spasticity and motor performance in children with CP. Methods: This will be a protocol study for a pilot, triple-masked, placebo-controlled RCT (a class I trial following the American Academy of Neurology criteria) with blinded patients, outcome assessors, and intervention delivery team. Eligible children should be diagnosed with CP levels I or II based on the Gross Motor Function Classification System and be aged between 7 and 12 years. Thirty-six children with CP will be randomized into 3 groups to receive (1) MPH (2.5 mg of MPH + 100 mg placebo), (2) modafinil (100 mg modafinil + 2.5 mg placebo), or (3) a placebo (2.5 mg placebo + 100 mg placebo), in addition to physical therapy for 12 weeks. Primary outcomes include the Gross Motor Function Measure-66 and the Modified Ashworth Scale. Secondary outcomes include the Timed Up and Go test, 5 Time Sit to Stand test, Modified Clinical Test for Sensory Interaction of Balance, and 10-Meter Walk Test. Results: The protocol has been accepted by Kuwait University (VDR/EC-225) and the Ministry of Health of Kuwait (2022/2157). The inclusion of participants will start in June 2024. Conclusions: The combination of CNS stimulant medications and controlling for rehabilitation has not been studied yet. The findings of this study may determine if using CNS stimulant medications is beneficial for the reduction of spasticity and improvement of physical function in children with spastic CP. Trial registration: ClinicalTrials.gov NCT05675098; https://clinicaltrials.gov/study/NCT05675098.

PMID: 38441919