Cerebral palsy research news

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Interventions and Management

Interventions and Management

1.Exploring the Link Between Motor Functions and the Relative Use of the More Affected Arm in Adults with Cerebral Palsy

Isabelle Poitras, Jade Clouâtre, Alexandre Campeau-Lecours, Catherine Mercier

Sensors (Basel) . 2025 Jan 23;25(3):660. doi: 10.3390/s25030660.

Individuals with hemiparetic cerebral palsy (CP) exhibit reduced use of their more affected (MA) arm, yet the factors that influence its use during activities of daily living remain elusive. The objectives of this study were to describe the relative use of the MA arm during an ecological task, examine its relationship with the level of impairment, and investigate its association with performance in various unilateral and bilateral tasks.
Methods: Participants took part in two sessions comprising robotic assessments and clinical assessments of motor functions, as well as accelerometry measurement during kitchen tasks. Four variables were derived from accelerometry data. Stepwise regression analyses were used to identify the best contributors to the accelerometry variables among robotic and clinical assessments.
Results: Nineteen adults with CP (34.3 years old ± 11.5; MACS I = 7, II = 6, III = 6) were included. The Use Ratio measured during the kitchen tasks ranged between 0.10 and 0.63. The best predictors of all accelerometry metrics were two bilateral assessments (r2 = 0.23-0.64).
Conclusions: The importance of assessing bilateral tasks was reaffirmed by the key role played by two bilateral tasks in determining the relative use of the MA arm. The results support the use of intensity-based accelerometry metrics to measure MA arm use.
PMID: 39943298

2.Barriers, Facilitators, and a Proposed Model of Care for Implementation of Upper Limb Distributed Practice Approaches for Children with Unilateral Cerebral Palsy

Emma Taylor, Susan Greaves, Brian Hoare

J Clin Med . 2025 Jan 30;14(3):924. doi: 10.3390/jcm14030924.

Abstract
Background/Objectives: There is high-level research evidence supporting task-focused upper limb therapy models for children with unilateral cerebral palsy (CP). However, a knowledge gap exists in understanding how to effectively implement distributed practice approaches in clinical practice and the effect on the development of bimanual performance. This study aims to evaluate clinical outcomes, examine key considerations for implementation outcomes, and propose a Model of Care for children with unilateral CP. Methods: A mixed-methods approach was applied, including a retrospective case series with an observational descriptive design. A convenience sample of nine children (<5 years of age) with unilateral CP who received multiple blocks of distributed, evidence-based upper limb therapy approaches between 2014 and 2020 were included. Outcomes were evaluated using the Assisting Hand Assessment family of assessments. A Model of Care framework was informed by the Updated Consolidated Framework for Implementation Research and the Conceptual Model for Implementation Research. Results: A total of 59 blocks of upper limb therapy (10 mCIMT and 49 bimanual therapy) were delivered, ranging from two to nine blocks (mean = 6.6) for each child. All children demonstrated improved outcomes in bimanual performance with an average change of 14 AHA units (range 1-22). Barriers to implementation included complexity and cost. Facilitators included the evidence base and adaptability of the approaches that allowed clinicians to respond to an individual child and family's needs. Informed by evidence-based protocols and visual analysis of data, and in consideration of the barriers and/or facilitators to implementation from this study, a Model of Care for implementation of upper limb distributed practice approaches for children with unilateral CP in clinical practice is proposed. Conclusions: Implementing repeated, distributed blocks of evidence-based upper limb therapy in a clinical setting for children with unilateral CP led to incremental improvements in bimanual performance. There are a range of barriers and facilitators to the implementation of distributed practice approaches in clinical practice. The Model of Care outlines best practice care and service delivery for children with unilateral CP and their families and aims to support clinical practice and the future examination of implementation-effectiveness in practice.
PMID: 39941595

3.Development of a decision aid for Australian carers of children with cerebral palsy and their community clinicians, about selective dorsal rhizotomy surgery

Jennifer A Lewis, Kirsty Stewart, Simon P Paget, Neil Wimalasundera, Meredith Wynter, Joshua R Zadro, Carissa Bonner, Marnee J McKay

Disabil Rehabil. 2025 Feb 11:1-8. doi: 10.1080/09638288.2025.2463637. Online ahead of print.

Purpose: Develop and user-test a patient decision aid about selective dorsal rhizotomy (SDR) surgery for carers of children with cerebral palsy (CP) and clinicians treating children with CP.
Method: This study utilised a mixed-methods design. Stage One developed the prototype. Stage Two recruited carers and clinicians to focus groups/semi-structured interviews to review the prototype. Stage Three was an iterative cycle of redrafts based on feedback from Stage Two and input from the SDR Advisory and Consumer Groups. Stage Four assessed acceptability of the SDR Decision Aid via questionnaire.
Results: A prototype SDR decision aid was developed and reviewed by 13 clinicians and 8 carers. Five themes were identified: (1) positive and (2) constructive feedback on the presentation; and additional information considered important for future end-users regarding (3) rehabilitation, (4) lived experience, and (5) selection processes. The final version of the SDR Decision Aid was rated highly acceptable by carers and clinicians, based on length, amount of information provided, and usefulness in clinical settings. Participants indicated they would recommend the decision aid to others seeking information about SDR.
Conclusion: The SDR Decision Aid is an acceptable and valuable tool for helping parents discuss SDR as a treatment option with their clinicians.
Plain language summary
Selective dorsal rhizotomy (SDR) is a neurosurgical procedure performed to reduce spasticity in the lower limbs of children with bilateral spastic cerebral palsy (CP).There are limited accessible, evidence-based, reliable resources to educate families and clinicians about SDR in Australia.This gap was addressed through a co-design process to develop an SDR Decision Aid.Acceptability testing found that the SDR Decision Aid is an acceptable and valuable tool in initiating discussions to facilitate shared decision-making about SDR as a treatment option for children with CP.
PMID: 39935063

4.Muscle physiology and the science of tone agents

Joshua Vova

Review Pediatr Res . 2025 Feb 10. doi: 10.1038/s41390-025-03918-0. Online ahead of print.

Abstract
Cerebral Palsy (CP) encompasses a spectrum of permanent motor disorders stemming from early insults to the developing brain, resulting in alterations in muscle tone. While spasticity and dystonia are common motor disorders in CP, non-neural factors such as changes in muscle architecture contribute to muscle stiffness. Muscle stiffness in CP involves changes in muscle morphology and structure. Current treatments, such as botulinum toxin, have limitations, leading to exploration of alternative techniques like cryoneurolysis, hyaluronidase, and extracorporeal shockwave therapy. This brief review advocates for a comprehensive approach that considers both muscular and neurologic components of hypertonia, emphasizing the need for further research on cellular-level changes contributing to muscle stiffness. IMPACT: This review highlights the gap in current literature regarding the complex interplay between neural and non-neural factors in muscle stiffness and hypertonia in children with cerebral palsy (CP). While spasticity and dystonia are well studied, the review emphasizes the need for interventions addressing muscle morphology and extracellular matrix stiffness. It introduces emerging therapies like cryoneurolysis, hyaluronidase, and extracorporeal shockwave therapy, calling for more research on their long-term efficacy and safety.
PMID: 39930248

5.Gross Motor Function Measure-66 Item Sets for use with infants and toddlers at high risk for cerebral palsy: Construct validity and responsiveness

Natalie A Koziol, Christiana D Butera, Lin-Ya Hsu, Silvana Alves Pereira, Stacey C Dusing

Dev Med Child Neurol . 2025 Feb 14. doi: 10.1111/dmcn.16259. Online ahead of print.

Aim: To evaluate the construct validity and responsiveness of the Gross Motor Function Measure-66 Item Set (GMFM-66-IS), a standardized criterion-referenced observational measure, for use with children younger than 24 months with or at high risk for cerebral palsy (CP).
Method: Non-experimental integrative data analysis was performed on secondary data from three clinical trials involving children with or at high risk for CP (n = 79, 42 males, mean corrected age = 11.3 months [SD = 4.9]), and one observational study of typically developing children (n = 32, 14 males, mean age = 5.7 months [SD = 0.8]). The GMFM-66-IS and comparator instrument (gross motor subtest from the Bayley Scales of Infant and Toddler Development, Third Edition [Bayley-III] or Bayley Scales of Infant and Toddler Development, Fourth Edition [Bayley-4], depending on the study) were administered at baseline and 3 months later. Comparator groups were based on neurological impairment, clinical rating of gross motor change, and CP status. Correlations (r) and regression-adjusted standardized mean differences (Hedges' g) were computed.
Results: GMFM-66-IS and Bayley scores were correlated at baseline (r = 0.83), 3 months later (r = 0.88), and across time (r = 0.83). Children with mild impairment had higher mean GMFM-66-IS scores at baseline (g = 0.87) and 3 months later (g = 0.95). Children rated as demonstrating greater than expected gross motor change had larger mean GMFM-66-IS change scores than children demonstrating less than expected change (g = 0.62). Typically developing children had larger mean GMFM-66-IS change scores (g = 1.00).
Interpretation: GMFM-66-IS scores were supported by evidence of strong construct validity and moderate responsiveness.
PMID: 39951388

6.Is the GMFM-66 Item Set optimal to measure progress in young infants at high risk of cerebral palsy?

Virginia Knox

Dev Med Child Neurol . 2025 Feb 14. doi: 10.1111/dmcn.16261. Online ahead of print.

No abstract available
PMID: 39951383

7.Spatiotemporal characteristics of gait when walking on an uneven surface in children with cerebral palsy

Cloé Dussault-Picard, Yorsa Cherni, Philippe C Dixon

Sci Rep . 2025 Feb 10;15(1):4912. doi: 10.1038/s41598-025-89280-x.

Abstract
For children with cerebral palsy (CP), walking on uneven surfaces (US) is a challenging task essential for their engagement in their daily lives. This study aims to compare spatiotemporal parameters of multiple domains of walking (pace, rhythm, stability, variability) in children with spastic CP between gait on an uneven surface (US) and an even surface (ES) and assess differences against their typically developing (TD) peers. A total of 34 children (17CP/17TD) walked at a self-selected speed on an US and an ES. Gait speed, stride length, stride time, walk ratio, cadence, double and single support time, and stride width were calculated. For each parameter, stride-to-stride variability was calculated using the coefficient of variation. A 2-way ANOVA (group, surface) was conducted on each parameter. Stride width, and variability of gait speed, cadence, and walk ratio presented a group × surface interaction ($p \leq 0.042$). Post-hoc tests revealed a greater stride width, and variability of gait speed, and walk ratio in the CP, compared to the TD group ($p \leq 0.005$) only on an US, and on both surfaces for cadence variability ($p = 0.017$). Gait analysis on an US reveals gait changes in children with CP, highlighting the importance of using more ecological approaches for gait assessment.
PMID: 39929957

8.The Effectiveness of Physical Activity and Nutrition Interventions for Children and Adolescents With Cerebral Palsy to Improve Physical Health and Cognitive Outcomes: A Systematic Review

Jo Cossington, Shelly Coe, Liana Nagy, Thomas Mitaras, Helen Dawes

Review Pediatr Exerc Sci . 2025 Feb 13:1-11. doi: 10.1123/pes.2024-0068. Online ahead of print.

Purpose: Using systematic review methodology, we set out to describe the evidence for physical activity and nutrition interventions for children and adolescents with cerebral palsy (CP) as compared with no intervention or exposure that reports physical health and cognitive outcomes.
Method: Quantitative, primary studies that explored the effectiveness of these interventions, replicable in school and home contexts, in comparison to any other or no intervention or exposure in children and adolescents between the ages of 6-18 years old with a diagnosis of cerebral palsy were included (PROSPERO CRD42022322143). Risk of bias was assessed by Joanna Briggs Institute and QualSyst.
Results: A total of 16 international heterogeneous studies (13 physical activity and 3 nutrition) with interventions ranging from a single exposure to 8 months, with quality 58% to 89% and effectiveness, D = 0.03 to 0.97, were included. Outcome measures were varied.
Conclusion: The review brings together a number of high-quality studies on physical activity and nutrition interventions and promising findings of impact on cardiovascular, musculoskeletal, and cognitive outcomes. Evidence supports implementation of these interventions in community contexts. Future research would benefit from agreement on the use of core outcome measures for meta-synthesis.
PMID: 39947189

9.Effects of Botulinum Neurotoxin on Muscle Mass and Volume in Individuals with Spastic Cerebral Palsy: A Systematic Review and Meta-analysis

Ai-Chieh Lin, Yu-Chi Su, Yu-Ching Lin

Am J Phys Med Rehabil . 2025 Feb 4. doi: 10.1097/PHM.0000000000002705. Online ahead of print.

Objective: To comprehensively survey the impact of botulinum neurotoxin (BoNT) on muscle volume or mass in treating lower limb spasticity in individuals with spastic cerebral palsy (CP).
Design: We searched PubMed, Embase, Web of Science, and the Cochrane Library up to May 15, 2024. We focused on changes in the volume or mass of the gastrocnemius, triceps surae, or entire distal lower limb muscles at various follow-up periods. Meta-regression analysis was conducted to assess the moderating effects of age and gross motor function classification system (GMFCS) level.
Results: Our analysis included 11 cohort studies. A significant decrease in gastrocnemius muscle volume or mass was observed 2 to 3 months post-BoNT treatment (SMD -0.496, 95% CI [-0.810, -0.181]) but not at earlier (SMD -0.134, [-0.397, 0.129]) or later (SMD -0.223, [-1.199, 0.752]) periods. The triceps surae and entire distal lower limb muscles showed no changes. Older patients (P = 0.026) and those with GMFCS I-II levels (P = 0.0191) had more pronounced decreases.
Conclusion: The present study showed a decrease in muscle volume or mass of the BoNT-injected gastrocnemius after a short follow-up period but not in the triceps surae or the distal lower limb in individuals with spastic CP.
PMID: 39938061

10.Pain in adults with cerebral palsy: A systematic review

Jennifer M Ryan, Jessica Burke, Rachel Byrne, Emily Capellari, Adrienne Harvey, Neil E O'Connell, Donna Omichinski, Elisabet Rodby-Bousquet, Mark Peterson; Adult CP Clinical Practice Guideline Working Group

Review Dev Med Child Neurol . 2025 Feb 12. doi: 10.1111/dmcn.16254. Online ahead of print.

Aim: To describe the prevalence and incidence of pain, identify prognostic factors for pain, determine psychometric properties of tools to assess pain, and evaluate effectiveness of interventions for reducing pain among adults with cerebral palsy (CP).
Method: Six databases were searched to identify studies published since 1990 in any language that met eligibility criteria defined for each objective. Titles, abstracts, and full texts were screened by two independent reviewers.
Results: Sixty-three studies were identified; 47 reporting prevalence, 28 reporting prognostic factors, four reporting psychometric properties, five evaluating intervention effectiveness. Pain prevalence ranged from 24% to 89%. Prevalence was higher among adults with CP than in adults without it. Communication function, sex, and age were prognostic factors for pain prevalence. Numerical, verbal, and pictorial rating scales were valid for assessing pain intensity in adults with CP. Pharmacological and surgical interventions had no effect on pain. An active lifestyle and sports intervention reduced pain in adults with CP compared with usual care.
Interpretation: Many adults with CP experience pain, although prevalence estimates vary considerably. The quality of evidence for prognostic factors and interventions is very low to low. There is a lack of evidence about effective pain management among adults with CP.
PMID: 39937705

11.Assessment of Cognition and Language Using Alternative Response Modalities

Kristine Stadskleiv, Katy Latham, Kristina Tufteskog Spanne, Karen Sætre, Anna Fraas, Ilaria Ruscito, Yasmine Taha, Janice Murray

Assessment . 2025 Feb 12:10731911251315012. doi: 10.1177/10731911251315012. Online ahead of print.

Abstract
Assessing cognition and language using standardized tests is challenging when the individual has severe speech and motor impairments. Tests with a multiple-choice format may be adapted without compromising standardization using alternative response modes like partner assisted scanning (PAS) and eye-pointing (EP). Standardization of such assessment is little researched. The study investigates the (a) reliability of, (b) transparency of, and (c) adherence to assessment protocols using PAS and EP. The participants were students from special needs education and speech and language therapy, who worked in dyads (n = 39). Two observers recorded a number of errors made in protocol delivery, independently of each other. The dyads made between 0 and 81.5 errors. Number of errors was not related to response mode, $t(38) = -0.21$, $p = .839$. The observers were in high agreement, with an intraclass correlation coefficient of .97, $p < .001$. The study suggests that assessing language involving alternative modes of responding can be successfully taught to novice practitioners.
PMID: 39936524

12.Vertical Video-based Gait Analysis for Assessment of Transverse Plane Motion: Reliability and Validity in a Neuromuscular Population

Ramiro Olleac, Bernardo Centeno, Clara Duffy, Marcos Nuñez, Marcos Crespo, Lucas M Barrios, Jon R Davids, Vedant A Kulkarni

J Pediatr Orthop . 2025 Feb 14. doi: 10.1097/BPO.0000000000002926. Online ahead of print.

Background: In the absence of 3-dimensional gait analysis (3DGA), assessment of transverse plane motion of the lower extremity from sagittal and coronal video has a high degree of error. We propose a standardized method through vertical video-based gait analysis (VVGA) to assess the position of the pelvis and lower extremity in the transversal plane. This study aims to evaluate the reliability and accuracy of VVGA compared with 3DGA for transverse plane kinematics.
Methods: VVGA and 3DGA were obtained simultaneously on subjects between the ages of 6 and 35 referred to a motion analysis center. Gait Deviation Index (GDI) and Gait Profile Score (GPS) were used to estimate overall gait deviation of the subjects. Three raters at different levels of experience performed VVGA on all patients utilizing a standardized technique. Inter-rater and intrarater reliability was calculated using interclass correlation coefficients (ICC). Mean absolute difference (MAD) between VVGA measurements and 3DGA data was calculated for each body-segment.
Results: Twenty-six patients (median age: 12 y, 61.53% male) with neuromuscular disorders participated in the study, with the majority (65%) having cerebral palsy. The mean GDI of the subject group was 80.7 and the mean GPS was 1082, indicating a neuromuscular cohort with significant gait deviations. Inter-rater and intrarater reliabilities were excellent, with ICC ranging from 0.94 to 0.99. The overall MAD between VVGA analysis and 3DGA was 4.90 degrees, indicating a clinically acceptable overall error. Segment-specific errors were 4.63 degrees for pelvis rotation, 5.35 degrees for hip rotation, and 4.70 degrees for foot progression.
Conclusions: VVGA is an accurate and reliable method for assessing the transverse plane position of the pelvis, hip, and foot when utilizing a standardized method of collection and data analysis. Further study is required to assess whether this technique can be used for surgical decision-making or outcome assessment.
PMID: 39949315

13.Early Independent Wheeled Mobility in Children with Cerebral Palsy: A Norwegian Population-Based Registry Study

Anne Kilde, Kari Anne I Evensen, Nina Kløve, Elisabet Rodby-Bousquet, Stian Lydersen, Gunvor Lilleholt Klevberg

J Clin Med . 2025 Jan 30;14(3):923. doi: 10.3390/jcm14030923.

Abstract
Background: The aim was to explore independent wheeled mobility in children with CP, and identify predictors of early independent wheeled mobility and changes over time across birth cohorts. Methods: We included data from the Norwegian Quality and Surveillance Registry for Cerebral Palsy (NorCP) comprising 11,565 assessments of 1780 children born in 2002-2019. Variables included demographic data, Gross Motor Function Classification System (GMFCS) and Manual Ability Classification System (MACS) levels, wheelchair use, and independent wheeled mobility. Cox proportional hazard regression was used to identify predictors for early independent wheeled mobility. Kaplan-Meier survival curves were used to compare birth cohorts. Results: Of 769 (43%) children who used a wheelchair, 511 (67%) had independent wheeled mobility. Two thirds of the children (n = 337) achieved independent wheeled mobility before age 7. Most children with independent wheeled mobility used powered wheelchairs. Children at GMFCS levels III and IV were more likely to reach independent wheeled mobility at an early age. Children at MACS levels III-V had a lower probability of early independent wheeled mobility. The average age of achieving independent mobility decreased from 9.5 to 4.0 years between birth years 2002 and 2019. Conclusions: Two in three children were independent wheelchair users before 7 years of age, and the age of obtaining independent wheeled mobility has decreased over the last 20 years. Children with better hand function were more likely to obtain early independent wheeled mobility. Early intervention programs to promote mobility, development and participation should include powered mobility, adapted steering options, and interventions for hand function.
PMID: 39941594

14.Durability and usability evaluation of a tilt-in-space manual wheelchair for children in India

Abigail Dumm, Ritu Ghosh, Sama Raju, Sureshkumar Kamalakannan, Soikat Ghosh Moulic, Anand Mhatre

Disabil Rehabil Assist Technol . 2025 Feb 14:1-8. doi: 10.1080/17483107.2025.2463552. Online ahead of print.

Abstract
Around 8 million children with functional disabilities in India need postural support wheelchair designs. This study tests the durability and usability of a new tilt-in-space, postural support wheelchair design for children. The International Organization for Standardization (ISO) wheelchair durability testing was followed by a mixed-method observational field with a purposively selected, diverse sample of children aged 3-17 with varying diagnoses needing a tilt-in-space wheelchair in the rural and urban community settings in South India. Children were fitted with appropriate size wheelchairs. Demographic information was collected at baseline. Customized rapid surveys and interviews evaluated usability, use satisfaction, and willingness to buy and use the wheelchair device at the 2- and 12-month follow-up visits. The wheelchair passed ISO durability testing without part failures. Twelve participants (n = 7 boys, n = 5 girls), aged 10.25 ± 2.67 years, reported high to moderate satisfaction of use. During follow-up, caregivers reported improvements in the child's physical function, social interaction, and time spent in the chair. No part failures were reported. Themes were found regarding the inappropriateness of previous wheelchair designs and the benefits for children's growth, function, and participation, as well as burden reduction for caregivers. The participants reported that they would buy the wheelchair for a price range of Rs. 15500-28751 ($186-346). The study results demonstrate the benefits of high-quality and usability of the postural support wheelchair design for children with functional disabilities. Such a design is necessary to promote growth, social skills, and reduced parental burden. Future studies should compare the design with wheelchairs currently prescribed in India.
Plain language summary
CUB is a durable and usable postural support wheelchair for children with intellectual and developmental disabilities in less-resourced settings.Wheelchair service providers and therapists in less-resourced settings are recommended to provide wheelchairs with appropriate features that enable appropriate growth, function, and participation of children with disabilities.Wheelchairs with postural support and tilt-in-space features must be part of wheelchair service provision schemes in less-resourced settings.
PMID: 39951476

15.Selective dorsal rhizotomy long-term effects on functional motility in Jordanian children with spastic cerebral palsy

Yazan E Al-Kharabsheh, Anas Said, Ismail A Ismaiel, Issam Khawaja, Marwan Altaher, Ali Bani-Ahmed, Carmen M Cirstea

Front Neurol . 2025 Jan 29:16:1502451. doi: 10.3389/fneur.2025.1502451. eCollection 2025.

Introduction: Spasticity management in children with cerebral palsy (CP) is a challenge for healthcare providers worldwide. In the US and Europe, treatment options include non-surgical and surgical (i.e., selective dorsal rhizotomy, SDR) procedures, with beneficial effects on functional motility. SDR was introduced in Jordan in 2019. We performed the first assessment of the long-term effects on motor function in Jordanian children with spastic CP (SCP) who underwent SDR.
Methods: A retrospective cohort study of 43 patients (28 boys, 15 girls, mean ± SD age at surgery, 6.2 ± 2.5 years, 67.4% with diplegia, 30.2% quadriplegia, and 2.3% hemiplegia, 97.7% bilateral deficits) who received SDR (42 bilateral) was conducted between 01/01/2019 and 03/01/2023. Gross Motor Function Classification System (GMFCS) and Functional Mobility Scale (FMS) scores were compared before and 12 months after SDR. Sex, age and clinical scores at surgery, and post-SDR surgical treatment were included in the model (IBM SPSS Statistics 29.0).
Results: Clinical scores improved 12 months after SDR: GMFCS decreased by at least one level (in 58.5% of patients), and FMS significantly increased ($p < 0.001$); GMFCS decreased in 77.7% of those with pre-SDR severe impairment vs. 43.5% in moderately to mildly impaired patients. An age sub-analysis demonstrated higher changes in GMFCS in younger children (GMFCS decreased in 46.9% of those aged <10 years old vs. none in those older than 10 years). These findings suggest that younger children (<10 years old) and more impaired (levels IV and V on GMFCS) are likely the best candidates for this procedure. Twelve-month functional improvement was similar in boys and girls (GMFCS decreased in 44.0% of boys vs. 37.5% of girls). Compared to pre-SDR management, all patients continued physiotherapy, less received Botox (by 97.7%), and more received adjunct orthopedic surgeries (32.6% vs. none) after SDR; out of those receiving post-SDR adjuvant surgeries, 50.0% improved GMFCS (compared to 64.0% of those without).
Conclusion: Our data demonstrated SDR's beneficial long-term effects on functional mobility in SCP children, particularly those younger than 10 years and more severely impaired. These findings provide critical information that may aid in identifying "the best" therapeutic window and "the best" candidate for SDR in Jordan.
PMID: 39944546

16.Barriers and Facilitators of Home Programmes in Children With Cerebral Palsy: A Systematic Review and a Metasynthesis

Mª Inmaculada Medina-Valera, Aarón Fernández-Del Olmo, Elena Pinero-Pinto

Review Child Care Health Dev. 2025 Mar;51(2):e70049. doi: 10.1111/cch.70049.

Introduction: One of the treatments with the greater scientific support for children with cerebral palsy (CP) are home programmes (HP). However, its implementation may be complex in some cases. A systematic review was conducted to explore the existing literature on the following question: What are the barriers and facilitators to implementing HP for children with CP?
Material and methods: The articles were extracted from the Web of Science (WoS), Scopus, ERIC, PubMed and CINAHL databases.
Inclusion criteria: articles based on therapies conducted at home, for children with CP aged 0-8 years and their families, published in English and Spanish.
Exclusion criteria: reviews, studies of cases and controls and one-case studies. The risk of bias was assessed through Cochrane tools Risk of Bias (RoB) I, RoB 2 and RoB E.
Results: Twenty-one articles were selected from a total of 1.336, with 523 families and professionals. A qualitative research was carried out through content analysis using inductive coding and subsequent analytical categorization within an interpretative paradigm. Six themes were obtained: participation, personal cost and social support, family impact, training, professional role and efficacy. The quantitative results were analysed descriptively. They address HP research in a superficial manner.
Conclusions: Barriers: lack of time or availability to attend to the children one by one, poor economic and social support networks and sensitive emotional situation. Facilitators: training, adapted treatment objectives, activities within the daily routine and fluid family-professional communication.
Limitation: Only one article could be found that analysed family variables, considering the possible confounding variables.
There is no funding source for this review. Registered in PROSPERO with code number: CRD42023477735.
PMID: 39936229

17.From eligibility to diagnosis: candidacy and the complex journey of cerebral palsy diagnosis within primary care

Jessica Baggaley, Charlotte Seiboth, Tim Rapley, Anna Basu

BMC Pediatr . 2025 Feb 12;25(1):112. doi: 10.1186/s12887-025-05455-5.

Background: Cerebral Palsy (CP) is an umbrella term for a group of permanent postural and movement conditions caused by non-progressive damage to the developing brain. Infants not identified with risk factors for CP around the time of birth are usually referred on from primary care after six months of age, essentially precluding early therapy. Candidacy, a seven-step dynamic theory, describes how individuals negotiate their eligibility for medical attention with themselves, others, and health services. This study aims to explore the CP diagnostic journey for community identified infants using the concept of candidacy.
Methods: Data was combined from two studies: an online survey of caregivers of children with CP about their earliest concerns and diagnosis journeys (n=255), and a series of interviews to support the development of a new tool to facilitate earlier identification of infants with emerging motor difficulties (11 parents, 11 health care professionals [HCPs]). A deductive thematic analysis was used with a semantic, critical realist approach. An initial analysis was framed by the Andersen Model of Total Patient delay, and then conceptualised using Candidacy.
Results: Participants had difficulties identifying whether their child needed medical attention, prompting online searches, and seeking advice from family and friends. HCP adjudications led to immediate or delayed referral, in which families continued their searches, reappearing at services until a referral was made. Once referred, families faced poor operating conditions, such as long waiting times. After learning the diagnosis criteria, participants began making requests for referral and navigated to private services if requests were denied. Participants felt that more information on infant development from a reliable source was needed to support new parents in raising their concerns to aid earlier identification.
Conclusion: Participants identified personal lack of infant development knowledge as being the limiting factor to earlier referral. Further research is needed to develop materials relevant for the UK and to understand General Practitioner perspectives regarding provision of such materials.
PMID: 39939861

18.Coagulation and fibrinolytic system of umbilical venous blood in hyper-coiled umbilical cord: A single center cohort study

Shota Saji, Masatomo Doi, Junki Koike, Nao Suzuki, Junichi Hasegawa

Placenta . 2025 Feb 8:162:9-13. doi: 10.1016/j.placenta.2025.02.003. Online ahead of print.

Introduction: We aimed to clarify whether the coagulation-fibrinolytic system is activated in a hyper-coiled umbilical cord (HCC).
Methods: This prospective cohort study was conducted at a single perinatal center in Japan, including singleton pregnant women who delivered after 37 weeks of gestation between January and July 2024. Umbilical venous blood was collected immediately after birth and before placental delivery. The coagulation and fibrinolytic systems were measured, and variables were compared between patients with and without HCC.
Results: As a variable of cell blood count and hemostatic function, platelet concentration was significantly lower in the HCC group [median (range): 25.5 (17.3-32.1) vs 30.4 (18.5-39.55) x100000/μl, $p = 0.020$]. For coagulation variables, fibrinogen concentration [105 (63-116) vs 137.5 (56-229) mg/dl, $p < 0.001$] and antithrombin III [35 (27-51) vs 47.5 (31-62) %, $p = 0.022$] were significantly lower in the HCC group. Regarding fibrinolytic variables, plasmin inhibitor complex concentration was significantly higher in HCC group [1.3 (1.0-6.9) vs 0.7 (0.3-5.2) μg/ml, $p = 0.036$]; however, plasminogen concentration was significantly lower in HCC group [40 (32-46) vs 50 (25-64), $p < 0.001$].
Discussion: This is the first report where the coagulation-fibrinolytic system in the umbilical venous blood in cases with HCC was demonstrated. Findings reveal an activated coagulation-fibrinolytic system even in cases without severe fetal growth restriction due to HCC after 37 weeks of gestation.
PMID: 39951913

Prevention and Cure

19.Combined therapy of human amnion-derived mesenchymal stem cells and scalp acupuncture alleviates brain damage in a rat model of cerebral palsy

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Background: Cerebral palsy (CP) is a prevalent cause of physical disability in children, often resulting from hypoxic-ischemic encephalopathy, with current therapies often failing to address the underlying pathophysiology. This study aimed to investigate the potential synergistic effects of human amnion-derived mesenchymal stem cells (hAMSCs) combined with scalp acupuncture in a rat model of CP.
Methods: Twenty male Sprague-Dawley rats were randomly divided into four groups: Sham, CP, hAMSCs, and hAMSCs+scalp acupuncture (hAMSCs+AP). The CP model was induced via left common carotid artery ligation. hAMSCs were administered through tail vein injection, followed by scalp acupuncture at Baihui (GV20) and Qubin (GB7) points. Neurobehavioral function was assessed using the Bederson score, and brain tissues were analyzed using hematoxylin and eosin (H&E) staining, TUNEL staining, and RT-qPCR for apoptosis-related genes.
Results: The CP group exhibited significant neurobehavioral deficits and increased apoptosis. Both hAMSCs and hAMSCs+AP treatments improved neurobehavioral function and reduced apoptosis. The combination therapy further decreased apoptosis levels, normalized mRNA expression of Bax, Caspase 9, and Caspase 3, and alleviated histological damage.
Conclusions: The combination of hAMSCs and scalp acupuncture provides a promising treatment for CP, potentially alleviating brain damage through apoptosis regulation. Further studies are required to elucidate the detailed mechanisms and assess clinical feasibility and safety.
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20.Placental pathology is associated with lower quality fidgety movements in preterm infants

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Background: Preterm infants are at risk for neurodevelopmental disabilities later in life, like motor delays and cerebral palsy (CP). The placenta plays a critical role throughout pregnancy, particularly in preterm birth. Our aim is to explore the relation between placental lesions and accurate predictors of neurodevelopmental outcomes in preterm infants.
Methods: Preterm infants (<30 weeks and/or birthweight <1000 g) were included with histopathological examination (according to Amsterdam criteria) of the placentas. We predicted the risk for future possible neurodevelopmental impairment using Prechtl's General Movement Assessment to evaluate fidgety movements (FM) at 3 months post-term. We also calculated the Motor Optimality Score-Revised (MOS-R).
Results: In total 78 infants were included. The gestational age ranged from 24.1 to 32.6 weeks and birth weight was between 550 and 1950 g. The presence of AIUI (ascending intrauterine infection) was significantly associated with absent FMs ($p = 0.034$). Both the presence of fetal and maternal vascular malperfusion (FVM and MVM) were associated with a MOS-R < 23[OR4.58, 95% CI[1.35, 15.55], $p = 0.015$;OR2.55, 95% CI[1.02, 6.64], $p = 0.045$).
Conclusion: AIUI is associated with a higher risk of absent FMs and therefore an increased risk for CP. FVM and MVM are significantly associated with MOS-R < 23, which is predictive of an elevated risk for adverse neurodevelopmental (non-CP) outcomes. This finding supports the hypothesis that impaired neurodevelopment in preterm infants already starts before birth.
Impact: Our article underscores a key message: neurodevelopmental challenges in preterm infants originate prenatally. Our research has identified a significant association between certain placental lesions and a lower quality of fidgety movements, placing these preterm born infants at a high risk for adverse neurodevelopmental outcomes. To our knowledge, this is the first study to investigate the role of placental pathologies and risk of neurodevelopmental outcomes, while using general movements during the fidgety period. We advocate for neonatologists to integrate placental pathology assessments into their treatment strategies for newborns, recognizing its importance in enhancing care outcomes.
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