Cerebral palsy research news

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Interventions and Management

1.Intrathecal baclofen pump versus combined dorsal/ventral rhizotomy for spastic quadriplegia: healthcare cost and complication analysis

Emma Hartman, Marcella Ruppert-Gomez, Amanda Mosher, Kristin Buxton, Ann Morgan, Scellig Stone, Weston T Northam

J Neurosurg Pediatr . 2025 May 16:1-8. doi: 10.3171/2025.2.PEDS24576. Online ahead of print.

Objective: Combined dorsal/ventral rhizotomy (CDVR) has emerged as a tone management option for pediatric patients with cerebral palsy and medically refractory spasticity. However, its costs to the patient and the healthcare system compared with those of an intrathecal baclofen (ITB) pump are understudied. The authors aimed to evaluate ITB and CDVR with respect to healthcare cost, resource utilization, and clinical safety.
Methods: The records for all pediatric patients who underwent ITB pump placement or CDVR at a single institution between 2003 and 2024 were retrospectively reviewed. Hospital and professional charge data, both inpatient and outpatient, as well as clinical data were collected and analyzed.
Results: Seventeen patients underwent CDVR and 392 underwent ITB therapy. There were no clinically significant differences between the two treatment groups in terms of baseline demographics or Gross Motor Function Classification System level, preoperative risk factors, and comorbidities. None of the patients who had undergone CDVR experienced surgical site infection or CSF leakage, whereas 4.1% of patients in the ITB group had surgical site infection and 1.8% had CSF leakage. There were no differences ($p \geq 0.05$) between the treatment groups in terms of mean hospital length of stay (6.5 days) and return to the emergency department or readmission within 30 days, although readmissions were longer in the ITB group (3 vs 0 median days). Accounting for professional and hospital charges for surgery, hospitalization, and follow-up care during the 1st postoperative year, patients in the CDVR group saved a median $7907 relative to those in the ITB group. Over a 10-year period, the projected differential would grow and ITB would ultimately be expected to be 4.6 times more expensive than CDVR, yielding a median cost differential of $182,432 per patient ($p < 0.005$). Additionally, CDVR, as compared to ITB, required less postoperative follow-up, averaging a projected decrease of 15 clinic visits per patient over 10 years, reducing hospital resource utilization, the burden on caregivers, and indirect costs to families associated with lost wages and transport to and from appointments.
Conclusions: CDVR offers significantly decreased healthcare costs and resource utilization relative to ITB. CDVR has a comparable clinical safety and complication profile and deserves further study as an alternative to ITB.
PMID: 40378465

2.Predictors of massive transfusion of allogenic blood products during posterior spinal fusion in patients with cerebral palsy

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Spine Deform . 2025 May 11. doi: 10.1007/s43390-025-01091-2. Online ahead of print.

Purpose: This article aimed to determine modifiable risk factors to prevent massive blood transfusion of blood products (MTBP) during spinal fusion in patients with cerebral palsy.
Methods: Patient data were queried from a prospectively collected multicenter database. Perioperative MTBP was defined as the administration of allogenic blood products equaling at least half (50%) of the patients' preoperative blood volume during the surgical procedure. Univariate and multivariate logistic regression was used for statistical analysis.
Results: Three hundred thirty-three patients were included. Ninety-four percent of patients were Gross Motor Classification System IV and V. The incidence of MTBP was 29.7% (99/333). The lack of antifibrinolytic use was significant at univariate analysis. Preoperative low weight, blood volume loss, hybrid system, and unit rod use remained significant after the adjustment in multivariate analysis. Loss of more than 68% of patient blood volume was the threshold for MTBP. Patients receiving MTBP had increased hospital ($P = 0.006$) and intensive care unit ($P < 0.001$) stays. However, surgical site complications, deep wound infections, and reoperation rate were not different ($P = 0.12$, $P = 0.46$, $P = 0.22$, respectively). There was a significant decrease in MTBP incidence from 2008 (53%) to 2016 (11%) ($P < 0.001$) with routine administration of antifibrinolytics.
Conclusion: The incidence of MTBP in patients with cerebral palsy undergoing PSF during the study period was 29.7% and this rate has decreased over time, making the surgery safer. Optimization of preoperative nutrition status, use of pedicle screw constructs when possible, and use of antifibrinolytics when not contraindicated is recommended to reduce the risk of perioperative MTBP.
PMID: 40349263

3.Neuromusculoskeletal modeling of spasticity: A scoping review

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PLoS One . 2025 May 14;20(5):e0320153. doi: 10.1371/journal.pone.0320153. eCollection 2025.

Introduction: This scoping review aimed to provide an overview of neuromusculoskeletal models used to investigate the mechanisms underlying spasticity and identify issues to be addressed in future models.
Materials and methods: We followed the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) guidelines and searched four bibliographic databases (PubMed, Compendex Engineering Village, IEEE Xplore, and Science Direct). Inclusion criteria were original studies written in English that investigated the underlying mechanisms of spasticity in humans with no age restrictions. Two independent reviewers selected studies.
Results: Eighteen studies met the inclusion criteria. Stroke was the neurological condition addressed by most studies, followed by cerebral palsy. The studies focused mainly on passive tasks with the knee joint as the primary target. All studies considered that spasticity was associated with alterations in the stretch reflex loop. Among the parameters tested by the studies, the reflex gains and thresholds were the parameters that could better represent levels of severity or effects of botulinum toxin type-A treatment. Recent studies proposed that stretching acceleration, muscle force, and force rate could be fed back into the feedback loop besides the muscle length and stretching velocity. However, no consensus was found among them. Finally, it has been that stiffness and viscosity of muscle-tendon-unit are also relevant for describing resistance to passive movement.
Conclusion: In order to provide relevant clinical and physiological information, future modeling should include supraspinal mechanisms in-depth, use image-based data to personalize non-neural parameters, specify models according to etiology and tasks, especially the active tasks of daily life activities.
PMID: 40367071

4.Non-Invasive Brain Stimulation Effectiveness on Gait, Balance, and Motor Functions in Children with Cerebral Palsy: A Systematic Review and Meta-Analysis

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Review NeuroRehabilitation . 2025 May 14:10538135251336924. doi: 10.1177/10538135251336924. Online ahead of print.

Abstract
Background Studies on non-invasive brain stimulation (NIBS) for children with cerebral palsy (CP) have yielded inconsistent findings regarding motor skills. This research will evaluate its efficacy through a systematic review. Method A thorough search was conducted on the PubMed, Cochrane, and ScienceDirect databases, encompassing all trials that examined the impact of NIBS on balance, gait, and motor skills in children with CP. The analysis adhered to PRISMA guidelines. Results The review included 17 trials, 13 assessing NIBS protocols, involving 385 children in the meta-analysis. Pooled analysis showed significant therapeutic effects on gait spatiotemporal outcomes in terms of walking speed (post-transcranial direct current stimulation (tDCS) and repetitive transcranial magnetic stimulation (rTMS) multi-session treatment) and gait cadence (post-tDCS multi-session). In addition, tDCS multi-session showed significant therapeutic effects on standing abilities and mobility functions. However, no significant effect of tDCS on balance, step length, stride length, walking endurance, and GMFM-walking functions. Conclusion This review highlighted the potential benefits of NIBS, particularly tDCS, in improving various motor functions in children with CP, such as walking speed, cadence, and mobility. However, its impact on balance and other gait factors remains inconclusive, indicating the need for further research to optimize NIBS protocols based on updated brain mapping findings.
PMID: 40368372

5.Using Radial Shock Wave Therapy to Control Cerebral Palsy-Related Dysfunctions: A Randomized Controlled Trial [Letter]

Sumyia Mehrin Omar, Aboma Zewude Abdissa, Maryam Mohammed Bashir

Int J Gen Med . 2025 May 7:18:2475-2476. doi: 10.2147/IJGM.S535117. eCollection 2025.

No abstract available
PMID: 40356886

6.Transcranial direct current stimulation and motor function in children with cerebral palsy: A systematic review and meta-analysis

Hyunjoon Kim, Marie M Kelly, Xiwen Su, Claudio L Ferre

Review Dev Med Child Neurol . 2025 May 13. doi: 10.1111/dmcn.16365. Online ahead of print.

Aim: To provide meta-analytical evidence regarding the effects of transcranial direct current stimulation (tDCS) on motor function in children with cerebral palsy (CP) across different stimulation protocols.
Method: Using JBI methodology, we applied a random effects model to quantify motor function changes after tDCS. Moderator analyses examined the impact of electrode polarity and stimulation site. Subgroup analyses evaluated the impact of therapy inclusion and the number of sessions.
Results: tDCS improved motor function in children with CP (Hedges' g = 0.53; 95% confidence interval [CI] = 0.24-0.81). Moderator analyses revealed statistically significant efficacy of anodal tDCS (Hedges' g = 0.73; 95% CI = 0.45-1.02), especially applied to the primary motor cortex (M1) (Hedges' g = 0.81; 95% CI = 0.52-1.11). Subgroup analyses showed tDCS efficacy with (Hedges' g = 0.86; 95% CI = 0.52-1.20) and without therapy (Hedges' g = 0.70; 95% CI = 0.21-1.19), and in single (Hedges' g = 0.85; 95% CI = 0.39-1.31) and multiple sessions (Hedges' g = 0.78; 95% CI = 0.42-1.14). Limb-specific analysis showed positive effects for lower-limb function (Hedges' g = 0.88; 95% CI = 0.50-1.25). When anodal tDCS was applied to the M1, both lower (Hedges' g = 1.02; 95% CI = 0.70-1.35) and upper (Hedges' g = 0.50; 95% CI = 0.16-0.83) limbs showed improvements.
Interpretation: Anodal tDCS, particularly when applied to the M1, may effectively improve motor function in children with CP.
PMID: 40359202

7.Dynamic Task-Related Changes in Electroencephalography Brain Connectivity During a Button-Press Task in Children with and Without Bilateral Cerebral Palsy

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Brain Connect . 2025 May;15(4):162-174. doi: 10.1089/brain.2024.0096.

Background: Cerebral palsy (CP) often affects function of one or both arms. Resting-state magnetic resonance imaging studies identified abnormal neuronal connectivity related to functional deficits in CP, with few studies on dynamic, task-related changes in connectivity. Here, we compare connectivity in participants with CP and typical development (TD) during an upper limb task and relate these to motor performance. Methods: Children with CP (n = 15) and TD (n = 15) performed a button-press task with both arms, while recording 64-channel electroencephalography. Inter- and intrahemispheric connectivity between dominant and nondominant premotor, motor, and sensory regions were examined during rest, movement preparation, and execution using a normalized magnitude squared time-frequency coherence analysis (α-band: 8-12 Hz, β-band: 13-35 Hz, γ -band: 36-85 Hz). Results: The only group differences were in intrahemispheric connectivity during nondominant arm trials, with CP having higher frontal to central connectivity than TD in all frequency bands in the dominant hemisphere and higher central to parietal beta connectivity in the nondominant hemisphere. Significant main effects for period showed most differences between rest and movement phases. Group by period interactions were also only found during nondominant arm trials (interhemispheric: CP coherence increased more during execution in frontal, central, and parietal regions; intrahemispheric: CP coherence decreased less during execution in nondominant and dominant frontal to parietal regions). Clinical and movement scores were moderately related to connectivity in CP, with poorer nondominant arm function significantly correlated with higher inter- and intrahemispheric coherence. Conclusions: Group differences emerged mainly during intrahemispheric nondominant arm trials across frequency bands with higher coherence in CP associated with greater functional limitation. Impact Statement In contrast to assessing brain connectivity with MRI in children with CP, the use of EEG enables the investigation of this during a functional task, and the sample is not limited by head movements that preclude the attainment of high-quality MRI data in many with CP. The finding of increased task-specific intrahemispheric brain connectivity in bilateral CP, the magnitude of which was related to the degree of functional limitations, suggests a new target for rehabilitation as well as a sensitive outcome measure for clinical trials aimed at improving brain and motor function in CP.
PMID: 40366203

8.Between Anxiety and Adaptation: Children's and Parents' Experiences with Botulinum Toxin Treatment in Cerebral Palsy

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J Clin Med . 2025 May 2;14(9):3164. doi: 10.3390/jcm14093164.

Background/Objectives: This study explores how children with cerebral palsy (CP) and their parents experience botulinum toxin type A (BoNT-A) treatment, focusing on emotional and procedural challenges and communication within the triad of children, parents, and healthcare providers. Methods: This qualitative sub-study was conducted within the WE-study, a randomized controlled trial on BoNT-A effects in children with CP. Semi-structured interviews with 20 parents and 18 children (aged 4-15 years, GMFCS I-II) were thematically analyzed. Results: Three themes were identified: Preparing for the treatment, Being in the moment, and Adapting after treatment. Pre-procedural anxiety was common, with children describing nervousness or physical discomfort in the days before the treatment. During the procedure, pain management and sedation choices influenced children's experiences, with healthcare providers being the primary source of information. After treatment, some children experienced temporary walking instability, but most quickly resumed daily activities. Communication primarily occurred between healthcare providers and each party individually, rather than through a triadic interaction. Conclusions: BoNT-A treatment involves both emotional distress and adaptation. Strengthening child-inclusive communication, structured preparation, and collaboration within the triad may improve treatment experiences and better align care with child-centered principles. Future research should explore strategies to enhance child involvement in repeated treatments.
PMID: 40364195

9.The effect of extrinsic feedback on improving functioning in people with congenital and acquired brain injury: a systematic review and meta-analysis

Ivana Bardino Novosel, Jan Christensen, Mie Klarskov Jensen, Jakob Lorentzen

Disabil Rehabil . 2025 May 9:1-14. doi: 10.1080/09638288.2025.2497461. Online ahead of print.

Purpose: Estimating the effect of extrinsic feedback (EF) on functional recovery, functional skill acquisition, and motor learning in individuals with brain injuries.
Method: Systematic review and meta-analysis using databases MEDLINE, EMBASE, PEDro, and Cochrane Central Register of Controlled Trials searched on January 2024. Eligible trials compared motor training with EF provision to no EF provision or with different EF content. Two reviewers independently screened, extracted data, and assessed the risk of bias. Random effects meta-analysis synthesized the results. The certainty of evidence was rated using the GRADE approach.
Results: 51 controlled trials, including 1,451 participants. No significant EF effect for children and teenagers with cerebral palsy (CP). Among adults with stroke, EF showed a large effect on functional recovery (SMD 1.03, 95% CI [0.13; 1.93]) and a moderate effect on motor learning (SMD 0.52, 95% CI [0.35; 0.69]).
Conclusion: High to moderate evidence for a large to moderate effect of EF on functional recovery and motor learning in adults with stroke. Effectiveness for children, adolescents, and adults with congenital and traumatic brain injury lacks evidence. Comprehensive meta-analytic synthesis of different EF content was not possible.
Study registration: PROSPERO CRD42022327646..
Plain language summary
Extrinsic feedback provision significantly improves functional recovery and motor learning in individuals with stroke. The effectiveness of extrinsic feedback for individuals with cerebral palsy and traumatic brain injury is uncertain due to low sample size and other methodological issues The most effective content of extrinsic feedback remains unclear. We provide a mapping of possible content that can be used to tailor extrinsic feedback to meet individual patient needs.
PMID: 40346794

10.Chronic lower back pain in adults with cerebral palsy: Stigma, anxiety, and physical decline

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Dev Med Child Neurol . 2025 May 13. doi: 10.1111/dmcn.16357. Online ahead of print.

Aim: To determine the biopsychosocial factors associated with pain interference and pain intensity in adults with cerebral palsy (CP) and chronic lower back pain (LBP).
Method: This study was a cross-sectional data analysis of a community survey examining function and chronic pain in adults with CP. We examined bivariate relationships and built two regression models with pain interference with general activities and pain intensity as the dependent variables and biopsychosocial factors as explanatory factors.
Results: We included 295 participants (75 males, 203 females, two transgender, 14 non-conforming) with CP and LBP in our analyses. The mean age was 43 years 2 months; 81% were ambulatory and pain was present for mean 17 years 11 months [SD 13 years 5 months]. Ordinary least squares regression models indicated greater pain interference with change in best motor function since childhood (95% confidence interval [CI] = 0.47-1.96; p = 0.002), stigma (95% CI = 0.02-0.15; p = 0.01), and higher anxiety (95% CI = 0.02-0.11; p = 0.01; n = 238; adjusted R2 = 0.17); and greater pain intensity with lower income (95% CI = -1.07 to -0.19; p = 0.01), Hispanic or Latino ethnic group (95% CI = 0.06-2.17; p = 0.04), higher anxiety (95% CI = 0.01-0.06; p = 0.01), and less satisfaction with social roles (95% CI = -0.10 to -0.04; p < 0.001; n = 290; adjusted R2 = 0.16).
Interpretation: These findings emphasize the importance of interpreting chronic pain in the context of biopsychosocial factors, particularly anxiety, stigma, ethnic group, income, satisfaction with social roles, and physical functional decline.
PMID: 40356363

11.The impact of perceived healthcare provider attitudes on planned vs. unplanned pregnancies in people with cerebral palsy

Georgia Condran, Hayley Lipworth-Cohen, Anne Berndl

J Obstet Gynaecol Can . 2025 May 14:102916. doi: 10.1016/j.jogc.2025.102916. Online ahead of print.

Background: For individuals with Cerebral Palsy (CP), the transition from adolescence to adulthood can be particularly difficult. There are misperceptions surrounding the sexuality of people with disabilities; CP is no exception. These may affect discussions with healthcare providers (HCPs).
Study methods: This is part of an online international survey examining reproductive health outcomes of people with CP, designed with the principles of person-centred research. Multiple recruitment techniques were utilized, including partnering with disability organizations to perform snowball and peer recruitment.
Results: 57 pregnancies were included in this analysis, 33 planned and 24 unplanned. 8/24 (33.3%) participants who reported unplanned pregnancies stated their HCP acted negatively/ignored their inquiries about sexual health, compared to 2/33 (6.1%) participants with planned pregnancies (p = 0.007). 11/24 (45.8%) participants with unplanned pregnancies reported negative attitudes toward inquiries about pregnancy planning, compared to 6/33 (18.2%) participants with planned pregnancies (p = 0.02). Those with planned pregnancies reported higher rates of HCPs inquiring whether they were sexually active (32/33 (97.0%) vs. 21/24 (87.5%)) and offering birth control (31/33 (93.9%) vs. 21/24 (87.5%)); however, this is not statistically significant. Sexually transmitted infection screening was offered more frequently to individuals with unplanned pregnancies than those with planned pregnancies (17/24 (70.8%) vs. 16/33 (48.5%)), again not statistically significant.
Conclusion: People with CP appear to have similar risk for unplanned pregnancies as the general population; however, many report negative attitudes from their HCPs toward family planning. Further research is needed to enrich HCP education regarding sexual health in this population.
PMID: 40379256

12.The impact of systematic displacement of the lateral knee marker on gait kinematics using the virtual knee alignment device and the Plug-in Gait model

Lisa Schneemann, Dagmar Linnhoff, Bettina Wollesen, Klaus Mattes, Inke Marie Albertsen

Gait Posture. 2025 May 1:121:129-134. doi: 10.1016/j.gaitpost.2025.04.035. Online ahead of print.

Background: Marker-based motion capture is widely used in clinical gait analysis, but errors due to incorrect marker placement can impact kinematic results. When using the Plug-in Gait model (PiG, Vicon, Oxford, UK) the virtual Knee Alignment Device (vKAD, Prophysics, Kloten, Switzerland) is designed to automatically correct marker displacements on the lateral shank and femur. However, the impact of lateral knee marker displacement on gait kinematics using vKAD has not been studied.
Research question: Does systematic lateral knee marker displacement have a significant effect on the maximum angles of the knee (sagittal, frontal, transverse) and hip joint (transverse) during swing phase when using PiG and vKAD?
Methods: Twelve healthy adults (27.9 ± 7 years, 173.1 ± 9 cm, 68.9 ± 7 kg) underwent gait analysis using PiG and vKAD in five marker placement conditions of the lateral knee marker on both legs. Conditions included the correct anatomical position (reference) and systematic displacements of 1 cm and 2 cm anterior/posterior to the reference. A two-way repeated ANOVA compared maximum joint angles of the knee (sagittal, frontal, transverse) and hip (transverse) during the swing phase between conditions.
Results: All selected joint angles were significantly affected by the marker placement conditions. A 2 cm displacement to the reference position resulted in the following kinematic deviations: hip internal rotation 7°/-11°, knee flexion 2°/-4°, knee varus/adduction 7°/-8°, and knee internal rotation 1°/-4°.
Significance: Even a 1 cm anterior displacement of the lateral knee marker led to an unphysiological knee varus range of motion in the swing phase, overestimation hip internal rotation. These findings have practical implications for researchers and clinicians as they can serve to optimize the knee joint axis and enhancing accuracy of instrumental gait analysis. Improved accuracy, particularly in hip rotation, is crucial for clinicans working with patients like those with cerebral palsy.
PMID: 40367589

13.Automatic detection of human gait events: a simple but versatile 3D algorithm

Théo Vancanneyt, Camille Le Moal, Maxence Blard, Juliette Lenoir, Nicolas Roche, Céline Bonnyaud, Fabien Dubois

J Neuroeng Rehabil . 2025 May 13;22(1):110. doi: 10.1186/s12984-025-01544-9.

Background: Detecting Foot Strike and Foot Off events in human gait, which is cyclic yet variable, consistently requires expert correction. This subjective correction can reduce spatiotemporal parameters, joint kinematic and kinetic accuracy, regardless of the gait event detection algorithm used from the literature. Recently developed methods have combined existing algorithms to better capture this gait variability, using Ground Reaction Forces. However, those methods do not fully account for intra-individual variability, particularly in the case of multiple and simultaneous gait patterns.
Method: We developed a deterministic algorithm called the Multi-Condition algorithm. This algorithm identifies the Foot Strike when the first of the foot markers loses its degrees of freedom and the Foot Off when the last of the foot markers regains its degrees of freedom.
Results: This algorithm was tested on 819 C3D gait files from 9 healthy individuals and 50 individuals with stroke, multiple sclerosis, spinal cord injury, cerebral palsy, polio, neuromuscular disease or amputation. The Multi-Condition algorithm detected both Foot Strike and Foot Off within a range of three frames, which was more accurate and precise than the inter-rater variability of expert correction. Detection of gait events required only a few seconds, regardless of the pathology or gait pattern, even when considering intra-individual variability.
Conclusion: Accurately identifying gait events is the first critical step in providing reliable gait analysis parameters for clinicians. The Multi-Condition algorithm aims to achieve deterministic consensus in the accurate and precise identification of gait events, regardless of the pathology or the gait pattern. To promote its adoption and ongoing testing, the Multi-Condition algorithm is available as an open-access resource.
PMID: 40361153

14.Very low birth weight infant outcomes in a resource-limited setting: a five-year follow-up study

Windhi Kresnawati, Peter John Pandie, Rinawati Rohsiswatmo

Front Pediatr . 2025 May 1:13:1581033. doi: 10.3389/fped.2025.1581033. eCollection 2025.

Background: Preterm birth and very low birth weight (VLBW) remain major contributors to neonatal morbidity and mortality, particularly in low-income settings such as Indonesia, where healthcare resources are limited. In response, the Ministry of Health introduced mentoring programs in 2014, followed by intensive neonatal training initiatives in 2015. These interventions substantially improved survival rates for LBW infants however, they face significant growth and developmental challenges. This study aims to investigate the growth and development of VLBW infants in remote area at five years of age.
Method: Data were collected retrospectively between September 2021 and May 2022 from children born between 2016 and 2017 with VLBW (<1,500 grams) at Biak Regional Hospital, Indonesia. Growth parameters, including stunting and wasting and developmental outcomes such as cerebral palsy, blindness, and developmental impairment or delays were assessed after 5 years of age for follow up assessment.
Results: Among 78 identified infants with VLBW, 54 infants (69.2%) with a gestational age of <34 weeks were discharged alive between 2016 and 2017. Their gestational ages ranged from 27 to 33 weeks, with birth weights between 625 and 1,400 grams. Overall, 12 infants died before reaching one year of age while five died after one year. The 1-year survival rate was 77.8%, while 5-year survival rate was 68.5%. The incidences of stunting, wasting, cerebral palsy, and blindness were 32.1%, 46.4%, 21.4%, and 10.7%, respectively.
Conclusion: The high prevalence of growth and developmental impairments highlights the need for sustained multidisciplinary efforts to improve long-term outcomes for VLBW infants. In resource-limited settings, the focus should extend beyond survival to ensure optimal growth and development of the children.
PMID: 40376624

15.Evaluation of Survival and Neurodevelopment in Neonates Born Very Preterm at a Tertiary Centre in Portugal

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Acta Med Port . 2025 May 2;38(5):288-296. doi: 10.20344/amp.22345. Epub 2025 May 2.

Introduction: Advances in medical care have significantly improved survival rates for preterm infants globally, leading to an increase of population of newborns at neurological risk. Knowledge of gestational age-specific outcomes is essential to guide and provide the best medical care. This study aimed to evaluate the impact of gestational age in mortality and neurodevelopment of very preterm infants. As a secondary objective, we aimed to determine the influence of perinatal factors on the combined outcome of neurodevelopmental impairment or death.
Methods: We conducted a retrospective cohort study of all infants born before completing 32 weeks of gestational age, admitted to the Neonatal Intensive Care Unit in a tertiary maternity hospital in Portugal from 2013 to 2021. Neurodevelopment was assessed at 24 months of corrected age, using Griffiths Mental Developmental Scales II. Moderate to severe neurodevelopment impairment was considered in the presence of at least one of the following criteria: global development quotient < 70, cerebral palsy, severe visual impairment or profound sensorineural deafness.
Results: There were 311 very preterm infants assessed for eligibility, 10.9% neonatal deaths and 11.9% losses to follow-up. Neurodevelopment evaluation was performed on 274 infants, of whom 6.2% (17/274) had moderate to severe neurodevelopment impairment: 7.5% (5/67) born before 28 weeks of gestational age and 5.8% (12/207) between 28 - 31 weeks. Global development quotient < 70 was verified in 4.7% of cases. Cerebral palsy was diagnosed in 3.3%, severe visual impairment in 0.7% and profound sensorineural deafness in 0.7%. The survival rate without moderate to severe neurodevelopment impairment exceeded deaths at 25 weeks and was > 86% from 28 weeks onward. In multivariable logistic regression analysis, gestational age was identified as a protective factor for moderate to severe neurodevelopment impairment or death (aOR 0.81; CI 95% 0.68 - 0.98), whereas male sex (aOR 3.19; CI 95% 1.57 - 6.71) and resuscitation with tracheal intubation (aOR 8.17; CI 95% 3.16 - 20.96) were independent risk factors.
Conclusion: This study reaffirms gestational age as a key determinant of survival and neurodevelopmental outcomes in very preterm infants, with those born before 28 weeks facing higher risks of mortality and severe neurodevelopmental impairments. Understanding local survival rates and neurodevelopmental outcomes is paramount for guiding perinatal decision-making and providing accurate evidence-based counseling to parents of preterm infants.
PMID: 40359121

16.Risk Factor Effects on Neurodevelopment at 2 Years in Very Preterm Children: A Systematic Review

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Pediatrics . 2025 May 15:e2024069565. doi: 10.1542/peds.2024-069565. Online ahead of print.

Context: Various medical and social factors are associated with adverse neurodevelopment in children born very preterm. Analyses accounting for confounders involving representative samples are essential to quantify the effects of different factors.
Objective: We aimed to systematically review the effects of various risk factors on neurodevelopmental impairment (NDI) at 18 to 36 months of age in children born before 32 weeks' gestation.
Data sources: Ovid MEDLINE, Embase, and PubMed were searched for articles up through April 29, 2024.
Study selection: We used geographic or network population cohort studies of children born after January 1, 1990 at less than 32 completed weeks' gestation reporting risk factors and NDI measures at 18 to 36 months old. Studies including less than 50 children, not addressing confounders in the analysis, or comprising nonrepresentative samples were excluded.
Data extraction: Study characteristics, population characteristics, exposure and outcome definitions, effect sizes, and covariates were extracted.
Results: Of 18 012 studies screened, 51 were eligible. Brain injury (intraventricular hemorrhage grade III or IV and/or periventricular leukomalacia) had the highest adjusted odds of moderate-to-severe NDI and its main contributors (moderate-to-severe cognitive or language delay and moderate-to-severe cerebral palsy), followed by neonatal seizures and retinopathy of prematurity (≥stage 3, "threshold disease" or "treated"). Small for gestational age exhibited inconsistent effects, whereas lower maternal age exhibited no effect on the outcomes included.
Limitations: This included an inability to meta-analyze due to factor and outcome definition heterogeneity.
Conclusions: This review illustrates the extent to which risk factors influence the odds of NDI in children born very preterm, finding neurologic morbidities confer the highest risk. We highlight the need for consistent factor and outcome definitions.
PMID: 40368397

17.Experiences and Therapy Needs of Parents With an Infant at High Risk for Development of Unilateral Spastic Cerebral Palsy: A Qualitative Interview Study

Cornelia H Verhage, Maria J C Eijsermans, Madelon Kleingeld, Marjolijn Ketelaar, Jan Willem Gorter, Linda S de Vries 6, Marco van Brussel, Agnes van den Hoogen

J Child Neurol . 2025 May 14:8830738251335052. doi: 10.1177/08830738251335052. Online ahead of print.

Abstract
To understand experiences and therapy needs of parents with an infant with unilateral perinatal brain injury and at high risk for unilateral spastic cerebral palsy in the first year. Patients and Methods: Sixteen parents (from 8 children with unilateral spastic cerebral palsy, 3 without) diagnosed with unilateral perinatal brain injury participated in semistructured interviews. Data were analyzed using thematic analysis. Results: The overarching theme, "an unexpected journey," included 4 subthemes: (1) "A roller coaster start"-stressful initial experiences on a neonatal intensive care unit; (2) "Wishing for a crystal ball"-need for information on (future) development; (3) "Reaching for the stars"-value of therapist guidance in supporting infant development; (4) "Growing seeds of confidence"-increased parental confidence in their child's development and their role. Conclusion: Parents have information needs about their child's (future) neurodevelopment. Physical or occupational therapists provide information, monitor motor progress, and guide parents in supporting development and can offer needed reassurance.
PMID: 40368348

18.Mother's experiences of shame and compassion in the early postnatal period: A thematic analysis

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Midwifery . 2025 May 9:147:104454. doi: 10.1016/j.midw.2025.104454. Online ahead of print.

Background: Mothers are less likely to seek support from maternity care providers who appear critical or judgmental. While compassion from providers can help mitigate the impact of shame, the experiences of shame within a mothers' close support network remains unexplored.
Aim: The aim of the present study was to explore mothers' experiences of shame and compassion within their support networks in the early postpartum period.
Methods: Fourteen mothers were recruited when their babies were approximately 3-months old from a larger Australian study on shame and compassion. A thematic analysis of semi-structured interviews was undertaken.
Findings: Six themes were identified by the authors: (1) unravelling judgment; (2) are you with me or against me?; (3) the voice of doubt: am I failing at this?; (4) when mothering ideals don't work out: managing shame in your village; (5) finding the right kind of support; and (6) weaving kindness into your role as a mother. All mothers, regardless of who shamed them turned towards others who were sensitive, sympathetic, and empathic, to cope with the shame experience.
Discussion: Shame experiences can significantly influence mothers' willingness to access support, impacting their mental health. Maternity care providers can play a critical role in recognising and addressing these dynamics to foster a more supportive environment.
Conclusion: Understanding the complexities of shame and compassion can guide providers in creating compassionate care strategies that better serve mothers during this vulnerable period.
PMID: 40367717

19.Experiences of Parents of Children With Cerebral Palsy Participating in an Online Parenting Course Grounded in Acceptance and Commitment Therapy

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Randomized Controlled Trial Child Care Health Dev . 2025 May;51(3):e70075. doi: 10.1111/cch.70075.

Background: To understand the experiences of parents of children with cerebral palsy (CP) participating in an online parenting course grounded in acceptance and commitment therapy (PACT) from an implementation perspective.
Method: Fifty-five parents from 50 families of children with CP (GMFCS I = 21, II = 15, III = 8, IV = 8, V = 3) participated in this mixed methods study. Families were drawn from 67 families participating in an RCT of PACT. Parents participated in a qualitative interview and gave additional feedback on 10-point Likert scales and open-ended questions via the course platform. The implementation analysis consisted of a thematic analysis as well as descriptive statistics, t-tests and ANOVAs to examine the impact of child age and motor functioning as potential barriers.
Results: Parents reported that they liked both the ACT content and the online format, and the modules were rated highly in the course feedback (7-9 on 10-point Likert scales). Parents reported positive changes for both them and their child. Parents of younger (2-5 years) children rated the videos from Module One Living a Meaningful Life more highly than parents of older (6-10 years) children. There were no other effects of child age or motor functioning.
Conclusion: Overall, parental response to PACT was positive, and child age and motor functioning level were not barriers. The online format of the programme and ACT content were well suited to the needs of this population. In particular, the ACT components of values and mindfulness were found to be particularly relevant. Implementation should focus on understanding that ACT can be psychologically challenging, ensuring that parents who need individualised support for intervention adaptation receive it, providing good support to address technological difficulties and building effective reminders into the intervention protocol.
Trial registration: Australian New Zealand Clinical Trials Registry: ACTRN12616000351415.
PMID: 40356592

Prevention and Cure

20.Novel Approaches to the Treatment of Preterm White Matter Injury through Targeting Remyelination

Bridget E L Ostrem, Dawn Gano

Review Clin Perinatol . 2025 Jun;52(2):289-306. doi: 10.1016/j.clp.2025.02.005. Epub 2025 Mar 26.

Abstract
Preterm white matter injury (WMI) is a common cause of cerebral palsy and cognitive disability after premature birth. Preterm WMI is caused by a differentiation arrest in the oligodendrocyte (OL) lineage, and a failure of myelination. As there are no specific treatments, care is supportive and focused on rehabilitation. However, novel high-throughput screening methods have enabled the identification of "pro-myelinating" compounds that promote OL differentiation and myelination. Many of these compounds stimulate remyelination in animal models and patients with demyelinating disorders. The shared mechanisms of remyelination and developmental myelination suggest that pro-myelinating compounds may have potential utility in preterm WMI.
PMID: 40350212

21.Predicting neurodevelopment in very preterm infants using the Test of Infant Motor Performance

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Background: Infants born very preterm (VPT) are at increased risk of neurodevelopmental impairments. The Test of Infant Motor Performance (TIMP) is an assessment used to evaluate an infant's gross motor skills, however, understanding of its predictive accuracy in VPT infants is limited.
Aims: To determine the accuracy of the TIMP assessed at term equivalent age (TEA), and 3 months corrected age (CA), to identify motor or cognitive impairment at 12 months CA in VPT infants.
Method: This prospective observational cohort study recruited 202 infants born at <31wks gestational age (GA). At TEA and 3 months CA the TIMP was performed. At 12 months CA the following neurodevelopmental assessments were conducted; Alberta Infant Motor Scale (AIMS), Neurological Sensory Motor Development Assessment (NSMDA) and Bayley Scale of Infant and Toddler Development 3rd edition (Bayley III).
Results: The TIMP had higher specificity than sensitivity across all four outcome measures. Using a cut off-of ≤ -0.5 at TEA, TIMP z-scores demonstrated low sensitivity and specificity for motor outcomes on the NSMDA (sensitivity 61 %, specificity 50 %), AIMS (sensitivity 59 %, specificity 50 %) and Bayley III (sensitivity 56 %, specificity 51 %). Area under the curve analyses showed that the TIMP assessed at 3 months had greater accuracy than at TEA in identifying neurodevelopmental impairments at 12 months CA.
Conclusions: The TIMP assessed at TEA and 3 months CA correctly identified the majority of VPT infants without motor and cognitive impairments. However, it missed VPT infants who developed adverse neurodevelopmental outcomes by 12 months CA.
PMID: 40347805