Cerebral palsy research news

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Interventions and Management

1.Effects of telerehabilitation monitored home-based therapies on upper extremity function-related outcomes in children and adolescents with unilateral cerebral palsy: A systematic review

Jibrin Sammani Usman, Thomson Wai-Lung Wong, Shamay Sheung Mei Ng

J Telemed Telecare. 2026 Feb 12. Online ahead of print.

Abstract
Children and adolescents with cerebral palsy (CP) demonstrate proficient function if they can perform all tasks required for daily living. Telerehabilitation (TR) and monitoring can facilitate the execution of home-based (HB) therapies. This systematic review aimed to assess the scientific evidence regarding the effects of TR-monitored HB therapies on outcomes related to upper extremity function in children and adolescents with unilateral cerebral palsy (UCP). Methods Comprehensive searches were conducted across online databases, including the Cochrane Library, EMBASE, PubMed, Web of Science, and PEDro, as well as additional sources, from inception to October 2025. The inclusion criteria encompassed randomized controlled trials, whose risk of bias and methodological quality were evaluated using the Cochrane Risk-of-Bias Tool and the PEDro scale. A narrative synthesis approach was employed for data analysis. Results TR-monitored HB therapies showed positive improvements in hand coordination, dexterity, bimanual hand function, ADL motor and processing skills, occupational performance, and execution of functional goals in children and adolescents with UCP compared with the control interventions. Conclusions Telerehabilitation-monitored HB therapies showed potential to improve upper extremity function-related outcomes in children and adolescents with unilateral cerebral palsy.
PMID: 41678347

2.Early onset scoliosis in syndromic and neuromuscular disorders: A multidisciplinary approach

Aaron J Wey, Alexander J Schüpper, Travis S CreveCoeur, Amer F Samdani

J Clin Orthop Trauma. 2026 Jan 12;73:103345. eCollection 2026 Feb.

Abstract
Children with neuromuscular and syndromic disorders are among the most medically fragile patients in pediatric spine care. Conditions such as cerebral palsy, myelomeningocele, spinal muscular atrophy, neurofibromatosis type 1, Marfan syndrome, and Prader–Willi syndrome carry a high risk of early-onset scoliosis during critical periods of thoracic and pulmonary development. Scoliosis in these populations reflects combined neurologic impairment, connective-tissue fragility, cardiopulmonary compromise, nutritional deficiency, and systemic disease. This review discusses condition-specific clinical and surgical challenges and highlights the essential role of multidisciplinary care. In cerebral palsy, scoliosis risk correlates with motor severity and is exacerbated by respiratory and nutritional issues. In myelomeningocele, neurosurgical and urologic coordination is vital. In spinal muscular atrophy, perioperative care focuses on airway clearance, ventilation, and nutrition. Neurofibromatosis type 1 presents unique challenges including dystrophic scoliosis requiring tailored instrumentation. Marfan syndrome requires collaboration with cardiology and chest-wall specialists due to tissue fragility. Prader–Willi syndrome necessitates careful management of obesity, endocrine dysfunction, and sleep apnea. Multidisciplinary pathways reduce complications, improve consistency, and increase family satisfaction. Comprehensive, coordinated, lifelong care is essential for optimal outcomes.
PMID: 41659021

3.Musculoskeletal pathology in children with infantile cerebral palsy: a new classification system

L M Kessling, R A van Stralen, J J Tolk, H K Graham, E Rutz

Orthopadie (Heidelb). 2026 Feb 11. Online ahead of print.

Abstract
Cerebral palsy (CP) is one of the most common causes of physical disability in childhood. While the Gross Motor Function Classification System (GMFCS) describes motor abilities, a unified classification for musculoskeletal pathologies was lacking. The newly proposed four-stage system—based on the Mercer Rang model—describes the progression of lower limb pathology and supports diagnosis, treatment planning, and research. STAGE 1: Hypertonia: From birth to about 6 years, spasticity and delayed motor development predominate; contractures are rare. Early intervention and spasticity management are the focus. STAGE 2: Contractures: Between ages 4 and 12 years, discrepancies between muscle-tendon length and bone growth cause reduced range of motion. Surgical muscle or tendon lengthening may be indicated. STAGE 3: Bony deformities: Deformities such as increased femoral anteversion or pes valgus occur alongside soft tissue contractures; rotational osteotomies and multilevel surgeries are often required. STAGE 4: Decompensated pathology: After puberty, irreversible deformities and joint degeneration develop. Surgery typically aims at pain reduction or stabilization.
Conclusion: This classification raises awareness of disease progression, supports stage-appropriate treatment selection, and may prevent over- or undertreatment. Early recognition and intervention are crucial to improving long-term musculoskeletal and functional outcomes.
PMID: 41673359

4.Blood flow restriction during walking training in bilateral cerebral palsy (EMBRIN): a pilot feasibility study protocol

Adélie Christiaens, Mickaël Dinomais, Valentine Gilquin, Anthony Coelho, Léna Carcreff, Anthéa Loiez, Josselin Demas

BMJ Open. 2026 Feb 12;16(2):e110636

Abstract
Children with bilateral cerebral palsy (BCP) frequently develop progressive gait impairments driven in part by muscle weakness. Although power training, which involves high-velocity loaded movements, can enhance functional capacity, its substantial physical demands often limit feasibility in this population. Blood flow restriction (BFR) training has emerged as a promising alternative, capable of eliciting comparable physiological benefits while using low-intensity exercise. This study evaluates the feasibility, safety and clinical effects of integrating BFR with treadmill training in children with BCP, an innovative approach that may deliver the advantages of intensive strengthening while reducing physical burden.
This single-centre pilot study uses a double-baseline design with 13 participants with BCP (Gross Motor Function Classification System II-III), aged 8-18. The protocol consists of a 10-week usual care period followed by a 10-week Blood Flow Restriction Treadmill Training (BFR-TT) intervention, with three sessions per week. Feasibility targets were defined as completion of at least 80% of at least 80% of sessions. Safety is monitored through pain scales and adverse events. Outcomes assess body function (strength, GAITRite), activity (walking speed, walking endurance and motor function) and participation (daily activities), comparing changes between the usual care and BFR-TT periods.
This study was approved by the French Protection of Persons Committee (2024-A00791-46). Results will be published in peer-reviewed journals and presented at international conferences.
Trial registration number: NCT06533956.
PMID: 41689222

5.Assessment and Treatment of Varus Foot Deformity in Children with Cerebral Palsy: A Review

Robert M Kay, Susan A Rethlefsen

J Clin Med. 2026 Feb 2;15(3):1147

Abstract
Cerebral palsy (CP) is a developmental disability caused by injury to the fetal or infant brain, affecting between 1.6 to 3.7 per 1000 live births worldwide. Ambulatory patients with cerebral palsy experience various gait problems, for which they seek treatment from medical professionals. Varus foot deformities are among the most problematic for patients. Varus foot deformity is characterized by the inner border of the foot being tilted upward and the hindfoot inward, increasing weight-bearing on the lateral aspect of the foot. This positioning increases weight-bearing pressure under the lateral (outside) of the foot and often under the fifth metatarsal head when walking. As such, varus foot deformity can contribute to in-toeing, make shoe and brace-wearing difficult and painful, compromise gait stability, and sometimes lead to metatarsal fractures. Current knowledge of CP etiology and classifications, as well as principles and advances in assessment and treatment decision making for varus foot deformities, are outlined in this narrative review. In younger children with flexible deformities, non-operative interventions such as bracing, botulinum toxin injection, and serial casting are effective. The literature and expert consensus suggest that, if possible, surgery should be delayed until after the age of 8 years. When surgery is indicated, soft tissue procedures are used for flexible deformities. In addition to the soft tissue procedures, bone surgery is needed for rigid deformities. Careful pre-operative foot assessment is needed, including assessment of deformity flexibility and range of motion, X-rays, and computerized gait analysis if possible. Strategies are presented for thorough assessment when gait analysis is not available or feasible. Research reports of surgical outcomes for soft tissue and bony correction are positive, but should be interpreted with caution. The quality of evidence on surgical outcomes is compromised by use of varying research design methods and selection of outcome measures, with few including measures of function or patient-reported outcomes. It is recommended that surgical outcome be assessed using standardized assessment tools, such as the Foot Posture Index, which have had their validity and reliability established. Recent advances in 3D kinematic foot model development and musculoskeletal modeling have the potential to greatly improve surgical outcomes for patients with CP.
PMID: 41682829

6.Validity and Reliability of a Smart Band for Monitoring Cardiorespiratory Parameters in Children and Adolescents with Severe Cerebral Palsy

Angélica Guerrero-Blázquez, Ángela Concepción Álvarez-Melcón, José Javier López-Marcos, Patricia Martín-Casas, Adrián Arranz-Escudero, Rosa María Ortiz-Gutiérrez

Sensors (Basel). 2026 Jan 27;26(3):828

Abstract
Cerebral palsy (CP) is a disorder frequently associated with respiratory and cardiac comorbidities, making the monitoring of heart rate (HR) and oxygen saturation (SpO2) essential. This study examined the reliability and validity of Xiaomi Mi Band 6, compared with a clinical pulse oximeter, for measuring HR and SpO2 in 35 children and adolescents with CP classified at GMFCS levels III-V. Mi Band 6 demonstrated good reliability for HR (ICC = 0.83), although the high measurement error (MDC90 = 19.57 bpm) limits its usefulness for small physiological changes. SpO2 results showed low reliability (ICC = 0.55) and substantial variability (MDC90 = 18.85%), exceeding the clinically acceptable error margin of ±2-3%. Validity analyses revealed poor agreement between Mi Band 6 and clinical pulse oximeter for SpO2, and moderate agreement for HR, with large variability in Bland-Altman analyses. Factors such involuntary movements, altered muscle tone, low body weight, and reflective sensors on the wrist may have affected the results. In conclusion, Xiaomi Mi Band 6 demonstrated good reliability and may be cautiously used for general HR monitoring, but it is not suitable for assessing SpO2 in this pediatric population. Further research is needed to identify cost-effective and accurate wearable technologies.
PMID: 41682344

7.Outcome measures for ambulant children with cerebral palsy after limb extremity orthopedic surgery: What should be measured and who should decide?

Elizabeth R Boyer

Dev Med Child Neurol. 2026 Feb 11. Online ahead of print.

PMID: 41673509

8.Efficacy of Madopar and trihexyphenidyl combination therapy for dystonia in children with cerebral palsy

Xiaolin Zhou, Xiangyang Luo, Zhanwen He, Mujin Liu, Pinggan Li

Front Neurol. 2026 Jan 26;17:1707423. eCollection 2026.

Introduction: Dystonia is a predominant and debilitating movement disorder associated with dyskinetic cerebral palsy (DCP). Although trihexyphenidyl (THP) is commonly used, its efficacy often plateaus. Combining dopaminergic and anticholinergic agents is a rational therapeutic approach, but evidence for Madopar (levodopa/benserazide) plus THP is limited.
Methods: This retrospective cohort study compared THP monotherapy with combined Madopar + THP therapy in children with DCP and dystonia. Propensity score matching balanced baseline characteristics. Outcomes were measured at baseline, 8 weeks, and 16 weeks, including BADS, GMFM-88, QUEST, and CP-QOL. Parent-reported improvements in daily activities, drooling, speech, and sleep were also evaluated.
Results: Compared with THP alone, the combination therapy produced significantly greater reductions in dystonia severity and superior improvements in gross motor function, upper limb function, and quality of life. Parent-reported improvements in daily life and ease of care were markedly higher in the combination group. No serious adverse events occurred.
Discussion: Madopar + THP is more effective than THP monotherapy for managing dystonia in children with DCP, improving motor function and quality of life while maintaining safety.
PMID: 41668699

9.Preoperative Evaluation of the Child With Cerebral Palsy

Henry G Chambers, Grant D Hogue, Mara S Karamitopoulos, Jill E Larson, Benjamin J Shore, Verena M Schreiber

J Pediatr Soc North Am. 2025 Dec 18;14:100312. eCollection 2026 Feb.

Abstract
Children with cerebral palsy (CP) undergoing orthopaedic surgery require thorough preoperative evaluation to optimize outcomes and reduce risks. This review outlines key components of a comprehensive preoperative assessment, emphasizing an individualized approach tailored to the child's functional needs and medical complexity. Anesthesia considerations include pulmonary, cardiovascular, and gastrointestinal factors to minimize perioperative complications. Neurological issues such as seizure control and medication interactions are addressed, alongside respiratory challenges including aspiration risk and impaired airway clearance. Gastrointestinal concerns, nutritional status, and bowel management are highlighted as critical elements of preparation. Vascular access planning and volume management are discussed for major procedures. Skin health, including prevention of pressure injuries and wound-healing considerations, requires proactive strategies. Additional considerations include urinary tract issues, deep vein thrombosis risk, blood loss management, pain strategies, anesthesia challenges, and psychological impacts. The review underscores the importance of multidisciplinary coordination, patient-centred care, and detailed planning to support safe surgical care for children with CP.
PMID: 41658017

10.Recurrent Status Epilepticus in an Adult With Spastic Quadriplegic Cerebral Palsy

Ashraf Mukhtar, Mutasim Binidris, Moayad H Ali, Mohammed Kuttub Udin, Moayad A Elgassim

Case Reports Cureus. 2026 Jan 12;18(1):e101335

Abstract
Status epilepticus (SE) is a neurological emergency associated with high morbidity and mortality. Management of individuals with cerebral palsy (CP) presents unique challenges due to baseline neurological deficits, limited communication, and altered metabolism of antiepileptic drugs (AEDs). We report the case of a 22-year-old male with spastic quadriplegic CP and long-standing epilepsy who presented with recurrent generalized tonic-clonic seizures persisting for five hours despite medication compliance. His pre-existing neurological impairment complicated early recognition. A non-contrast CT brain ruled out intracranial hemorrhage, stroke, and infection. The patient was treated with intravenous diazepam and phenytoin, resulting in seizure cessation within two hours, and was discharged seizure-free after four days. This report highlights the importance of prompt diagnosis and timely escalation of treatment in SE in adults with CP. Multidisciplinary follow-up and caregiver education remain essential for long-term control and prevention of recurrence.
PMID: 41685034

11.Design and validation of kineanthropometric measurement protocols in adult population with cerebral palsy

David Expósito, José Miguel Soriano, Carla Soler

Clin Nutr. 2026 Jan 2;58:106572. Online ahead of print.

Background & aims: Adults with cerebral palsy (CP) face a high risk of malnutrition, yet most nutritional assessment methods have been developed for children. Despite the known anatomical and functional heterogeneity in adults with CP, there is a lack of validated, adapted tools for this population. This study aims to design and validate a specific anthropometric method for assessing the nutritional status of adults with CP, addressing this critical gap in clinical and research practice.
Methods: This cross-sectional study consisted of two phases. First, anthropometric measurements were performed on 47 adults with CP to identify practical challenges and design an adapted protocol. In the second phase, this protocol was applied to 74 healthy adults trained to simulate the postural limitations commonly observed in individuals with CP, based on direct observation in the CP group. Measurements obtained with the adapted method were statistically compared to those obtained using the International Society for the Advancement of Kinanthropometry (ISAK) reference protocol.
Results: The adapted protocol accounts for the anatomical and functional challenges of individuals with CP by allowing measurements to be performed in a supine position or with limbs flexed or extended, as necessary. Statistical analysis revealed no significant differences between the adapted protocol and the ISAK reference method for any of the anthropometric measurements. These results confirm that the modified approach yields accurate and reliable assessments of nutritional status in adults with CP.
Conclusion: The anatomical and functional limitations of adults with CP present significant challenges to traditional ISAK methodology. However, the adapted protocol, performed in a supine position by trained anthropometrists, produces comparable results. Key indicators such as Arm Muscle Area, Arm Adipose Area, and the Adipose-Muscular Index can reliably assess the nutritional status of this population, offering a viable alternative for clinical and research applications.
PMID: 41679234

12.Difficulty in Keeping Teeth Clean and Its Impact on Oral Health in Cerebral Palsy: Evidence From a New Zealand Cohort

Alexandra Sorhage, Caitlin Agnew, A Marie Blackmore, Anna H Mackey, Jillian Haszard, Ngaire S Stott

Int J Paediatr Dent. 2026 Feb 11. Online ahead of print.

Background: Children with cerebral palsy (CP) face challenges in maintaining oral hygiene, but data on their practices and outcomes are limited.
Aim: To examine oral health practices and their association with adverse oral health outcomes among children and young adults with CP in New Zealand.
Design: A cross-sectional survey of 90 individuals (aged 0–26 years) collected data on oral health behaviours, experiences, Gross Motor Function Classification System (GMFCS) level, and Eating and Drinking Ability Classification System (EDACS) level.
Results: Sixty-one participants brushed twice daily, 84 used fluoride toothpaste, and 73 had seen a dental professional in the past two years. Difficulty keeping teeth clean was reported by 36 participants and was associated with poor oral health, toothache within 12 months, bad breath, and recent bleeding gums. Difficulty was more common in GMFCS IV–V and EDACS III–V.
Conclusion: Difficulty maintaining oral hygiene is common in individuals with greater physical and swallowing limitations and is associated with adverse oral health indicators. Family-centred strategies are needed to support effective oral care.
PMID: 41669990

13.Effects of diaphragmatic breathing and manual diaphragm relaxation on respiratory muscle strength, chest expansion, pulmonary function, and sitting ability in children with diplegic cerebral palsy: A randomized controlled trial

Berna Karamancıoğlu, Özge Keniş Coşkun, Ela Erdem-Eralp, Yasemin Gökdemir, Evrim Karadag-Saygı

J Pediatr Rehabil Med. 2026 Feb 9. Online ahead of print.

Objective: To investigate the effects of manual diaphragmatic relaxation combined with diaphragmatic breathing on respiratory muscle strength, pulmonary function, chest expansion, and sitting ability in children with diplegic cerebral palsy (CP).
Materials and methods: Fifteen children with diplegic CP (aged 5–15 years) were randomized to control or intervention groups. Both groups received conventional physiotherapy twice weekly for eight weeks; the intervention group additionally received manual diaphragm relaxation and diaphragmatic breathing. Primary outcome was respiratory muscle strength; secondary outcomes included pulmonary function tests, chest expansion, and GMFM-B sitting scores.
Results: After eight weeks, the intervention group showed significant improvements in respiratory muscle strength, chest mobility, and GMFM-B scores. Respiratory muscle strength was significantly higher in the intervention group compared with control, though PFT parameters and GMFM-B group differences were not statistically significant.
Conclusion: Adding manual diaphragm relaxation and diaphragmatic breathing to physiotherapy may enhance respiratory and functional outcomes in children with CP.
PMID: 41664476

14.Learning powered mobility: caregiver perceptions of young children's capabilities and device impact

Heather A Feldner, Kiana Keithley, Kimberly A Ingraham, Anna Fragomeni, Nicole Zaino, Liesbeth Gijbels, Alexis Sinclair, Andrew N Meltzoff, Patricia K Kuhl, Katherine M Steele

Disabil Rehabil Assist Technol. 2026 Feb 8. Online ahead of print.

Purpose: Self-initiated mobility is essential for young children with disabilities but access to powered mobility (PM) under age 3 remains limited by environmental, design, and attitudinal barriers. This study explored caregiver perceptions following a 12-session trial using a novel PM device.
Materials and methods: Ten caregivers of children with cerebral palsy (GMFCS IV–V) and other developmental disabilities participated. Children completed 12 laboratory-based sessions using the Explorer Mini. Caregiver exit interviews were transcribed and inductively coded until themes were established.
Results: Four themes emerged: (1) evolving caregiver perceptions of capability and adaptability; (2) emerging autonomy and new skills within and beyond the device; (3) clear need and benefit with some drawbacks; and (4) ongoing stigma and uncertainty regarding PM use.
Conclusion: PM trials positively shifted caregiver perceptions of both PM itself and their child's capabilities. Caregivers expressed a desire for greater home access to PM to support development, though some continued to experience stigma. Expanded availability of adaptable PM options may better meet diverse positioning and access needs.
PMID: 41655207

15.Effectiveness of the National Health Screening Program for Infants and Children in Detecting Neurodevelopmental Disorders: A Nationwide Population-Based Analysis

Seong Woo Kim, Na Yoon Yoo, Yeji Kim, Taemi Youk, Seungbeen Hong

Ann Rehabil Med. 2026 Feb 11. Online ahead of print.

Objective: To evaluate the effectiveness of the National Health Screening Program for Infants and Children (NHSPIC) in early diagnosis of neurodevelopmental disorders (NDDs) using the National Health Insurance Database of South Korea.
Methods: Children born between 2011 and 2018 who completed the first four NHSPIC stages were included. A positive finding was defined as a recommendation for further evaluation. After 1:1 propensity score matching, 82,138 participants were included in each group.
Results: Children with positive findings had significantly higher risks of developing all seven NDDs, including autism spectrum disorder, intellectual disability, developmental language disorder, cerebral palsy, learning disability, ADHD, and tic disorder. Hazard ratios varied by disorder and NHSPIC stage, demonstrating stage-specific utility for early detection.
Conclusion: Developmental screening in the NHSPIC facilitates early diagnosis of NDDs and provides evidence to inform child health screening policy.
PMID: 41668555

16.Estimating cerebral palsy incidence from prevalence in Tanna Island, Vanuatu: Prevention is more important than rehabilitation

Robert J Reynolds, Steven M Day

Dev Med Child Neurol. 2026 Feb 9. Online ahead of print.
PMID: 41662450

17.Growth and neuropsychological developmental correlates in children with autism and cerebral palsy - a pilot study

Rouzha Pancheva, Melisa Ilhan, Rositsa Chamova, Stefka Tsvetanova, Krasimira Koleva, Miglena Georgieva, Rozalina Braykova, Stanislava Hadzhieva, Albena Toneva, Marco Fiore, Violeta Iotova

Riv Psichiatr. 2026 Jan-Feb;61(1):12-22

Background: Cerebral palsy (CP) and autism spectrum disorder (ASD) are neurodevelopmental conditions that affect physical growth and developmental outcomes. This pilot study examined how physical growth indicators relate to neuropsychological profiles in children with CP and ASD and compared developmental characteristics across groups.
Methods: Twenty-seven children (CP: 14; ASD: 13) underwent anthropometric assessments (HAZ, WAZ, BMIAZ, MUACAZ, TSFAZ, SSFAZ). Neuropsychological development was assessed with the Developmental Profile 3 across physical, adaptive, cognitive, social-emotional, and communication domains.
Results: Children with ASD scored significantly higher in physical development, adaptive behaviour, and overall development than those with CP. Across the full sample, weight-for-age correlated with adaptive behaviour and overall development; MUACAZ and TSFAZ were associated with specific developmental domains. Weight-for-age significantly predicted neurodevelopmental scores after adjustment.
Conclusions: Children with CP showed greater growth and developmental delays than those with ASD. Weight-for-age is an important predictor of neurodevelopment, supporting the integration of nutritional and developmental care.
PMID: 41665891

18.Development and investigation of the psychometric properties of the rehabilitation resilience scale (RRS) for caregivers of children with cerebral palsy

Ning-Bo Yang, Bi-Lan Zheng, Wei Huang, Lian-Huan Cai, Xiao-Bin Wang, Li-Qun Yao

Sci Rep. 2026 Feb 10. Online ahead of print.

Abstract
To develop a rehabilitation resilience scale (RRS) for caregivers of children with cerebral palsy (CP) and examine its reliability and validity. This study was conducted in three phases. Phase I involved item development through literature review and semi-structured interviews, followed by Delphi expert consultations. Phase II comprised a pilot survey with 50 caregivers to evaluate clarity, comprehensibility, and acceptability. Phase III consisted of large-scale psychometric testing with 436 participants, including item selection and analyses of validity and reliability. Two Delphi rounds yielded strong expert agreement. The final scale included 47 items across seven dimensions. Psychometric testing demonstrated a content validity index of 0.973. Exploratory factor analysis supported a 7-factor structure explaining 70.139% of variance; confirmatory factor analysis confirmed this structure. Cronbach's α was 0.952 overall (0.837–0.947 across dimensions). Test–retest reliability was 0.866. The 47-item RRS shows strong psychometric properties and is a valid tool for assessing rehabilitation resilience in caregivers of children with CP.
PMID: 41663578

19.Living DAGs: The Future of DAGs in Epidemiology

Robert J Reynolds

Am J Epidemiol. 2026 Feb 9. Online ahead of print.

Abstract
Directed acyclic graphs (DAGs) are widely used to identify estimands and select covariates in causal inference, yet they are typically treated as static and study-specific. This Opinion article proposes that DAGs should instead function as living epistemic infrastructure—shared, evolving representations of causal systems annotated with evidence levels and updated over time. Such an approach encourages cumulative, transparent, and collaborative scientific practice. Examples from spaceflight risk management and cerebral palsy research illustrate how living DAGs are already emerging. The article calls for broader adoption of shared, revisable DAGs to improve research design and strengthen cumulative epidemiologic science.
PMID: 41662841

20.Mortality Among Youth and Young Adults With Autism Spectrum Disorder, Intellectual Disability, or Cerebral Palsy

Kelly A Shaw, Dedria McArthur, Deborah A Bilder, Michelle M Hughes, Charles E Rose, Amanda V Bakian, Maureen S Durkin, Robert T Fitzgerald, Ellen M Howerton, Christine Ladd-Acosta, Maya Lopez, Elise T Pas, Walter Zahorodny, Monica DiRienzo, Mary E Patrick, Zachary Warren, Anita Washington, Allison Hudson, Sydney Pettygrove, Josephine Shenouda, Matthew J Maenner

JAMA Pediatr. 2026 Feb 9. Online ahead of print.

Importance: Autism spectrum disorder (ASD), intellectual disability (ID), and cerebral palsy (CP) are lifelong neurodevelopmental conditions with varying impairments. US mortality data for these groups are limited.
Objective: To compare mortality and causes of death among a multisite cohort identified at age 8 years with ASD, ID, or CP with the general population through youth or young adulthood.
Design, setting, and participants: Nine US sites identified 32,787 individuals with ASD, ID, and/or CP at age 8 years through active population-based surveillance (2000–2016). Death certificate linkage was completed through 2021. Individuals with multiple conditions were included in each relevant case group. Mortality rates were compared with matched general-population data.
Exposures: ASD, ID, or CP.
Main outcomes and measures: Mortality and ICD-10 underlying causes of death.
Results: There were 145 deaths among 23,393 individuals with ASD, 285 among 14,031 with ID, and 123 among 1,612 with CP. Mortality was elevated in all groups compared with the general population (ASD HR 1.35; ID HR 4.35; CP HR 9.62). For ASD, elevated mortality was seen only in females with co-occurring ID. Cause-of-death profiles varied by group; external causes predominated for the general population and ASD, while nervous system disorders predominated for CP and ID. Disability codes were rarely listed on death certificates.
Conclusions and relevance: Youth and young adults with ASD, ID, or CP experience significantly elevated mortality across multiple causes compared with the general population. Under-reporting of developmental disabilities on death certificates limits surveillance accuracy and has important clinical and public health implications.
PMID: 41661606

Prevention and Cure

21.Early Detection of Cerebral Palsy Using Standardized Screening Assessments in Neonatal Hypoxic Ischemic Encephalopathy: A Pilot Case Series

Mallory Kerner-Rossi, William Gomes, Tristan Sands, Jennifer M Bain, Faith Kim

J Child Neurol. 2026 Feb 13. Online ahead of print.

Abstract
Prechtl's General Movement Assessment (GMA) and the Hammersmith Infant Neurological Exam (HINE) are recommended for early detection of cerebral palsy (CP) in high-risk infants. These tools are well validated in premature infants but less well studied in the high-risk term population. We sought to determine the added prognostic value of incorporating GMA and HINE assessment in term- and near-term infants with hypoxic ischemic encephalopathy (HIE) who underwent therapeutic hypothermia (TH). In this retrospective and prospective pilot case series of 20 neonates with HIE that were treated with TH, we analyzed the associations between HIE severity, early clinical course, electroencephalography (EEG) background, and magnetic resonance imaging (MRI) injury pattern, with performance on the GMA and HINE. Absence of fidgety movements was significantly associated with severity of EEG background and was most concordant with gray matter injury score on MRI. There were no significant associations between 3-month HINE scores and any clinical measure. Three-month HINE scores were overall lower than published norms for age and tended to normalize over time in patients that had normal fidgety movements. Although the generalizability of these findings is limited because of the small sample size and lack of long-term outcomes, they support incorporation of the GMA as an early outcome in the follow-up of this population for accurate early identification of CP, which is complemented by longitudinal HINE scores for further delineation of severity and topography.
PMID: 41686699

22.Long-term neurological and psychiatric outcomes after paediatric arterial ischaemic stroke and cerebral sinovenous thrombosis

Jeanette Soenderlyng Springer, Søren Paaske Johnsen, Charlotte Olesen, Jan Brink Valentin, Ruta Tuckuviene

Dev Med Child Neurol. 2026 Feb 12. Online ahead of print.

Aim: To examine long-term outcomes in children and adolescents after first-time arterial ischaemic stroke (AIS) or cerebral sinovenous thrombosis (CSVT).
Method: Patients (0-18 years) diagnosed with a first-time cerebral thrombosis between 1994 and 2006 were followed until 2017 in this descriptive follow-up study. Patients were identified, and age- and sex-matched 1:10 with individuals from the general population. Data were extracted from national registries of patients. Outcomes included all-cause mortality, and hospital diagnoses of neurological and psychiatric disorders after cerebral thrombosis.
Results: A total of 251 patients with cerebral thrombosis were followed up for a median of 16 years (interquartile range 13 years 1 month-19 years 4 months). Cumulative all-cause mortality at 23 years 8 months was 11.4% (95% confidence interval [CI] 7.1-17.9). Hazard ratios indicated an increased risk of 64.0 times (95% CI 35.3-116.0) for cerebral palsy, 17.9 times (95% CI 10.2-31.5) for vision problems, and 4.1 times (95% CI 2.0-8.4) for being diagnosed with severe mental disorders during follow-up for those with previous cerebral thrombosis compared with the general population. The risk of morbidity was significantly increased following both AIS and CSVT.
Interpretation: Children and adolescents experience a higher all-cause mortality and a high risk of neurological and psychiatric diagnoses after AIS or CSVT compared with the general population.
PMID: 41681082

23.Perinatal arterial ischemic stroke (PAIS) and neonatal cerebral sinovenous thrombosis (CSVT) in the preterm neonate: a systematic review

Bregje O van Oldenmark, Andrea van Steenis, Niek E van der Aa, Anna-Lisa Oechsle, Mark Dzietko, Ginette M Ecury-Goosen, Enrico Lopriore, Linda S de Vries, Sylke J Steggerda

Pediatr Res. 2026 Feb 12. Online ahead of print.

Abstract
Perinatal arterial ischemic stroke (PAIS) and cerebral sinovenous thrombosis (CSVT) cause significant neurological morbidity, including cerebral palsy, in preterm infants. Compared to term infants, the epidemiology, risk factors, and outcomes of PAIS and CSVT in preterm infants are less well understood. This systematic review aimed to summarize the literature on incidence, risk factors, clinical presentation, neuroimaging, and neurodevelopmental outcomes of PAIS and CSVT in infants born before 37 weeks' gestation. A comprehensive search of PubMed, Embase, and Web of Science for studies from 2004 to 2025 identified 14 eligible studies including 132 infants with PAIS and 57 with CSVT. Incidence rates were higher in infants of lower gestational age. Identified PAIS risk factors included twin-to-twin transfusion syndrome, fetal heart rate abnormalities, and hypoglycemia. Perforator artery strokes were most common, while CSVT frequently involved the transverse sinus. Many risk factors overlapped with term infants but preterm infants showed more prematurity-related complications, longer ventilation, and postoperative states. Neurodevelopmental outcomes were poor, with high rates of impairment and mortality, especially in CSVT. The review highlights urgent needs for larger, controlled studies to improve prevention, early diagnosis, and management in this vulnerable population. IMPACT: This review systematically summarizes incidence, risk factors, neuroimaging patterns, treatment, and outcomes of perinatal arterial ischemic stroke (PAIS) and cerebral sinovenous thrombosis (CSVT) specifically in preterm infants-a group often excluded from previous studies. The findings reveal that preterm infants with PAIS and CSVT have unique and overlapping risk factors, often present asymptomatically, and are at high risk for poor neurodevelopmental outcomes and mortality. The review highlights urgent knowledge gaps and stresses the need for larger studies and targeted strategies to improve recognition, management, and long-term outcomes for this vulnerable group.
PMID: 41680509

24.Characteristics of unilateral cerebral palsy according to gestational age at birth: A retrospective study

Johanie Victoria Piché, Nafisa Hussein, Adam Kirton, Darcy Fehlings, Maryam Oskoui, Michael Shevell, Mary Dunbar

Dev Med Child Neurol. 2026 Feb 11. Online ahead of print.

Aim: To investigate the relationship between gestational age and clinical and magnetic resonance imaging (MRI) characteristics in infants with unilateral cerebral palsy (CP).
Method: This retrospective study used data from the Canadian CP Registry. Gestational age was analyzed as continuous and categorical. Neonatal signs included encephalopathy or seizures. MRI patterns were focal injury, white matter injury (WMI), and other. Additional impairments included seizures and non-motor-related impairments. Relationships between gestational age, imaging, and impairments were evaluated using multivariable and multinomial regression.
Results: Of 826 participants, 572 (69.3%) were born at term, 121 (14.6%) moderate-to-late preterm, and 133 (16.1%) very-to-extremely preterm. Neonatal signs were less common in infants born 32–36.9 weeks compared with term infants. Common MRI patterns were focal injury (417; 68.2%) and WMI (68; 11.1%). Focal injury increased with gestational age, while WMI decreased. Impairments did not vary with gestational age but were associated with specific MRI patterns.
Interpretation: Most infants with unilateral CP are born at term without neonatal neurological signs. Gestational age at birth was associated with neonatal signs and MRI pattern but not with development of specific severe impairments.
PMID: 41670174

25.The association between bronchopulmonary dysplasia severity and neurodevelopmental disorders

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J Perinatol. 2026 Feb 10. Online ahead of print.

Objectives: To examine the association between bronchopulmonary dysplasia (BPD) severity and risk of neurodevelopmental disorders (NDD).
Study design: Infants born <32 weeks' gestation and birth weight <1500 g (2015–2020) were included. Participants lost to follow-up or deceased before age 3 were excluded. BPD severity was defined by respiratory support at 36 weeks postmenstrual age. Logistic regression assessed associations between BPD severity and composite NDD outcomes.
Results: Greater BPD severity was associated with higher risk of NDD. Tracheostomy was also a significant risk factor.
Conclusions: Increasing BPD severity should raise suspicion for future NDD risk.
PMID: 41667626

26.Implementation of PlGF-based first-trimester screening and aspirin prophylaxis for preterm pre-eclampsia: clinical and economic evaluation

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Ultrasound Obstet Gynecol. 2026 Feb 9. Online ahead of print.

Objective: To evaluate the clinical effectiveness and economic impact of first-trimester placental growth factor (PlGF)–based screening followed by aspirin prophylaxis for preventing preterm pre-eclampsia.
Methods: This retrospective cohort study compared pre- and post-implementation periods of a screen-and-prevent strategy. The preimplementation phase included risk assessment without aspirin; the postimplementation phase included aspirin for high-risk women. Screening was based on the Fetal Medicine Foundation algorithm with and without PlGF. Primary outcome was preterm pre-eclampsia; secondary outcomes included preterm birth, overall pre-eclampsia, and estimated national healthcare cost savings.
Results: Among 11,061 screened pregnancies, the incidence of preterm pre-eclampsia decreased from 1.1% to 0.6% (aOR 0.41). Preterm birth and overall pre-eclampsia also decreased. Protective effects of aspirin were strongest when high-risk status was determined using PlGF. Economic modelling projected 403 prevented cases annually and €27.7 million in cost savings.
Conclusions: Real-world implementation of PlGF-based screening with aspirin prophylaxis reduced preterm pre-eclampsia and preterm birth and is associated with substantial health-system cost savings.
PMID: 41664568

27.Combined EEG, aEEG and MRI biomarkers in the neonatal period to predict neurodevelopmental outcomes in infants with neonatal encephalopathy: a diagnostic test accuracy systematic review and Bayesian meta-analysis

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Arch Dis Child Fetal Neonatal Ed. 2026 Feb 9. Online ahead of print.

Objective: To assess the predictive accuracy of early neurophysiological and neuroimaging biomarkers, alone and in combination, for adverse neurodevelopmental outcomes in term-born infants with neonatal encephalopathy (NE).
Design: Systematic review and Bayesian meta-analysis of studies including term infants with NE who underwent aEEG or EEG and MRI within the first month of life. Adverse outcomes at 18–36 months included cerebral palsy, postneonatal epilepsy, severe hearing or visual impairment, moderate-to-severe developmental delay, or death attributable to NE.
Main outcome measures: Sensitivity, specificity and diagnostic odds ratio (DOR) for abnormal aEEG background, EEG background, EEG seizures and MRI injury, individually and combined.
Results: Twenty-seven studies (1843 infants) were analysed. MRI injury had the strongest individual predictive accuracy (DOR 31.01). Abnormal EEG background also performed well. Combining EEG background with MRI injury improved predictive power (DOR 78.59) and specificity compared with MRI alone.
Conclusions: MRI is a strong individual predictor of adverse neurodevelopmental outcomes in NE. Combined EEG and MRI biomarkers further enhance prognostic accuracy and may support clinical decision-making.
PMID: 41663195