Cerebral palsy research news

Monday 26 August 2024

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Interventions and Management

1. Pediatric Hand Surgery Training: A Spectrum of Educational Resources

Hannah E Korah, Amber Leis, Aaron Berger, Michael G Galvez

Review J Hand Surg Glob Online. 2024 May 18;6(4):471-476. doi: 10.1016/j.jhsg.2024.04.004. eCollection 2024 Jul.

Treatment of children with upper-extremity trauma, congenital hand differences, cerebral palsy, and brachial plexus birth injuries requires specialized training, given the spectrum of pathology and complexities of treating an individual who is still developing. Although a limited number of dedicated pediatric hand surgery fellowships are available, mastering the large breadth of the field should ideally begin early in training and may take several different pathways. The authors seek to provide a comprehensive list of resources for trainees interested in pediatric hand surgery, including training opportunities, educational tools, and networking organizations. By shining a light on these pediatric hand surgery resources, we hope to encourage future trainees to plan ahead, so that they are well-prepared for the care of children with complex upper limb reconstructive needs.

PMID: 39166206

2. Selective endoscopic neurotomy of the upper and lower subscapular nerves in a patient with dyskinetic cerebral palsy: a case report

Mohammad Asif Aslam, Shwan Khoschnau

Case Reports JSES Rev Rep Tech. 2024 Mar 25;4(3):511-514. doi: 10.1016/j.xrrt.2024.03.004. eCollection 2024 Aug.

No abstract available

PMID: 39157248

3. Robotic assessment of bilateral and unilateral upper limb functions in adults with cerebral palsy

I Poitras, S P Dukelow, A Campeau-Lecours, C Mercier

J Neuroeng Rehabil. 2024 Aug 22;21(1):144. doi: 10.1186/s12984-024-01415-9.

Background: Children with unilateral cerebral palsy (CP) exhibit motor impairments predominantly on one side of the body, while also having ipsilesional and bilateral impairments. These impairments are known to persist through adulthood, but their extent have not been described in adults with CP. This study's aim is to characterize bilateral and unilateral upper limbs impairments in adults with CP. Methods: Nineteen adults with CP (34.3 years old ± 11.5) performed three robotic assessments in the Kinarm Exoskeleton Lab, including two bilateral tasks (Object Hit [asymmetric independent goals task] and Ball on Bar [symmetric common goal task]) and one unilateral task (Visually Guided Reaching, performed with the more affected arm [MA] and less affected arm [LA]). Individual results were compared to sex, age and handedness matched normative data,

describing the proportion of participants exhibiting impairments in each task-specific variable (e.g., Hand speed), each performance category (e.g., Feedforward control) and in global task performance. Associations were assessed using Spearman correlation coefficients between: 1: the results of the MA and LA of each limb in the unilateral task; and 2: the results of each limb in the unilateral vs. the bilateral tasks. Results: The majority of participants exhibited impairments in bilateral tasks (84%). The bilateral performance categories (i.e., Bimanual) identifying bilateral coordination impairments were impaired in the majority of participants (Object Hit: 57.8%; Ball on Bar: 31.6%). Most of the participants were impaired when performing a unilateral task with their MA arm (63%) and a smaller proportion with their LA arm (31%). The Feedforward control was the unilateral performance category showing the highest proportion of impaired participants while displaying the strongest relationship between the MA and LA arms impairments (rs = 0.93). Feedback control was the unilateral performance category most often associated with impairments in bilateral tasks (6 out of 8 performance categories). Conclusions: Adults with CP experienced more impairment in bilateral tasks while still having substantial impairments in unilateral tasks. They frequently display Feedforward control impairments combined with a higher reliance on Feedback control during both bilateral and unilateral tasks, leading to poorer motor performance.

PMID: 39169408

4. Do Adductor Tenotomies Prevent Progressive Migration in Children with Cerebral Palsy?: A Systematic Review

Renée Anne van Stralen, Merel Charlotte Rosalie Roelen, Pranai Buddhdev, Max Reijman, Denise Eygendaal, Jaap Johannes Tolk

JBJS Rev. 2024 Aug 20;12(8):e24.00093. doi: 10.2106/JBJS.RVW.24.00093. eCollection 2024 Aug 1.

Background: Up to one-third of children with cerebral palsy (CP) develop migration of the hip, and the risk increases with a higher Gross Motor Function Classification System (GMFCS). In progressive hip migration in young children, adductor tenotomy is an accepted treatment option to delay or prevent progressive hip migration. However, there is quite a large variability in reported results. This systematic review aims to determine the effectiveness of a soft-tissue release in the prevention of progressive hip migration in children with CP. Methods: This systematic review was performed in accordance with the guidelines of the Cochrane Handbook for Systematic Reviews and the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols statements. Our inclusion criteria were studies describing pediatric, skeletally immature patients with CP and a "hip at risk" of progressive hip migration. Exclusion criteria were simultaneous bony reconstructions, case reports, technical notes, published abstracts, or studies with a follow-up under 1 year postoperatively. The primary outcomes were defined as failure rate (progressive hip migration and/or need for bony surgery, as defined by each paper) and change in migration percentage (MP) at final follow-up. As secondary analyses, we evaluated the outcome after specific subtypes of surgeries and assessed whether performing lengthening of iliopsoas, neurectomy of the anterior branch of the obturator nerve, age at the time of surgery, GMFCS level, and postoperative management impact the outcome. Results: Our literature search identified 380 titles. Eighty-four articles underwent full-text review, of which 27 met our inclusion/exclusion criteria and were subsequently selected for quantitative analysis. A prevalence meta-analysis was performed including 17 studies (2,213 hips). Mean follow-up ranged from 12 to 148.8 months. The mean preoperative MP was 33.4% (2,740 hips) and 29.9% at follow-up. The overall reported failure rate was 39% (95% confidence interval, 26%-52%). Performing a release of only adductor longus had a failure rate of 87%, whereas more extensive soft-tissue releases showed significantly better results with failure rates ranging from 0 to 44% ($p < 0.001$). Lengthening of the iliopsoas had no significant impact on failure rate ($p = 0.48$), nor did performing an obturator neurectomy ($p = 0.92$). Conclusion: The failure rate of adductor tenotomies to prevent progressive hip migration appears to be as high as 39% in studies with a varying follow-up. The failure rates are significantly higher when isolated release of the adductor longus is performed. This systematic review supports clinical decision making in children with CP and early hip migration. Level of evidence: Level IIA. See Instructions for Authors for a complete description of levels of evidence.

PMID: 39163494

5. Hip displacement in children with cerebral palsy: surveillance to surgery - a current concepts review

Jason J Howard, H Kerr Graham, Ashok Johari, Unni Narayanan, Lisa Bennett, Ana Presedo, Benjamin J Shore, Tatiana Guerschman, Alaric Aroojis

SICOT J. 2024:10:30. doi: 10.1051/sicotj/2024023. Epub 2024 Aug 22.

This review brings together a multidisciplinary, multinational team of experts to discuss the current state of knowledge in the detection and treatment of hip displacement in cerebral palsy (CP), a global public health problem with a high disease burden. Though common themes are pervasive, different views are also represented, reflecting the confluence of traditional thinking regarding the aetiology and treatment of hip displacement in CP with emerging research that challenges these tried-and-true principles. The development of hip displacement is most closely related to gross motor function, with radiographic surveillance programs based on the Gross Motor Function Classification System (GMFCS), the goal being early detection and timely treatment. These treatments may include non-operative methods such as abduction bracing and Botulinum Neurotoxin A (BoNT-A), but outcomes research in this area has been variable in quality. This has contributed to conflicting opinions and

limited consensus. Soft tissue lengthening of the hip adductors and flexors has traditionally been employed for younger patients, but population-based studies have shown decreased survivorship for this treatment when performed in isolation. Concerns with the identification of hip displacement in very young children are raised, noting that early reconstructive surgery has a high recurrence rate. This has prompted consideration of viable minimally invasive alternatives that may have better success rates in very young children with CP, or may at least delay the need for osteotomies. Recent reports have implicated the role of abnormal proximal femoral growth and secondary acetabular dysplasia as a primary cause of hip displacement, related to ambulatory status and abductor function. As such, guided growth of the proximal femur has emerged as a possible treatment that addresses this purported aetiology, with promising early results.

PMID: 39177434

6. Rectus femoris electromyography signal clustering: Data-driven management of crouch gait in patients with cerebral palsy

Mehrdad Davoudi, Firooz Salami, Robert Reisig, Dimitrios A Patikas, Sebastian I Wolf

PLoS One. 2024 Aug 20;19(8):e0298945. doi: 10.1371/journal.pone.0298945. eCollection 2024.

This study aimed to investigate how electromyography (EMG) cluster analysis of the rectus femoris (RF) could help to better interpret gait analysis in patients with cerebral palsy (CP). The retrospective gait data of CP patients were categorized into two groups: initial examination (E1, 881 patients) and subsequent examination (E2, 377 patients). Envelope-formatted EMG data of RF were collected. Using PCA and a combined PSO-K-means algorithm, main clusters were identified. Patients were further classified into crouch, jump, recurvatum, stiff and mild gait for detailed analysis. The clusters (labels) were characterized by a significant peak EMG activity during mid-swing (L1), prolonged EMG activity during stance (L2), and a peak EMG activity during loading response (L3). Notably, L2 contained 76% and 92% of all crouch patients at E1 and E2, respectively. Comparing patients with a crouch gait pattern in L2-E1 and L2-E2, two subgroups emerged: patients with persistent crouch (G1) and patients showing improvement at E2 (G2). The minimum activity of RF during 20-45% of the gait was significantly higher ($p = 0.025$) in G1 than in G2. A greater chance of improvement from crouch gait might be associated with lower RF activity during the stance phase. Using our findings, we could potentially establish an approach to improve clinical decision-making regarding treatment of patients with CP.

PMID: 39163275

7. The effectiveness of kinesiology taping on balance, gait, and gross motor function in the lower limbs of children with cerebral palsy: a systematic review

Seth Kwame Agyenkwa, Duaa Abualkhair, Rustem Mustafaoglu, Ahmet Abo Orabi

Review Rev Assoc Med Bras (1992). 2024 Aug 16;70(8):e20240300. doi: 10.1590/1806-9282.20240300. eCollection 2024.

No abstract available

PMID: 39166678

8. Management of Dorsal Bunion in Nonambulatory Adolescents with Cerebral Palsy: A Retrospective Cohort Study

Samuel K Van de Velde, H Kerr Graham, Ken Ye, Henry Chambers, Erich Rutz

J Bone Joint Surg Am. 2024 Aug 22. doi: 10.2106/JBJS.24.00092. Online ahead of print.

Background: A dorsal bunion may occur in nonambulatory adolescents with cerebral palsy (CP) and a Gross Motor Function Classification System (GMFCS) level of IV or V. The deformity can cause pain, skin breakdown, and difficulty wearing shoes and braces. A consensus on the biomechanics and surgical management of dorsal bunions in persons with severe CP has not been established. Methods: This retrospective cohort study included 23 nonambulatory adolescents with CP, GMFCS level IV or V, and symptomatic dorsal bunions requiring surgery. The median age at surgery was 17 years, and the median follow-up was 56 months. Reconstructive surgery included the excision of a 2 to 3-cm segment of the tibialis anterior tendon to correct the elevation of the first metatarsal. The fixed deformity of the first metatarsophalangeal joint was managed with use of corrective arthrodesis and dorsal plate fixation. Clinical and radiographic outcomes were assessed preoperatively and postoperatively at the transition to adult services. Results: There were significant improvements in the clinical and radiographic outcome measures ($p < 0.001$). Pain was relieved, and there were no further episodes of skin breakdown. The elevation of the first metatarsal was corrected from a mean of 3° of dorsiflexion to a mean of 19° of plantar flexion. The deformity of the first metatarsophalangeal joint was corrected from a mean of 55° of plantar flexion to a mean of 21° of dorsiflexion. Six patients had complications, all of which were grade I or II according to the modified Clavien-Dindo system. Conclusions: The surgical reconstruction of a dorsal bunion via soft-tissue rebalancing of the first ray and corrective arthrodesis of the first

metatarsophalangeal joint resulted in favorable medium-term clinical and radiographic outcomes in nonambulatory adolescents with CP. Level of evidence: Therapeutic Level IV. See Instructions for Authors for a complete description of levels of evidence.

PMID: 39172874

9. [Applied anatomy study and preliminary clinical application of hyper selective neurectomy of triceps branches combined with partial neurotomy of S 2 nerve root to relieve spastic equinus foot] [Article in Chinese] [Abstract in English, Chinese]

Ke Xu, Yaobin Yin, Shufeng Wang, Feng Li, Wenjun Li

Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 2024 Aug 15;38(8):1010-1015. doi: 10.7507/1002-1892.202404012.

Objective: To observe the possibility of hyper selective neurectomy (HSN) of triceps branches combined with partial neurotomy of S 2 nerve root for relieving spastic equinus foot. Methods: Anatomical studies were performed on 12 adult cadaveric specimens. The S 2 nerve root and its branches were exposed through the posterior approach. Located the site where S 2 joined the sciatic nerve and measured the distance to the median line and the vertical distance to the posterior superior iliac spine plane, and the S 2 nerve root here was confirmed to have given off branches of the pelvic splanchnic nerve, the pudendal nerve, and the posterior femoral cutaneous nerve. Between February 2023 and November 2023, 4 patients with spastic equinus foot were treated with HSN of muscle branches of soleus, gastrocnemius medial head and lateral head, and cut the branch where S 2 joined the sciatic nerve. There were 3 males and 1 female, the age ranged from 5 to 46 years, with a median of 26 years. The causes included traumatic brain injury in 2 cases, cerebral hemorrhage in 1 case, and cerebral palsy in 1 case. The disease duration ranged from 15 to 84 months, with a median of 40 months. The triceps muscle tone measured by modified Ashworth scale (MAC) before operation was grade 3 in 2 cases and grade 4 in 2 cases. The muscle strength measured by Daniels-Worthingham manual muscle test (MMT) was grade 2 in 1 case, grade 3 in 1 case, and 2 cases could not be accurately measured due to grade 4 muscle tone. The Holden walking function grading was used to evaluate lower limb function and all 4 patients were grade 2. After operation, triceps muscle tone, muscle strength, and lower limb function were evaluated by the above grading. Results: The distance between the location where S 2 joined the sciatic nerve and median line was (5.71±0.53) cm and the vertical distance between the location and posterior superior iliac spine plane was (6.66±0.86) cm. Before joining the sciatic nerve, the S 2 nerve root had given off branches of the pelvic splanchnic nerve, the pudendal nerve, and the posterior femoral cutaneous nerve. All the 4 patients successfully completed the operation, and the follow-up time was 4-13 months, with a median of 7.5 months. At last follow-up, the muscle tone of the patients decreased by 2-3 grades when compared with that before operation, and the muscle strength did not decrease when compared with that before operation. Holden walking function grading improved by 1-2 grades, and there was no postoperative hypoesthesia in the lower limbs. Conclusion: HSN of triceps branches combined with partial neurotomy of S 2 nerve root can relieve spastic equinus foot without damaging other sacral plexus nerves.

PMID: 39175325

10. Physical activity and exercise interventions in adults with cerebral palsy: a systematic review of quantitative and qualitative studies

Georgia Andreopoulou, John B Meharry, Kavi C Jagadamma, Marietta L van der Linden

Review Disabil Rehabil. 2024 Aug 24:1-15. doi: 10.1080/09638288.2024.2391568. Online ahead of print.

Purpose: Participating in physical activity may benefit health-related outcomes for adults with cerebral palsy (CP). The aim of this review is to provide a synthesis of the evidence from both qualitative and quantitative studies on the impact of physical activity and exercise interventions in adults with CP. Methods: Literature searches were conducted from inception to November 2023 in nine electronic databases. A meta-analysis was carried out to evaluate the efficacy of the interventions on walking speed related outcomes and muscle strength. Results: Twenty-two studies met the inclusion criteria. The interventions of the nine studies included in the meta-analysis did not improve walking speed over a distance of 10 m (SMD = -0.03, 95% CI: -0.34-0.40, p = 0.88, I2 = 0%) or endurance (distance covered in 2 or 6 min) (SMD = 0.25, 95% CI: -0.10-0.59, p = 0.16, I2 = 0%), but there was an improvement in lower limb muscle strength in favour of the experimental groups (SMD = 0.59, 95% CI: 0.19-0.99, p = 0.004, I2 = 20%). Only a few studies reported on psychosocial outcomes, quality of life, or intervention sustainability. Discussion and conclusions: Further research is needed to explore the impact on psychosocial outcomes and quality of life in adults with CP and the sustainability of physical activity participation.

PMID: 39180329

11. Clinical characteristics and outcomes of perinatal stroke in Australia: Population-based longitudinal study

Bithi Roy, Annabel Webb, Karen Walker, Catherine Morgan, Nadia Badawi, Iona Novak

J Paediatr Child Health. 2024 Aug 20. doi: 10.1111/jpc.16640. Online ahead of print.

Aim: Perinatal stroke is one of the main causes of hemiplegia and seizure disorder. This study aimed to analyse the clinical characteristics and outcomes of perinatal stroke in a cohort of Australian children for its early detection. Methods: A population -based prospective longitudinal study on perinatal stroke up to 2 years of age, was conducted from 2017 to 2019. Results: Eighty-seven children with perinatal stroke included 79% (69/87) acute and 21% (18/87) presumed perinatal stroke. Seventy-four per cent (51/69) acute symptomatic perinatal strokes presented in the first 3 days of life and 78% (14/18) presumed perinatal strokes presented by 6 months of age. 62% had an arterial stroke, 29% had a venous stroke and 5% had a combined arterial and venous stroke. Unexpectedly, 35% (24/69) acute symptomatic perinatal stroke had only respiratory symptoms and 50% (9/18) presumed perinatal stroke were asymptomatic. The incidence of cerebral palsy was 29% (20/69) with acute symptomatic perinatal stroke and 72% (13/18) with presumed perinatal stroke. Conclusions: The first week of a child's life is the most critical period in terms of lifelong disability from perinatal stroke. Recognising diverse clinical presentations will ensure early diagnosis and timely intervention treatments.

PMID: 39162173

12. Utilization of special services among children and youth with special healthcare needs: A time-to-event analysis of the national survey of children's health data, 2016-2022

Suman Kanti Chowdhury, Jennifer Marshall, Janice Zgibor, Russell S Kirby

Disabil Health J. 2024 Aug 20:101688. doi: 10.1016/j.dhjo.2024.101688. Online ahead of print.

Background: Special services including physical, occupational, speech, or behavioral therapies are associated with enhanced long-term functioning and well-being of children and youth with special healthcare needs (CYSHCN). Yet, there is a lack of recent evidence on the utilization of these services, and the age at which CYSHCN first receive them. Objective: This study assessed the distribution, timing, and determinants of special services utilization across different types of special healthcare needs. Methods: Data from 63,734 caregivers of CYSHCN aged 0-17 years from the 2016-2022 National Survey of Children's Health were analyzed using Rao-Scott Chi-Square, Log-rank, and Cox proportional hazard tests. Results: Overall, 41.9 % of CYSHCN ever received special services, including 91.4 %, 90.3 %, 88.0, and 34.1 % of children and youth with Down syndrome, cerebral palsy, autism, and other special healthcare needs (OSHCN), respectively. Children with Down syndrome and cerebral palsy received special services earlier than those with autism or OSHCN. Utilization of special services was higher among male children and youth (aHR 1.41; 95 % CI: 1.33-1.49), aged 0-5 years (aHR: 4.70; 95 % CI: 4.32-5.11), second or later born children (aHR: 1.18; 95 % CI: 1.10-1.26), from families with low-income (aHR: 1.14; 95 % CI: 1.04-1.24), living with married parents (aHR: 1.11; 95 % CI: 1.04-1.19), consistently insured (aHR: 1.24; 95 % CI: 1.08-1.42), and with a more complex health condition (aHR: 3.40; 95 % CI: 3.13-3.70) compared to their counterparts. Conclusions: These findings highlight the necessity of adopting tailored approaches for children with different special healthcare needs to optimize and sustain the utilization of special services.

PMID: 39174386

13. Cerebral palsy in children: A clinical practice review

Dilip R Patel, Karen M Bovid, Rebecca Rausch, Berrin Ergun-Longmire, Mark Goetting, Joav Merrick

Curr Probl Pediatr Adolesc Health Care. 2024 Aug 20:101673. doi: 10.1016/j.cppeds.2024.101673. Online ahead of print.

Cerebral palsy is a disorder characterized by abnormal tone, posture, and movement. In clinical practice, it is often useful to approach cerebral palsy based on the predominant motor system findings - spastic hemiplegia, spastic diplegia, spastic quadriplegia, extrapyramidal or dyskinetic, and ataxic. The prevalence of cerebral palsy is between 1.5 and 3 per 1,000 live births with higher percentage of cases in low to middle income countries and geographic regions. Pre-term birth and low birthweight are recognized as the most frequent risk factors for cerebral palsy; other risk factors include hypoxic-ischemic encephalopathy, maternal infections, and multiple gestation. In most cases of cerebral palsy, the initial injury to the brain occurs during early fetal brain development. Intracerebral hemorrhage and periventricular leukomalacia are the main pathologic findings found in preterm infants who develop spastic cerebral palsy. The diagnosis of cerebral palsy is primarily based on clinical findings. Early recognition of infants at risk for cerebral palsy as well as those with cerebral palsy is possible based on a combination of clinical history, use of standardized neuromotor assessment and findings on magnetic resonance imaging; however, in clinical practice, cerebral palsy is more reliably diagnosed by 2 years of age. Magnetic resonance imaging scan is indicated to delineate the extent of brain lesions and to identify congenital brain malformations. Genetic testing and tests for inborn errors of metabolism are indicated to identify specific disorders, especially treatable disorders. Because cerebral palsy is associated with multiple associated and secondary medical conditions, its management requires a sustained and consistent collaboration among multiple disciplines and specialties. With appropriate support, most children with cerebral palsy grow up to be adults with good functional abilities.

PMID: 39168782

14. Ultrasonic neuromodulation as a new therapy for spasticity in an animal model of spastic cerebral palsy

Gisely de Andrade Costa Pereira, André Luiz Oliveira Poleto, Aldo José Fontes-Pereira, Marco Antônio von Krüger, Wagner Coelho de Albuquerque Pereira

Acta Cir Bras. 2024 Aug 16:39:e394924. doi: 10.1590/acb394924. eCollection 2024.

Purpose: This study aimed to evaluate a new therapeutic option for the spasticity using ultrasound neuromodulation in an animal model of spastic cerebral palsy. Methods: Thirty-two adult male Wistar rats were randomly distributed in: negative control (NC); positive control (PC); untreated model (UTM); and treated model (TM). Rats in the control groups received sham surgery, and rats in the model groups received the spastic cerebral palsy model surgery. The rats' motor functions were evaluated by the Rotarod and CatWalk tests before and after surgery. PC and TM groups underwent ultrasonic neuromodulation by a physiotherapeutic ultrasound (intensity 0.1 W/cm2, at 1 MHz) continuous mode for 5 seconds, for seven days. Results: Twelve rats showed a spastic pattern (UTM = 6 and TM = 6), motor limitations (UTM = 6 and TM = 6), and ten had difficulty feeding (UTM = 5 and TM = 5). One UTM group rat could not recover its preoperative latency time, while the other rats in the model groups did. The speed at which the limbs swung reduced after surgery and increased in subsequent assessments, demonstrating greater instability and a deficit in locomotion balance. Conclusions: Results were not yet sufficient to assert ultrasound neuromodulation as a possible therapy for spasticity in spastic cerebral palsy in the parameters used, and more studies are necessary.

PMID: 39166555

15. Evidence-based early rehabilitation for children with cerebral palsy: co-development of a multifaceted knowledge translation strategy for rehabilitation professionals

Jessica H Hanson, Annette Majnemer, Filomena Pietrangelo, Leigh Dickson, Keiko Shikako, Noémi Dahan-Oliel, Emma Steven, Georgia Iliopoulos, Tatiana Ogourtsova

Front Rehabil Sci. 2024 Aug 7:5:1413240. doi: 10.3389/fresc.2024.1413240. eCollection 2024.

Background: Cerebral palsy (CP) is the most common childhood physical disability. Early and evidence-based rehabilitation is essential for improving functional outcomes in children with CP. However, rehabilitation professionals face barriers to adopting evidence-based practices (EBP)s. The objective of this project is to develop a knowledge translation (KT) strategy to support CP-EBP among pediatric rehabilitation professionals. Methods: We follow an integrated KT approach by collaborating with clinician- and patient-partners. Partners engaged in co-design through team meetings and content review via email. The KT strategy comprises two components: (1) An electronic (e)-KT toolkit was created from summarized evidence extracted from randomized clinical trials on early rehabilitation for children with CP, and (2) a multifaceted online KT training program developed with guidance from a scoping review exploring effective KT strategies. Results: The e-KT toolkit summarizes twenty-two early interventions for children with or at risk for CP aged 0-5 years. Each module features an introduction, resources, parent/family section, and clinician information, including outcomes, intervention effectiveness, and evidence level. The KT training program includes three 10-15 min video-based training modules, text summaries, quizzes, and case studies. Site champions, identified as qualified rehabilitation professionals, were onboarded to support the site implementation of the training program. A champion-training booklet and 1-hour session were designed to equip them with the necessary knowledge/resources. Conclusion: The tailored, multifaceted, and co-designed KT strategy aims to be implemented in pediatric rehabilitation sites to support professional's uptake of CP-EBPs. Lessons learned from its development, including the co-development process and multifaceted nature, hold potential for broader applications in rehabilitation.

PMID: 39169922

16. To consider the whole elephant: Finding our blind spots in caring for people with disabilities

Laurie Glader, Nancy Murphy

Editorial Dev Med Child Neurol. 2024 Aug 20. doi: 10.1111/dmcn.16068. Online ahead of print.

No abstract available

PMID: 39163207

17. A qualitative study investigating the experiences of unmet social needs for children with cerebral palsy and their families: perspectives of parents and clinicians

Katarina Ostojic, Isra Karem, Simon Paget, Laurel Mimmo, Alison Berg, Timothy Scott, Heather Burnett, Sarah McIntyre, Hayley Smithers-Sheedy, Sheikh Azmatullah, Jack Calderan, Masyitah Mohamed, Anne Olaso, Debbie van Hoek, Matthew

van Hoek, Mackenzie Woodbury, Alunya Wilkinson, Georgina Henry, Shaini Shiva, Karen Zw, Raghu Lingam, Russell Dale, Valsamma Eapen, Betty-Jean Dee-Price, Iva Strnadová, Sue Woolfenden; EPIC-CP Group

Disabil Rehabil. 2024 Aug 18:1-10. doi: 10.1080/09638288.2024.2391557. Online ahead of print.

Purpose: To explore (i) the impact of unmet social needs on children with cerebral palsy and their families; (ii) enablers-, and (iii) barriers to addressing unmet social needs. Material and methods: Eligible participants attended or worked at one of the three Paediatric Rehabilitation Departments including: children with a diagnosis of cerebral palsy; parents/carers; and clinicians. One-on-one interviews were conducted with parents/carers and focus groups with clinicians. Interview and focus group transcripts were deductively thematically analysed according to the social model of disability. Results: A total of 44 participants (8 parents and 36 clinicians) took part. No children consented to participate. Analysis of the qualitative data identified four main themes and 14 sub-themes. The main themes were: Unmet social needs are pervasive; An inequitable health system with no roadmap; Everyone suffers as a result of unmet social needs; and It takes a village to raise a child. Conclusion: Unmet social needs have profound impacts on families. The experiences of unmet social needs are intensified by the extra complexities of raising a child with disability. Societal barriers including inequitable systems and the fragmented services are barriers impeding on families receiving support and ultimately limiting their wellbeing.

PMID: 39155439

18. Age, sex, and multi-morbidity stratified mortality risk estimates for adults with cerebral palsy to inform clinical decision making

Daniel G Whitney, Lillian C Min, Edward A Hurvitz

Disabil Health J. 2024 Aug 14:101683. doi: 10.1016/j.dhjo.2024.101683. Online ahead of print.

Background: While research has provided key insights into mortality rates and risks for individuals with cerebral palsy (CP), clinically useable mortality risk estimates remain unreported for adults with CP, especially by key patient-level factors. Objective: The objective of this study was to generate clinically useable mortality risk estimates among adults with CP to inform clinical decision making. Methods: This retrospective cohort study, using a fee-for-service Medicare database, identified adults ≥18-years-old with CP from 01/01/2008-12/31/2010 and followed through 12/31/2019 for death. Mortality risk at 1-, 3-, 5-, and 9-year intervals were selected based on common clinical length of time to reasonably benefit from preventive care. Sex-stratified analyses assessed risk estimates by narrow age group (18-25/26-34/35-44/45-54/55-64/65-74/≥75 years old) and multi-morbidity group (Whitney Comorbidity Index score 0-2/3/4-6/≥7). Results: Of 24,767 adults with CP, n = 12,962 were men (mean [SD] age = 48.3 [15.0] years) and n = 11,805 were women (age = 49.7 [15.8] years). Loss to follow-up was rare. 1-year risk was similar between men and women (3.4 % vs. 3.3 %), but increased slightly more for men than women through 9-years (30.1 % vs. 28.0 %). As expected, the mortality risk increased with older age and higher WCI scores. The probability of death (and survival) is presented per age and multi-morbidity group for men and women with CP. Conclusions: Mortality risk estimates were reported at clinically relevant intervals by age, sex, and multi-morbidity status. This information can be used to weigh harm-to-benefit ratios of screening and treatment strategies based on mortality expectancy estimates.

PMID: 39153943

19. FERN: is it possible to conduct a randomised controlled trial of intervention or expectant management for early-onset selective fetal growth restriction in monochorionic twin pregnancy - protocol for a prospective multicentre mixed-methods feasibility study

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Multicenter Study BMJ Open. 2024 Aug 17;14(8):e080021. doi: 10.1136/bmjopen-2023-080021.

Introduction: Selective fetal growth restriction (sFGR) in monochorionic twin pregnancy, defined as an estimated fetal weight (EFW) of one twin <10th centile and EFW discordance ≥25%, is associated with stillbirth and neurodisability for both twins. The condition poses unique management difficulties: on the one hand, continuation of the pregnancy carries a risk of death of the smaller twin, with a high risk of co-twin demise (40%) or co-twin neurological sequelae (30%). On the other, early delivery to prevent the death of the smaller twin may expose the larger twin to prematurity, with the associated risks of long-term physical, emotional and financial costs from neurodisability, such as cerebral palsy.When there is severe and early sFGR, before viability, delivery is not an option. In this scenario, there are currently three main management options: (1) expectant

management, (2) selective termination of the smaller twin and (3) placental laser photocoagulation of interconnecting vessels. These management options have never been investigated in a randomised controlled trial (RCT). The best management option is unknown, and there are many challenges for a potential RCT. These include the rarity of the condition resulting in a small number of eligible pregnancies, uncertainty about whether pregnant women will agree to participate in such a trial and whether they will agree to be randomised to expectant management or active fetal intervention, and the challenges of robust and long-term outcome measures. Therefore, the main objective of the FERN study is to assess the feasibility of conducting an RCT of active intervention vs expectant management in monochorionic twin pregnancies with early-onset (prior to 24 weeks) sFGR. Methods and analysis: The FERN study is a prospective mixed-methods feasibility study. The primary objective is to recommend whether an RCT of intervention vs expectant management of sFGR in monochorionic twin pregnancy is feasible by exploring women's preference, clinician's preference, current practice and equipoise and numbers of cases. To achieve this, we propose three distinct work packages (WPs). WP1: A Prospective UK Multicentre Study, WP2A: a Qualitative Study Exploring Parents' and Clinicians' Views and WP3: a Consensus Development to Determine Feasibility of a Trial. Eligible pregnancies will be recruited to WP1 and WP2, which will run concurrently. The results of these two WPs will be used in WP3 to develop consensus on a future definitive study. The duration of the study will be 53 months, composed of 10 months of setup, 39 months of recruitment, 42 months of data collection, and 5 months of data analysis, report writing and recommendations. The pragmatic sample size for WP1 is 100 monochorionic twin pregnancies with sFGR. For WP2, interviews will be conducted until data saturation and sample variance are achieved, that is, when no new major themes are being discovered. Based on previous similar pilot studies, this is anticipated to be approximately 15-25 interviews in both the parent and clinician groups. Engagement of at least 50 UK clinicians is planned for WP3. Ethics and dissemination: This study has received ethical approval from the Health Research Authority (HRA) South West-Cornwall and Plymouth Ethics Committee (REC reference 20/SW/0156, IRAS ID 286337). All participating sites will undergo site-specific approvals for assessment of capacity and capability by the HRA. The results of this study will be published in peer-reviewed journals and presented at national and international conferences. The results from the FERN project will be used to inform future studies. Trial registration number: This study is included in the ISRCTN Registry (ISRCTN16879394) and the NIHR Central Portfolio Management System (CPMS), CRN: Reproductive Health and Childbirth Specialty (UKCRN reference 47201).

PMID: 39153765

Prevention and Cure

20. Metformin attenuates white matter injury in neonatal mice through activating NRF2/HO-1/NF-κB pathway

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Int Immunopharmacol. 2024 Aug 19:141:112961. doi: 10.1016/j.intimp.2024.112961. Online ahead of print.

White matter injury (WMI) is a major form of brain injury that occurs in preterm infants and develops into lifelong disabilities, including cerebral palsy, impaired cognitive function, and psychiatric disorders. Metformin (MET) has been reported to have neuroprotective effects. However, whether MET is responsible for neuroprotection against WMI remains unclear. In this study, we established a WMI model in neonatal mice to explore the neuroprotective effects of MET and attempted to elucidate its potential mechanisms. Our results showed that MET increased the expression of myelin basic protein (MBP), oligodendrocyte transcription factor 2 (Olig2), and CC1, improved the thickness and density of the myelin sheath, and reduced oxidative stress and microglial infiltration after chronic hypoxia induction. Moreover, MET improved memory, learning, and motor abilities as well as relieved anxiety-like behaviors in mice with WMI. These protective effects of MET may involve the upregulation of the nuclear factor erythroid 2-related factor 2 (NRF2)/heme oxygenase-1(HO-1)/NF-κB pathway related protein expressions. In addition, the NRF2 inhibitor ML385 could significantly reverse the effects of MET. In conclusion, this study suggested that MET attenuated chronic hypoxia-induced WMI through activating the NRF2/HO-1/NF-κB pathway, indicating that MET might be a promising therapeutic option for WMI.

PMID: 39163687