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Interventions and Management

1. Brain Functional Networks Study of Subacute Stroke Patients With Upper Limb Dysfunction After Comprehensive Rehabilitation Including BCI Training.

Wu Q1, Yue Z, Ge Y, Ma D, Yin H, Zhao H, Liu G, Wang J, Dou W, Pan Y.

Front Neurol. 2020 Jan 27;10:1419. doi: 10.3389/fneur.2019.01419. eCollection 2019.

Brain computer interface (BCI)-based training is promising for the treatment of stroke patients with upper limb (UL) paralysis. However, most stroke patients receive comprehensive treatment that not only includes BCI, but also routine training. The purpose of this study was to investigate the topological alterations in brain functional networks following comprehensive treatment, including BCI training, in the subacute stage of stroke. Twenty-five hospitalized subacute stroke patients with moderate to severe UL paralysis were assigned to one of two groups: 4-week comprehensive treatment, including routine and BCI training (BCI group, BG, n = 14) and 4-week routine training without BCI support (control group, CG, n = 11). Functional UL assessments were performed before and after training, including, Fugl-Meyer Assessment-UL (FMA-UL), Action Research Arm Test (ARAT), and Wolf Motor Function Test (WMFT). Neuroimaging assessment of functional connectivity (FC) in the BG was performed by resting state functional magnetic resonance imaging. After training, as compared with baseline, all clinical assessments (FMA-UL, ARAT, and WMFT) improved significantly ($p < 0.05$) in both groups. Meanwhile, better functional improvements were observed in FMA-UL ($p < 0.05$), ARAT ($p < 0.05$), and WMFT ($p < 0.05$) in the BG. Meanwhile, FC of the BG increased across the whole brain, including the temporal, parietal, and occipital lobes and subcortical regions. More importantly, increased inter-hemispheric FC between the somatosensory association cortex and putamen was strongly positively associated with UL motor function after training. Our findings demonstrate that comprehensive rehabilitation, including BCI training, can enhance UL motor function better than routine training for subacute stroke patients. The reorganization of brain functional networks topology in subacute stroke patients allows for increased coordination between the multi-sensory and motor-related cortex and the extrapyramidal system. Future long-term, longitudinal, controlled neuroimaging studies are needed to assess the effectiveness of BCI training as an approach to promote brain plasticity during the subacute stage of stroke.

PMID: [32082238](#)

2. Variability in length of stay following neuromuscular spinal fusion.

Fletcher ND, Bellaire LL, Dilbone ES, Ward LA, Bruce RW Jr.

Spine Deform. 2020 Feb 14. doi: 10.1007/s43390-020-00081-w. [Epub ahead of print]

BACKGROUND: Patients with neuromuscular scoliosis (NMS) who undergo posterior spinal fusion (PSF) often have long, protracted hospital stays because of numerous comorbidities. Coordinated perioperative pathways can reduce length of hospitalization (LOH) without increasing complications; however, a subset of patients may not be suited to rapid mobilization

and early discharge. **METHODS:** 197 patients with NMS underwent PSF at a single hospital by two surgeons with a post-operative care pathway emphasizing early mobilization, rapid transition to enteral feeds, and discharge prior to first bowel movement. Average LOH was 4.9 days for all patients. Patients were divided into quartiles (< 3 days, 3-5 days, 5-7 days, > 7 days) based on their LOH, and their charts were retrospectively reviewed for preoperative, intraoperative, and postoperative factors associated with their LOH. **RESULTS:** Age at surgery, gender, the need for tube feeds, and specific underlying neuromuscular disorder were not significant predictors of LOH; however, severely involved cerebral palsy (CP) patients (GMFCS 4/5) were more likely to have extended stays than GMFCS 1-3 patients ($p = 0.02$). Radiographic predictors of LOH included major coronal Cobb angle ($p = 0.002$) and pelvic obliquity ($p = 0.02$). Intraoperative predictors included longer surgical times, greater numbers of levels fused and need for intraoperative or postoperative blood transfusion ($p < 0.05$). The need for ICU admission and development of a pulmonary complication were significantly more likely to fall into the extended LOH group ($p < 0.05$). **CONCLUSIONS:** Several variables have been identified as significant predictors of LOH after PSF for NMS in the setting of a standardized discharge pathway. Patients with smaller curves and less complex surgeries were more amenable to accelerated discharge. Conversely, patients with severe CP with large curves and pelvic obliquity requiring longer surgeries with more blood loss may not be ideal candidates. These data can be used to inform providers' and families' post-operative expectations. **LEVEL OF EVIDENCE:** Therapeutic Level III.

PMID: [32060807](#)

3. Neglected femoral neck fractures in cerebral palsy: a narrative review.

Toro G, Moretti A, Paoletta M, De Cicco A, Braile A, Panni AS.

EFORT Open Rev. 2020 Jan 29;5(1):58-64. doi: 10.1302/2058-5241.5.190019. eCollection 2020 Jan.

Hip fractures are severe conditions with a high morbidity and mortality, especially when the diagnosis is delayed, and if formulated over 30 days after the injury, is termed a 'neglected femoral neck fracture' (NFNF). Cerebral palsy (CP) is probably one of the major risk factors for NFNF in Western countries, mainly because of both cognitive and motor impairments. However, considering the high prevalence of fractures in these patients, the incidence of NFNF in this population is probably underestimated, and this condition might result in persistent hip or abdominal pain. Several techniques are available for the treatment of NFNF (i.e. muscle pedicle bone graft, fixation with fibular graft, valgisation osteotomy), but most of them could affect motor function. Motor function must be preserved for as long as possible, in order to enhance the quality of life of CP patients. After discussing published NFNF cases in CP patients and available treatment options, a practical approach is proposed to facilitate the orthopaedic surgeon to both early identify and appropriately manage these challenging fractures. Cite this article: EFORT Open Rev 2020;5:58-64. DOI: 10.1302/2058-5241.5.190019.

PMID: [32071774](#)

4. Characteristics of dynamic standing balance with and without an insole in patients with spastic diplegia cerebral palsy.

Kusumoto Y, Tsuchiya J, Watanabe Y, Umeda M, Matsuda T, Takaki K, Nitta O.

J Phys Ther Sci. 2020 Jan;32(1):23-26. doi: 10.1589/jpts.32.23. Epub 2020 Jan 22.

[Purpose] This study examined characteristics of dynamic standing balance, with and without an insole, in patients with spastic diplegia cerebral palsy (CP). [Participants and Methods] This cross-sectional study used a crossover design. Eleven patients with spastic diplegia CP and gross motor levels between I and III with spastic diplegia CP (according to the Gross Motor Function Classification System expanded and revised version) were randomly allocated to either the barefoot or insole groups. The Index of postural stability (IPS) was evaluated while each patient was barefoot and while wearing insoles. The Pediatric Evaluation of Disability Inventory (PEDI) was used to measure functional self-care and mobility domains. [Results] While wearing the insoles, the center movement distance between right and left positions was significantly higher. While barefoot, IPS and area of postural sway correlated with the PEDI subscales for mobility and self-care. [Conclusion] Insoles promote standing balance and dynamic balance to move the center of pressure within the base of support. Such improvements may enhance activities of daily living in patients with spastic diplegia CP.

PMID: [32082023](#)

5. Clinical and functional outcomes of total hip arthroplasty in patients with cerebral palsy: A systematic review.

Adams CT, Lakra A.

J Orthop. 2020 Jan 25;21:19-24. doi: 10.1016/j.jor.2020.01.031. eCollection 2020 Sep-Oct.

Hip joint subluxation and dislocations are very common in cerebral palsy (CP) patients and are directly related to a patient's degree of spasticity. Hip dislocation and subluxation leads to hip pain and difficulty in hygiene maintenance by a caregiver. Most cases require surgical intervention to improve the quality of life in these patients. For many years pelvic and proximal femoral osteotomies with soft tissue releases were the mainstay of treatment for affected hips in CP patients. Recently, hip arthroplasty has been proposed as a very successful operation which provides a pain free and mobile joint in CP patients. The purpose of this review is to evaluate the current evidence for effectiveness of total hip arthroplasty in CP patients.

PMID: [32071528](#)

6. Complicated Muscle-Bone Interactions in Children with Cerebral Palsy.

Modlesky CM, Zhang C.

Curr Osteoporos Rep. 2020 Feb 14. doi: 10.1007/s11914-020-00561-y. [Epub ahead of print]

PURPOSE OF REVIEW: The goal of this review is to highlight the deficits in muscle and bone in children with cerebral palsy (CP), discuss the muscle-bone relationship in the CP population, and identify muscle-based intervention strategies that may stimulate an improvement in their bone development. **RECENT FINDINGS:** The latest research suggests that muscle and bone are both severely underdeveloped and weak in children with CP, even in ambulatory children with mild forms of the disorder. The small and low-performing muscles and limited participation in physical activity are likely the major contributors to the poor bone development in children with CP. However, the muscle-bone relationship may be complicated by other factors, such as a high degree of fat and collagen infiltration of muscle, atypical muscle activation, and muscle spasticity. Muscle-based interventions, such as resistance training, vibration, and nutritional supplementation, have the potential to improve bone development in children with CP, especially if they are initiated before puberty. Studies are needed to identify the muscle-related factors with the greatest influence on bone development in children with CP. Identifying treatment strategies that capitalize on the relationship between muscle and bone, while also improving balance, coordination, and physical activity participation, is an important step toward increasing bone strength and minimizing fractures in children with CP.

PMID: [32060718](#)

7. The Effect of Increased Gait Speed on Asymmetry and Variability in Children With Cerebral Palsy.

Brændvik SM, Goihl T, Braaten RS, Vereijken B.

Front Neurol. 2020 Jan 30;10:1399. doi: 10.3389/fneur.2019.01399. eCollection 2019.

Gait of children and adolescents with cerebral palsy (CP) is often reported to be more asymmetric and variable than gait of typically developing (TD) peers. As this may lead to less stable and less efficient gait, a relevant clinical question is how asymmetry may be improved and variability reduced in this population. The main objective of the current study was to investigate whether higher walking speed would affect gait symmetry and gait variability in children and adolescents with CP. Data from clinical gait analyses of 43 children and adolescents (29 males and 14 females) with unilateral (n = 28) or bilateral (n = 15) CP were included. Mean age was 11.3 ± 3.4 years, with level I (n = 26) or level II (n = 17) according to the Gross Motor Function Classification System (GMFCS). Corresponding data from 20 TD peers, matched in age and gender, were included as reference. Step time, step length, single support, and stance phase were studied at two different gait speeds: preferred and fast walking speed. Symmetry index and coefficient of variation were used as measures of asymmetry and variability, respectively. Results indicated that all participants managed to increase gait speed when instructed to do so. Overall, increased speed did not result in a more asymmetrical or variable gait, except for an increase in step length asymmetry and a difference in response between GMFCS levels I and II in variability. This implies that manipulation of gait speed may be useful clinically without necessarily making gait more unstable. However, some increase in step length asymmetry may be inevitable when gait speed is increased in people with CP.

PMID: [32082235](#)

8. [Long-term follow-up of achillotenotomy in patients with cerebral palsy]. [Article in Hungarian; Abstract available in Hungarian from the publisher]

Kérő G, Frigyesi L, Szabó T, Than P, Vermes C.

Orv Hetil. 2020 Feb;161(8):306-312. doi: 10.1556/650.2020.31669.

Introduction: The surgical solution of equinus deformity is one of the most important factors in the treatment of patients with cerebral palsy. We perform open Z achillotenotomy and percutaneous triple hemisection routinely in our department. **Aim:** The goal of our work was to analyze the long-term results of achillotenotomies in patients with cerebral palsy, to look for predisposing factors of major complications, and to compare the results of the performed operative methods. **Method:** Between 1990 and 2006, we performed 347 surgical Achilles tendon lengthenings. In 261 cases, the operations were performed percutaneously, and in 86 cases we performed open Z achillotenotomy. The average follow-up time was 15 years. The long-term outcomes were analyzed based on the age at surgery, the topographic appearance and the severity of cerebral palsy. Analysis regarding functional outcome was based on the widely known Physician Rating Scale system. **Results:** Due to recurrent equinus deformity, re-achillotenotomy was performed in 74 cases (21.3%), and in 14 cases (4%) the re-achillotenotomy needed to be performed a second time. We encountered overcorrection and calcaneus deformity in 12 cases (3.5%). Recurrence rate was higher in patients operated at a younger age (<7 years) and in patients with a more severe cerebral palsy (GMFCS II-III, ~26%). Recurrence showed accumulation in patients 9-14 years old. **Conclusion:** The major complication we encountered was recurrence of the equinus deformity. The majority of relapses occurred in patients who were operated at a younger age and suffered from a more severe form of cerebral palsy. We observed that recurrence showed an association with growth and accumulated in adolescence. Orv Hetil. 2020; 161(8): 306-312.

PMID: [32073292](#)

9. Effects of speech cues in French-speaking children with dysarthria.

Levy ES, Moya-Galé G, Chang YM, Campanelli L, MacLeod AAN, Escorial S, Maillart C.

Int J Lang Commun Disord. 2020 Feb 20. doi: 10.1111/1460-6984.12526. [Epub ahead of print]

BACKGROUND: Articulatory excursion and vocal intensity are reduced in many children with dysarthria due to cerebral palsy (CP), contributing to the children's intelligibility deficits and negatively affecting their social participation. However, the effects of speech-treatment strategies for improving intelligibility in this population are understudied, especially for children who speak languages other than English. In a cueing study on English-speaking children with dysarthria, acoustic variables and intelligibility improved when the children were provided with cues aimed to increase articulatory excursion and vocal intensity. While French is among the top 20 most spoken languages in the world, dysarthria and its management in French-speaking children are virtually unexplored areas of research. Information gleaned from such research is critical for providing an evidence base on which to provide treatment. **AIMS:** To examine acoustic and perceptual changes in the speech of French-speaking children with dysarthria, who are provided with speech cues targeting greater articulatory excursion (French translation of 'speak with your big mouth') and vocal intensity (French translation of 'speak with your strong voice'). This study investigated whether, in response to the cues, the children would make acoustic changes and listeners would perceive the children's speech as more intelligible. **METHODS & PROCEDURES:** Eleven children with dysarthria due to CP (six girls, five boys; ages 4;11-17;0 years; eight with spastic CP, three with dyskinetic CP) repeated pre-recorded speech stimuli across three speaking conditions (habitual, 'big mouth' and 'strong voice'). Stimuli were sentences and contrastive words in phrases. Acoustic analyses were conducted. A total of 66 Belgian-French listeners transcribed the children's utterances orthographically and rated their ease of understanding on a visual analogue scale at sentence and word levels. **OUTCOMES & RESULTS:** Acoustic analyses revealed significantly longer duration in response to the big mouth cue at sentence level and in response to both the big mouth and strong voice cues at word level. Significantly higher vocal sound-pressure levels were found following both cues at sentence and word levels. Both cues elicited significantly higher first-formant vowel frequencies and listeners' greater ease-of-understanding ratings at word level. Increases in the percentage of words transcribed correctly and in sentence ease-of-understanding ratings, however, did not reach statistical significance. Considerable variability between children was observed. **CONCLUSIONS & IMPLICATIONS:** Speech cues targeting greater articulatory excursion and vocal intensity yield significant acoustic changes in French-speaking children with dysarthria. However, the changes may only aid listeners' ease of understanding at word level. The significant findings and great inter-speaker variability are generally consistent with studies on English-speaking children with dysarthria, although changes appear more constrained in these French-speaking children. What this paper adds What is already known on the subject According to the only study comparing effects of speech-cueing

strategies on English-speaking children with dysarthria, intelligibility increases when the children are provided with cues aimed to increase articulatory excursion and vocal intensity. Little is known about speech characteristics in French-speaking children with dysarthria and no published research has explored effects of cueing strategies in this population. What this paper adds to existing knowledge This paper is the first study to examine the effects of speech cues on the acoustics and intelligibility of French-speaking children with CP. It provides evidence that the children can make use of cues to modify their speech, although the changes may only aid listeners' ease of understanding at word level. What are the potential or actual clinical implications of this work? For clinicians, the findings suggest that speech cues emphasizing increasing articulatory excursion and vocal intensity show promise for improving the ease of understanding of words produced by francophone children with dysarthria, although improvements may be modest. The variability in the responses also suggests that this population may benefit from a combination of such cues to produce words that are easier to understand.

PMID: [32077196](#)

10. Pain in adults with cerebral palsy: a systematic review and meta-analysis of individual participant data.

van der Slot WMA, Benner JL, Brunton L, Engel JM, Gallien P, Hilberink SR, Månnum G, Morgan P, Opheim A, Riquelme I, Rodby-Bousquet E, Simsek TT, Thorpe DE, Berg-Emons RJVD, Vogtle LK, Papageorgiou G, Roebroek M.

Ann Phys Rehabil Med. 2020 Feb 13. pii: S1877-0657(20)30034-8. doi: 10.1016/j.rehab.2019.12.011. [Epub ahead of print]

BACKGROUND: There is little focus on adults with cerebral palsy (CP) in research and health care and insufficient knowledge on how to identify and manage pain in this population. **OBJECTIVES:** This systematic review and meta-analysis aimed to determine whether pain prevalence in adults with CP is high and to explore variations in pain prevalence of subgroups, pain locations, pain severity and pain interference. **METHODS:** Potential datasets were identified by experts in the field and literature searches in Embase, MEDLINE, and Cochrane, from January 2000 to October 2016. Included studies had a representative sample of ≥ 25 adults with CP and ≥ 1 pain outcomes. Methodological quality assessment, pain prevalence estimates and logistic regression models for subgroup effects on pain prevalence were conducted. **RESULTS:** In total, 17 eligible studies were identified from 4584 publications. A meta-analysis was performed with individual participant data from 15 studies totalling 1243 participants (mean [SD] age 34.3 [12.6] years). Overall mean pain prevalence was 70% (95% CI 62-78). Women were more likely to have pain than men ($P < 0.001$). The odds of pain was increased in adults with gross motor function level II (odds ratio [OR] 1.92, 95% CI 1.22-3.12) and IV (OR 1.77, 95% CI 1.03-4.29). Participants with pain reported pain predominantly in the legs (76%, 95% CI 66-84), and mean pain severity was 3.7/10 (95% CI 2.7-4.7) and pain interference 3.5/10 (95% CI 2.5-4.5). **CONCLUSIONS:** This meta-analysis provides the first reliable pain prevalence estimate in a large international sample of adults with CP. The high prevalence of pain, 70%, suggests that adults with CP should be routinely screened for pain and treated accordingly. The range of measurement instruments used by the included studies emphasizes using common outcome measures specific to pain internationally.

PMID: [32061920](#)

11. Associations between macrolide antibiotics prescribing during pregnancy and adverse child outcomes in the UK: population based cohort study.

Fan H, Gilbert R, O'Callaghan F, Li L.

BMJ. 2020 Feb 19;368:m331. doi: 10.1136/bmj.m331.

OBJECTIVE: To assess the association between macrolide antibiotics prescribing during pregnancy and major malformations, cerebral palsy, epilepsy, attention deficit hyperactivity disorder, and autism spectrum disorder in children. **DESIGN:** Population based cohort study. **SETTING:** The UK Clinical Practice Research Datalink. **PARTICIPANTS:** The study cohort included 104 605 children born from 1990 to 2016 whose mothers were prescribed one macrolide monotherapy (erythromycin, clarithromycin, or azithromycin) or one penicillin monotherapy from the fourth gestational week to delivery. Two negative control cohorts consisted of 82 314 children whose mothers were prescribed macrolides or penicillins before conception, and 53 735 children who were siblings of the children in the study cohort. **MAIN OUTCOME MEASURES:** Risks of any major malformations and system specific major malformations (nervous, cardiovascular, gastrointestinal, genital, and urinary) after macrolide or penicillin prescribing during the first trimester (four to 13 gestational weeks), second to third trimester (14 gestational weeks to birth), or any trimester of pregnancy. Additionally, risks of cerebral palsy, epilepsy, attention deficit hyperactivity disorder, and autism spectrum disorder. **RESULTS:** Major malformations were recorded in 186 of 8632 children (21.55 per 1000) whose mothers were prescribed macrolides and 1666 of 95 973 children (17.36 per 1000) whose mothers were

prescribed penicillins during pregnancy. Macrolide prescribing during the first trimester was associated with an increased risk of any major malformation compared with penicillin (27.65 v 17.65 per 1000, adjusted risk ratio 1.55, 95% confidence interval 1.19 to 2.03) and specifically cardiovascular malformations (10.60 v 6.61 per 1000, 1.62, 1.05 to 2.51). Macrolide prescribing in any trimester was associated with an increased risk of genital malformations (4.75 v 3.07 per 1000, 1.58, 1.14 to 2.19, mainly hypospadias). Erythromycin in the first trimester was associated with an increased risk of any major malformation (27.39 v 17.65 per 1000, 1.50, 1.13 to 1.99). No statistically significant associations were found for other system specific malformations or for neurodevelopmental disorders. Findings were robust to sensitivity analyses. **CONCLUSIONS:** Prescribing macrolide antibiotics during the first trimester of pregnancy was associated with an increased risk of any major malformation and specifically cardiovascular malformations compared with penicillin antibiotics. Macrolide prescribing in any trimester was associated with an increased risk of genital malformations. These findings show that macrolides should be used with caution during pregnancy and if feasible alternative antibiotics should be prescribed until further research is available. **TRIAL REGISTRATION:** ClinicalTrials.gov NCT03948620.

PMID: [32075790](#)

12. The epidemiology of cerebral palsy in adulthood: A systematic review and meta-analysis of the most frequently studied outcomes.

van Gorp M, Hilberink SR, Noten S, Benner JL, Stam HJ, van der Slot WM, Roebroek ME.

Arch Phys Med Rehabil. 2020 Feb 11. pii: S0003-9993(20)30084-8. doi: 10.1016/j.apmr.2020.01.009. [Epub ahead of print]

OBJECTIVE: To describe the epidemiology of health status, impairments, activities and participation in adults with cerebral palsy (CP). **DATA SOURCES:** Embase, Medline, Web-of-Science, PsycINFO, CINAHL, Cochrane and Google Scholar were searched for three themes ('cerebral palsy', 'adult', and 'outcome assessment') in literature published between January 2000 and December 2018. **STUDY SELECTION:** Full paper, peer-reviewed, English journal articles on descriptive, observational or experimental studies describing the most studied outcomes in adults with CP ($n \geq 25$, age ≥ 18 years) were included. Studies were included in the analyses if frequently studied outcomes were described in at least 3 studies using similar methods of assessment. **DATA EXTRACTION:** Data were extracted independently by two authors from 65 articles (total $n=28429$) using a standardized score sheet. **DATA SYNTHESIS:** Meta analyses revealed that overall, on average 65.1% (95% CI: 55.1;74.5) of adults with CP experienced pain, 57.9% (51.1;64.6) were ambulant, 65.5% (61.2;69.7) had little or no limitation in manual ability, 18.2% (10.6;27.2) had tertiary education, 39.2% (31.5;47.1) were employed and 29.3% (9.0;55.3) lived independently. Considering adults without intellectual disability, proportions of individuals who were ambulant (72.6% [58.8;84.5]) and lived independently (90.0% [83.8;94.9]) were higher (respectively $p=0.014$ and $p<0.01$). The Fatigue Severity Scale score was 4.1 (3.8;4.4). Epilepsy (28.8% [20.1;38.4]) and asthma (28.3% [18.7;38.9]) were especially prevalent comorbidities. **CONCLUSIONS:** The present systematic review and meta-analysis on the epidemiology of adults with CP provided state-of-the-art knowledge on the most frequently studied outcomes. On the average adults with CP are fatigued, a majority experiences pain, is ambulant and has little or no difficulty with manual ability. On average, 40% is employed and 30% lives independently. More uniformity in assessment and reports is advised to improve knowledge on epidemiology and gain insight in more outcomes.

PMID: [32059945](#)

13. Pediatric ASPECTS predicts outcomes following acute symptomatic neonatal arterial stroke.

Mackay MT, Slavova N, Pastore-Wapp M, Grunt S, Stojanovski B, Donath S, Steinlin M.

Neurology. 2020 Feb 19. pii: 10.1212/WNL.0000000000009136. doi: 10.1212/WNL.0000000000009136. [Epub ahead of print]

OBJECTIVE: To test the hypothesis that the Alberta Stroke Program Early Computed Tomography Score (ASPECTS) is useful in determining outcomes after neonatal arterial ischemic stroke (NAIS), we assessed accuracy of the modified pediatric ASPECTS (pedASPECTS) to predict cerebral palsy (CP), neurologic impairment, and epilepsy. **METHODS:** Cross-sectional study included newborns with acute NAIS whose outcomes were assessed at ≥ 18 months after stroke. PedASPECTS accuracy to predict outcomes was determined by sensitivity, specificity, and receiver operator characteristic (ROC) curves, and correlation between pedASPECTS and infarct volume was determined by the Spearman correlation coefficient. **RESULTS:** Ninety-six children met the inclusion criteria. Median percentage infarct to supratentorial brain volume was 6.8% (interquartile range [IQR] 3.0%-14.3%). Median pedASPECTS was 7 (IQR 4-10). At a median age of 2.1 years, 35% developed CP, 43% had neurologic impairment, and 7% had epilepsy. Median pedASPECTS predicted outcomes of interest: CP (10, IQR 8-12) vs

no CP (5, IQR 4-8) ($p < 0.0001$), poor (9, IQR 7-12) vs good (6, IQR 4-8) neurologic outcomes ($p < 0.0001$), and epilepsy (10, IQR 8-12) vs no epilepsy (7, IQR 4-10) ($p = 0.033$). PedASPECTS accuracy was good for CP (ROC 0.811) and fair for neurologic impairment (ROC 0.760) and epilepsy (ROC 0.761). A pedASPECTS ≥ 8 had $\geq 69\%$ sensitivity and $\geq 54\%$ specificity for clinical outcomes. PedASPECTS correlated with infarct volume (Spearman rank 0.701, $p < 0.0001$).
CONCLUSIONS: This study provides Class II evidence that pedASPECTS has fair to good accuracy for predicting CP, neurologic impairment, and epilepsy after NAIS and correlates with infarct volume. PedASPECTS may assist with early identification of babies requiring close developmental surveillance.

PMID: [32075895](#)

14. A questionnaire survey on the efficacy of various treatments for dyskinetic cerebral palsy due to preterm bilirubin encephalopathy.

Kitai Y, Hirai S, Okuyama N, Hirotsune M, Nishimoto S, Mizutani S, Okumura A, Kumada S, Arai H.

Brain Dev. 2020 Feb 13. pii: S0387-7604(20)30032-2. doi: 10.1016/j.braindev.2020.01.006. [Epub ahead of print]

OBJECTIVES: Preterm children with severe dyskinetic cerebral palsy due to bilirubin encephalopathy often suffer from marked generalised hypertonus as they age. We performed a questionnaire survey to investigate patient-reported outcomes of treatments for improving their activities of daily life. **METHODS:** A mail questionnaire was administered to the caregivers of 67 children with preterm bilirubin encephalopathy aged >4 years. We asked about the type of treatments they received and their efficacy using a five-point subjective scale for the following five domains: motor function, postural stability, sleep, pain, and care burden. The names of oral drugs and their efficacies were also explored. **RESULTS:** The response rate of the questionnaires was 62.7% (42/67), and we analysed the results from 41 validated cases. All children underwent rehabilitation. A total of 30 children received oral drugs, 22 botulinum toxin, 12 orthopaedic surgery, and 3 intrathecal baclofen. Each of these treatments was subjectively reported to be effective in more than half of the recipients for each of the five domains, whereas 23 (56%) required more than two types of treatments other than rehabilitation. Chlordiazepoxide was the most commonly used oral drug, by 28 children (68%), and was discontinued in 7 patients (25%) only. In the sleep domain, the rate of a positive effect was significantly higher for oral drugs (92.7%) than the other treatments ($p < 0.01$). **CONCLUSION:** All treatments were partially effective, but their appropriate combination based on a multidisciplinary approach is essential for muscle tone management in children with preterm bilirubin encephalopathy.

PMID: [32063420](#)

15. A Mixed Methods Analysis of Parental Perspectives on Diagnosis and Prognosis of Neonatal Intensive Care Unit Graduates With Cerebral Palsy.

Guttmann K, Flibotte J, DeMauro SB, Seitz H.

J Child Neurol. 2020 Feb 17:883073820901412. doi: 10.1177/0883073820901412. [Epub ahead of print]

This study aimed to evaluate how parents of former neonatal intensive care unit patients with cerebral palsy perceive prognostic discussions following neuroimaging. Parent members of a cerebral palsy support network described memories of prognostic discussions after neuroimaging in the neonatal intensive care unit. We analyzed responses using Linguistic Inquiry and Word Count, manual content analysis, and thematic analysis. In 2015, a total of 463 parents met eligibility criteria and 266 provided free-text responses. Linguistic Inquiry and Word Count analysis showed that responses following neuroimaging contained negative emotion. The most common components identified through the content analysis included outcome, uncertainty, hope/hopelessness, and weakness in communication. Thematic analysis revealed 3 themes: (1) Information, (2) Communication, and (3) Impact. Parents of children with cerebral palsy report weakness in communication relating to prognosis, which persists in parents' memories. Prospective work to develop interventions to improve communication between parents and providers in the neonatal intensive care unit is necessary.

PMID: [32063083](#)

16. Health-related quality of life and upper-limb impairment in children with cerebral palsy: developing a mapping

algorithm.

Tonmukayakul U, Imms C, Mihalopoulos C, Reddihough D, Carter R, Mulhern B, Chen G.

Dev Med Child Neurol. 2020 Feb 16. doi: 10.1111/dmcn.14488. [Epub ahead of print]

AIM: To: (1) investigate the relationship between upper-limb impairment and health-related quality of life (HRQoL) for children with cerebral palsy and (2) develop a mapping algorithm from the Cerebral Palsy Quality of Life Questionnaire for Children (CPQoL-Child) onto the Child Health Utility 9D (CHU9D) measure. **METHOD:** The associations between physical and upper-limb classifications and HRQoL of 76 children (40 females, 36 males) aged 6 to 15 years (mean age 9 years 7 months [SD 3y]) were assessed. Five statistical techniques were developed and tested, which predicted the CHU9D scores from the CPQoL-Child total/domain scores, age, and sex. **RESULTS:** Most participants had mild impairments. The Manual Ability Classification System (MACS) level was significantly negatively correlated with CHU9D and CPQoL-Child ($r=-0.388$ and $r=-0.464$ respectively). There was a negative correlation between the Neurological Hand Deformity Classification (NHDC) and CPQoL-Child ($r=-0.476$, $p<0.05$). The generalized linear model with participation, pain domain, and age had the highest predictive accuracy. **INTERPRETATION:** The weak negative correlations between classification levels and HRQoL measures may be explained by the restricted range of impairment levels of the participants. The MACS and NHDC explained the impact of upper-limb impairment on HRQoL better than the other classifications. The generalized linear model with participation, pain, and age is the suggested mapping algorithm. The suggested mapping algorithm will facilitate the use of CPQoL-Child for economic evaluation and can be used to conduct cost-utility analyses.

PMID: [32064606](#)

17. Using Facebook to tell stories of premature ageing and sexual and reproductive healthcare across the life course for women with cerebral palsy in the UK and USA.

Shah S, Bradbury-Jones C, Taylor J.

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OBJECTIVE: To enhance understanding of the bodily and lifestyle effects of ageing with cerebral palsy (CP) for women, with a particular focus on experiences with sexual and reproductive healthcare (SRH) services in the UK and North America. **DESIGN:** A qualitative study underpinned by feminist disability theory and drawing on digital ethnographies to capture health and healthcare experiences for women with CP. **SETTING:** A global community of 140 women with CP, who are members of the closed international Facebook group, Women Ageing with Cerebral Palsy (WACP). **PARTICIPANTS:** Forty-five members of WACP who were based in the UK and North America. The women were aged between 21 and 75. **METHODS:** Messages posted on WACP between January 2018 and October 2018 were collated and underwent thematic analysis to identify themes relating to effects of ageing and experiences of SRH for women with CP at different points over the female life course. **RESULTS:** The breadth of experiences in relation to the effects of ageing and access to reproductive and sexual healthcare for women with CP can be divided into three themes: (1) bodily effects of ageing; (2) lifestyle effects of ageing; (3) experiences of reproductive and sexual healthcare. **CONCLUSIONS:** Giving women with CP a platform to 'speak for themselves' in relation to effects of ageing and SRH provides health professionals with an informed knowledge base on which to draw. This might improve treatment for this growing adult patient community whose experiences have not received attention in health discourse or services. Including these experiences in public medical and social discourse can also bring a new knowledge to girls with CP about what ageing could mean for them so plans can be put in place for their future.

PMID: [32071173](#)

18. Caring for People with Disabilities: An Ethics of Respect.

Mintz K, Wasserman D.

Hastings Cent Rep. 2020 Jan;50(1):44-45. doi: 10.1002/hast.1084.

Eva Feder Kittay's *Learning from My Daughter: The Value and Care of Disabled Minds* is poised to make a major contribution to the disability literature and is likely to spark controversy among disability scholars. The book's central contribution is the articulation of an ethics of care for meeting the "genuine needs" and "legitimate wants" of people with disabilities or chronic

illnesses. We applaud Kittay, who is the mother of a woman with cerebral palsy who has multiple physical and intellectual impairments, for sharing her story in such an eloquent, accessible, and personal manner. The question remains, however, as to whether Kittay's normative theory of care captures the ethical obligations that should exist between the carer and the cared-for. In demanding that the cared-for include the carer as a participant in all their interactions with others, Kittay conceptualizes what paid caregiving relationships should look like in a way we find misguided.

PMID: [32068283](#)

19. Coaching approaches in early intervention and paediatric rehabilitation.

Akhbari Ziegler S, Hadders-Algra M.

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Currently, coaching is increasingly applied to foster the involvement of families with an infant or young child with special needs in early intervention and paediatric rehabilitation. Coaching practices are included in many forms of intervention and are regarded as essential to reach beneficial outcomes for the child and family. There are, however, many ambiguities that blur the concept of coaching and hamper its understanding and integration as an evidence-based approach in early intervention and paediatric rehabilitation: lack of differentiation between coaching and training of families, for example. Challenges to incorporate coaching into professional practice relate to adult learning processes and knowledge acquisition, and transformation of attitudes, beliefs, and treatment habits. In this paper, we review the barriers encountered and the possibilities available to promote successful implementation of coaching in early childhood interventions. **WHAT THIS PAPER ADDS:** Literature defines coaching ambiguously, which hampers its implementation in early intervention. The term 'coaching' should be reserved for relationship-directed, family-centred intervention.

PMID: [32065385](#)

20. Novel insights into cerebral palsy.

Bartels EM, Korbo L, Harrison AP.

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Cerebral palsy (CP) is a neurodevelopmental disorder characterized by abnormalities of muscle tone, movement and motor skills, and is attributed to injury to the developing brain. CP affects about 1 in 500 neonates. CP shows clinical features which evolve with age, and these may over time lead to deterioration of motor function although the lesion to the developing brain is non-progressive. The underlying causes for CP remain unclear. Based on recent research we are able to give a physiological explanation on the appearance and development of the condition. The damage to the central nervous system causes a change in collagen structure, with a higher level of deposition of collagen around the muscles, increasing throughout life. Assuming this premise is correct, the question is, will it by any treatment be possible to delay or prevent this collagen accumulation in the CP muscles, thereby giving CP patients a better prognosis in the future.

PMID: [32065339](#)