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Interventions and Management

1. Effectiveness of Hand-Arm Bimanual Intensive Therapy on Hand Function among Children with Unilateral Spastic Cerebral Palsy: A Meta-Analysis.

Alahmari K, Tedla JS, Sangadala DR, Mukherjee D, Reddy RS, Bairapareddy KC, Kandakurti PK.

Eur Neurol. 2020 Apr 29:1-7. doi: 10.1159/000507325. [Epub ahead of print]

BACKGROUND: Hand-arm bimanual intensive therapy (HABIT) has been shown to be an effective method for improving upper-extremity function. However, owing to ambiguity within the evidence of HABIT's effects on hand function among children with unilateral spastic cerebral palsy (CP), this meta-analysis sought to elucidate whether the same was true in this patient population. **SUMMARY:** A computerized database search yielded 468 studies. After meticulous scrutiny and screening of these studies according to the selection criteria, 4 full-text articles were included in the meta-analysis. All 4 studies underwent a methodological quality assessment according to the Physiotherapy Evidence Database Scale (PEDro), with a score of greater than 8. Five comparisons were then made involving the 4 selected randomized controlled trials (RCTs). The effect size was measured using the correlation coefficient (r value). The effect sizes of the individual studies were 0.006, 0.03, 0.04, 0.22, and 0.15. The total effect size was 0.06. **Key Message:** This meta-analysis determined that there is a trivial benefit using HABIT when compared to constraint-induced movement therapy or structured and unstructured bimanual therapy in pediatric patients with unilateral spastic CP. More RCTs are needed to substantiate our evidence.

PMID: [32348996](#)

2. What is the threshold dose of upper limb training for children with cerebral palsy to improve function? A systematic review.

Jackman M, Lannin N, Galea C, Sakzewski L, Miller L, Novak I.

Aust Occup Ther J. 2020 Apr 27. doi: 10.1111/1440-1630.12666. [Epub ahead of print]

INTRODUCTION: Neuroplasticity is harnessed through high-intensity or high-dose training. Given the costs and time burden for families of children with cerebral palsy (CP), it is important to quantify which rehabilitation training approaches and doses confer the largest clinical gain. The main objective of this systematic review was to determine any threshold dose of upper limb training needed for children with CP to achieve clinically significant functional improvements. **METHODS:** This systematic review included studies if they were as follows: randomised controlled trials; participants had a diagnosis of CP or brain injury; mean age of participants was 0-18 years; and intervention was an active upper limb training intervention. Two raters independently extracted data. Data were pooled and analysed using a receiver operator characteristic (ROC) curve and odds ratios to investigate the dose of practice that led to clinically significant gains. **RESULTS:** A total of 74 trials were included in this review. Quantitative analyses included 25 studies (707 participants; age range 18 months to 21 years) for motor function (Assisting Hand Assessment) and 20 studies (491 participants; age range 3 months to 17 years) for individual goal achievement (Canadian Occupational Performance Measure). ROC curve analyses found that approximately 40 hr of practice is needed to improve upper limb motor ability in the unilateral population. For all typographies of CP, individual

goals were achieved at a lower dose (14-25 hr) of practice when goal-directed interventions were provided. **CONCLUSION:** To improve individual goals, children need to practice goals for more than 14-25 hr, combining face-to-face therapy with home practice. To improve general upper limb function (based on evidence in the unilateral population), children need to practice for more than 30-40 hr. Interventions that set functional goals and involve actual practice of those goals lead to goal achievement at a lower dose than general upper limb motor training.

PMID: [32342517](#)

3. A Game-Based Rehabilitation System for Upper-Limb Cerebral Palsy: A Feasibility Study.

Daoud MI, Alhusseini A, Ali MZ, Alazrai R.

Sensors (Basel). 2020 Apr 24;20(8). pii: E2416. doi: 10.3390/s20082416.

Game-based rehabilitation systems provide an effective tool to engage cerebral palsy patients in physical exercises within an exciting and entertaining environment. A crucial factor to ensure the effectiveness of game-based rehabilitation systems is to assess the correctness of the movements performed by the patient during the game-playing sessions. In this study, we propose a game-based rehabilitation system for upper-limb cerebral palsy that includes three game-based exercises and a computerized assessment method. The game-based exercises aim to engage the participant in shoulder flexion, shoulder horizontal abduction/adduction, and shoulder adduction physical exercises that target the right arm. Human interaction with the game-based rehabilitation system is achieved using a Kinect sensor that tracks the skeleton joints of the participant. The computerized assessment method aims to assess the correctness of the right arm movements during each game-playing session by analyzing the tracking data acquired by the Kinect sensor. To evaluate the performance of the computerized assessment method, two groups of participants volunteered to participate in the game-based exercises. The first group included six cerebral palsy children and the second group included twenty typically developing subjects. For every participant, the computerized assessment method was employed to assess the correctness of the right arm movements in each game-playing session and these computer-based assessments were compared with matching gold standard evaluations provided by an experienced physiotherapist. The results reported in this study suggest the feasibility of employing the computerized assessment method to evaluate the correctness of the right arm movements during the game-playing sessions.

PMID: [32344557](#)

4. Joint-Position Sense Accuracy Is Equally Affected by Vision among Children with and without Cerebral Palsy.

de Andrade E Souza Mazuchi F, Mochizuki L, Hamill J, Franciulli PM, Bigongiari A, de Almeida Martins IT, Ervilha UF.

J Mot Behav. 2020 Apr 27;1-8. doi: 10.1080/00222895.2020.1756732. [Epub ahead of print]

We compared the effect of visual information on the dominant upper limb position sense of children with diplegic cerebral palsy (n = 10) and normally developing children (n = 10). An isokinetic dynamometer passively moved the dominant forearm in 120° of elbow flexion/extension until the volunteers stopped the machine to indicate that the elbow joint was positioned in the predetermined target angle. Participants performed this task five times in sequence with and without visual feedback of the elbow angle. We calculated the absolute and the relative position errors related to the final elbow position and the target angle. In both groups, absolute error was significantly higher when vision was occluded. Relative error was not affected by cerebral palsy or visual feedback. When vision was occluded, accuracy on this task was similarly impaired in both groups and precision was not disturbed.

PMID: [32340568](#)

5. Wrist Arthrodesis in Children With Cerebral Palsy.

Vergara-Amador E, Franco-Chaparro L.

Tech Hand Up Extrem Surg. 2020 Apr 28. doi: 10.1097/BTH.0000000000000288. [Epub ahead of print]

Wrist treatment in spastic cerebral palsy includes splints, botulinum toxin, tendon transfers, tendon lengthening, capsular

liberations, and arthrodesis. A well-indicated wrist arthrodesis corrects deformity improving function and cosmetic appearance in patients with fixed deformities. It is indicated in patients with cerebral palsy, older than 12 years with a fixed deformity in wrist flexion. We report 11 clinical cases with the wrist arthrodesis with a plate of 3.5 with 2.7 mm by dorsal approach and technical resources to minimize the complications of tendon irritation and dorsal discomfort. We present an illustrative clinical case. It is a known procedure, its execution must be careful to avoid complications.

PMID: [32349096](#)

6. Functional outcomes of spasticity-reducing surgery and rehabilitation at 1-year follow-up in 30 patients.

Bergfeldt U, Strömberg J, Ramström T, Kulbacka-Ortiz K, Reinholdt C.

J Hand Surg Eur Vol. 2020 Apr 26:1753193420918743. doi: 10.1177/1753193420918743. [Epub ahead of print]

The effects of spasticity-reducing surgery in the upper extremity were assessed in a prospective observational study of 30 consecutive patients with stroke (n = 13), incomplete spinal cord injury (n = 9), traumatic brain injury (n = 5), cerebral palsy (n = 2), and degenerative central nervous system disease (n = 1). Surgery, which included lengthening of tendons and release of muscles, was followed by early rehabilitation at three intensity levels depending on the patients' specific needs and conditions. At 12 months follow-up there were significant improvements in all outcome measures with the following mean values: spasticity decreased by 1.4 points (Modified Ashworth Scale, 0-5), visual analogue pain score by 1.3 points, and both Canadian Occupational Performance Measures increased (performance by 3.4 and satisfaction by 3.6), and most measures of joint position or mobility improved. Hand surgery combined with early and comprehensive rehabilitation improves function, activity and patients' satisfaction in patients with disabling spasticity with improvement lasting for at least 1 year. Level of evidence: II.

PMID: [32338191](#)

7. Efficacy and safety of nabiximols cannabinoid medicine for paediatric spasticity in cerebral palsy or traumatic brain injury: a randomized controlled trial.

Fairhurst C, Kumar R, Checketts D, Tayo B, Turner S.

Dev Med Child Neurol. 2020 Apr 27. doi: 10.1111/dmcn.14548. [Epub ahead of print]

AIM: To assess the efficacy, safety, and tolerability of oromucosal nabiximols cannabinoid medicine as adjunct therapy for children with spasticity due to cerebral palsy/traumatic central nervous system injury with inadequate response to existing treatment. METHOD: Overall, 72 patients (mean [SD] age 12y 4mo [3y 1mo], range 8-18y) were randomized at a ratio of 2:1 to receive nabiximols (n=47; 29 males, 18 females) or placebo (n=25; 15 males, 10 females) for 12 weeks (12 sprays/day max. based on clinical response/tolerability). The primary outcome was change from baseline in level of spasticity on a 0 to 10 Numerical Rating Scale (NRS), assessed by the primary caregiver at 12 weeks. Secondary outcomes included additional measures for spasticity, sleep quality, pain, health-related quality of life, comfort, depression, and safety. RESULTS: There was no significant difference in the spasticity 0 to 10 NRS between nabiximols versus placebo groups after 12 weeks. No statistically significant differences were observed for any secondary endpoint. Adverse events were predominantly mild or moderate in severity; however, three cases of hallucinations were reported. INTERPRETATION: Nabiximols was generally well tolerated; however, neuropsychiatric adverse events were observed. No significant reduction in spasticity with nabiximols treatment versus placebo was observed. WHAT THIS PAPER ADDS: Oromucosal nabiximols is generally well tolerated by paediatric patients. However, three cases of hallucinations were observed, one of which involved auditory hallucinations and a suicide attempt. Oromucosal nabiximols versus placebo did not reduce cerebral palsy/central nervous system injury-related spasticity.

PMID: [32342496](#)

8. Derotational Subtrochanteric Osteotomy and External Fixation for the Treatment of Neurogenic Hip Dislocation in Children with Cerebral Palsy: Could This Be a Viable Method of Treatment?

Angelis S, Vynichakis G, Trellopoulos A, Apostolopoulos A, Filippou D, Salmas M, Chandrinos M, Balfousias T, Palaiodimos L, Kyriazi N, Michelarakis J.

Cureus. 2020 Mar 27;12(3):e7437. doi: 10.7759/cureus.7437.

Purpose The treatment of painful and chronic dislocated hip in children with severe cerebral palsy (CP) is particularly demanding and controversial. Numerous surgical techniques have been described, and their outcomes vary a lot. The purpose of the present study is to evaluate a new method, which combines varus derotational subtrochanteric osteotomy (VDSO) and external osteosynthesis: (VDSOEO). **Methods** Six non-ambulatory children with spastic quadriplegia and chronic dislocated painful hips were treated. The technique involved a small incision on the subtrochanteric site of the osteotomy, followed by retention with a single-sided external osteosynthesis with rotational correction capability [swiveling clamp (SC)] for the reduction of the femur head in the acetabulum, and finally by the osteotomy. Hardware was removed without a second intervention four-six months postoperatively and after the osteotomy was healed. Evaluation of the method was based on clinical, functional, and radiological criteria. **Results** Four patients achieved improved radiological scores. Two patients demonstrated resubluxation during the period of the osteotomy's healing process. However, no patients experienced pain, and all were able to sit post-surgery, while caregivers reported improved capacity for nursing care. **Conclusions** It is our strong belief that this approach can improve the quality of life in children with severe CP and painful and chronic dislocated hips. It is a viable and definitely less invasive procedure than classic pelvic or femur osteotomies.

PMID: [32351817](#)

9. Femoral shaft fractures in children with non-ambulatory neuromuscular disorders can be effectively treated using flexible intramedullary nails.

Siddiqui AA, Illingworth KD, Abousamra OA, Meisel EM, Kay RM.

J Child Orthop. 2020 Apr 1;14(2):132-138. doi: 10.1302/1863-2548.14.190154.

PURPOSE: There is little information in the literature regarding flexible intramedullary nails (FIN) for treating femur fractures in children with neuromuscular disorders. The purpose of this study is to investigate the outcomes of FIN for femoral shaft fractures in non-ambulatory children with neuromuscular disorders. **METHODS:** A retrospective review was conducted on patients with femur fractures at a paediatric hospital between 2004 and 2018. Inclusion criteria were femoral shaft fracture treated with FIN. Outcomes were compared between patients with neuromuscular disorders (NM group) and a control group of those without neuromuscular disorders. **RESULTS:** A total of 37 patients with 37 femoral shaft fractures were studied (12 patients in the NM group and 25 in the control group). All NM group patients were non-ambulatory at baseline. Fractures were length stable in all 25 patients in the control group and in 2/12 (17%) patients in the NM group. All fractures healed in both groups. Three complications (all nail migrations) requiring reoperation before fracture union occurred in the NM group, yielding a major complication rate of 25% (3/12) in the NM group versus 0% (0/25) in controls ($p = 0.03$). Angular deformity occurred in 5/12 (42%) NM group patients and 1/25 (4%) control group patient ($p = 0.009$); none required reoperation. **CONCLUSION:** Femur fractures in non-ambulatory children with neuromuscular disorders can be successfully treated with FIN. Angular deformities are common in this population, but had no functional impact in the non-ambulatory NM group patients. Surgeons must also be vigilant for implant prominence and skin breakdown in these patients. **LEVEL OF EVIDENCE:** III.

PMID: [32351626](#)

10. Gait training for adults with cerebral palsy following harmonic modification in rhythmic auditory stimulation.

Kim SJ, Yoo GE, Shin YK, Cho SR.

Ann N Y Acad Sci. 2020 Apr 30. doi: 10.1111/nyas.14306. [Epub ahead of print]

This study aimed to investigate the differences in gait outcomes of young adults with cerebral palsy (CP) following rhythmic auditory stimulation (RAS) with different types of cueing. A total of 13 ambulatory adults with CP were recruited. The participants were assigned to receive either RAS with simple chords or RAS with complex chords. Each participant received 30-min individual sessions three times per week for 4 weeks. In the simple RAS group, basic chords were used for cueing. In the complex RAS group, the diversified chords were adopted from patients' preferred music. At pre- and posttest, spatiotemporal and kinematic parameters and the range of motion (ROM) for each joint during a gait cycle were collected. After RAS,

cadence, velocity, and stride length significantly increased, but no significant group effect was found. Meanwhile, regarding kinematic parameters, a significant interaction effect between time and group was observed with the angle of plantar flexion in the preswing phase and ROM in the ankle. The complex RAS group showed increased maximal ankle plantar flexion in the preswing phase. These results demonstrated that the primary agent for gait control is rhythm, while perception of music facilitates patient engagement in walking differently depending on the level of musical elements.

PMID: [32356332](#)

11. Masticatory efficiency in children with cerebral palsy.

Bakarčić D, Lajnert V, Jokić NI, Gržić R.

Eur Arch Paediatr Dent. 2020 Apr 28. doi: 10.1007/s40368-020-00529-7. [Epub ahead of print]

PURPOSE: The purpose of this investigation was to compare quality of chewing in children with CP to the healthy controls, and determine whether the functional capacity of chewing units and overall dental health affect the quality of chewing. **METHODS:** A total of 86 were included in the investigation: 43 children with CP and 43 controls (13 girls aged 7-16 years and 30 boys aged 9-16 years) residents of the institutions for the children with special needs. Control group included the same number of children matched by age and gender for every child from the test group according to the pairing principle. The number of functional masticatory units was expressed through the number of healthy teeth and teeth with cavities which the patients could use for chewing. Masticatory efficiency assessment was determined by the method of chewed almond transparency after ten chewing cycles. The particles were passed through 12 sieves with diameter range from 0.6 to 7.2 mm. The masticatory efficiency was expressed with the number of sieves needed to pass 50% of the total almond mass. **RESULTS:** Healthy children had significantly more teeth in occlusal contact, while the DMF index did not differ significantly. Both groups had the same number of functional masticatory units. Children with CP had significantly poorer quality of chewing. **CONCLUSION:** Children with CP had significantly poorer quality of chewing which is not affected by tooth functionality, but rather the primary condition.

PMID: [32346832](#)

12. The cardiovascular disease burden of non-traumatic fractures for adults with and without cerebral palsy.

Whitney DG, Bell S, Etter JP, Prisby RD.

Bone. 2020 Apr 23;136:115376. doi: 10.1016/j.bone.2020.115376. [Epub ahead of print]

BACKGROUND: Individuals with cerebral palsy (CP) are vulnerable to non-trauma fracture (NTFx) and have an elevated burden of cardiovascular disease (CVD) related morbidity and mortality. However, very little is known about the contribution of NTFx to CVD risk among adults with CP. The purpose of this study was to determine if NTFx is a risk factor for CVD among adults with CP and if NTFx exacerbates CVD risk compared to adults without CP. **METHODS:** Data from 2011 to 2016 Optum Clinformatics® Data Mart and a random 20% sample Medicare fee-for-service were used for this retrospective cohort study. Diagnosis codes were used to identify adults (18+ years) with and without CP, NTFx, incident CVD up to 2 years (i.e., ischemic heart disease, heart failure, cerebrovascular disease), and pre-NTFx comorbidities. Crude incidence rates per 100 person years of CVD measures were estimated. Cox regression estimated hazard ratios (HR and 95% confidence interval [CI]) for CVD measures, comparing: (1) CP and NTFx (CP + NTFx; n = 1012); (2) CP without NTFx (CP w/o NTFx; n = 8345); (3) without CP and with NTFx (w/o CP + NTFx; n = 257,355); and (4) without CP and without NTFx (w/o CP w/o NTFx; n = 4.8 M) after adjusting for demographics and pre-NTFx comorbidities. **RESULTS:** The crude incidence rate was elevated for CP + NTFx vs. CP w/o NTFx and w/o CP + NTFx for any CVD and for each CVD subtype. After adjustments, the HR was elevated for CP + NTFx vs. CP w/o NTFx for any CVD (HR = 1.16; 95%CI = 0.98-1.38), heart failure (HR = 1.31; 95%CI = 1.01-1.70), and cerebrovascular disease (HR = 1.23; 95%CI = 0.98-1.55); although, only heart failure was statistically significant. The adjusted HR was elevated for CP + NTFx vs. w/o CP + NTFx for any CVD and for each CVD subtype (all P < .05). Stratified analyses showed a higher CVD risk by NTFx location, <65 year olds, and men when comparing CP + NTFx vs. CP w/o NTFx and w/o CP + NTFx. **CONCLUSIONS:** NTFx increases 2-year CVD risk among adults with CP and compared to adults without CP. Findings suggest that NTFx is a risk factor for CVD among adults with CP.

PMID: [32335375](#)

13. The use of a task through virtual reality in cerebral palsy using two different interaction devices (concrete and abstract) - a cross-sectional randomized study.

Leal AF, da Silva TD, Lopes PB, Bahadori S, de Araújo LV, da Costa MVB, de Moraes ÍAP, Marques RH, Crocetta TB, de Abreu LC, Monteiro CBM.

J Neuroeng Rehabil. 2020 Apr 29;17(1):59. doi: 10.1186/s12984-020-00689-z.

BACKGROUND: Cerebral Palsy (CP) is characterised by variable difficulties in muscular action, resulting in inability of the individual to perform functional movement. An option to provide functionality to the individual with CP is the use of computer innovation. The aim of this paper was to verify if there was any performance improvement in a task performed in a virtual environment and if there was transfer to the task performed in the real environment and vice versa in this population.

METHODS: A computer program was developed comprising a motor task, but with two possibilities of user interaction: a) concrete interface (with physical contact): in which the individual touches the computer screen to finish the task and b) abstract interface (no physical contact): in which the individual performs a hand movement in front of the Kinect device. Participants were split into two groups. The experimental group consisted of 28 individuals with CP within the ages of 6 and 15 years old. The control group included 28 typically developing individuals mirroring the age and sex of the experimental group.

RESULTS: Individuals from both groups were able to improve task performance and retain acquired information. The CP group presented worse performance than the control group in all phases of the study. Further findings showed that the CP group presented better performance in the abstract interface than in the concrete interface, whereas, in the control group, the opposite occurred: their best performance was in the concrete. **CONCLUSIONS:** Motor tasks performed by individuals with CP through an interface with a more virtual environment feature (abstract interface: Kinect) provided better performance when compared to an interface with a more real characteristic (concrete interface: Touchscreen). **TRIAL REGISTRATION:** ClinicalTrials.gov Identifier - NCT03352440; Date of registration - November 17, 2017.

PMID: [32349752](#)

14. Improvement of motor performance in children with cerebral palsy treated with exoskeleton robotic training: A retrospective explorative analysis.

Digiacoimo F, Tamburin S, Tebaldi S, Pezzani M, Tagliaferro M, Casale R, Bartolo M.

Restor Neurol Neurosci. 2020 Apr 22. doi: 10.3233/RNN-200001. [Epub ahead of print]

PMID: [32333565](#)

15. Continuity of Care Is Associated with Medical Costs and Inpatient Days in Children with Cerebral Palsy.

Yang KT, Yin CH, Hung YM, Huang SJ, Lee CC, Kuo TJ.

Int J Environ Res Public Health. 2020 Apr 23;17(8). pii: E2913. doi: 10.3390/ijerph17082913.

Background: Children with cerebral palsy (CP) place a considerable burden on medical costs and add to an increased number of inpatient days in Taiwan. Continuity of care (COC) has not been investigated in this population thus far. **Materials and Methods:** We designed a retrospective population-based cohort study using Taiwan's National Health Insurance Research Database. Patients aged 0 to 18 years with CP catastrophic illness certificates were enrolled. We investigated the association of COC index (COCI) with medical costs and inpatient days. We also investigated the possible clinical characteristics affecting the outcome. **Results:** Over five years, children with CP with low COCI levels had higher medical costs and more inpatient days than did those with high COCI levels. Younger age at CP diagnosis, more inpatient visits one year before obtaining a catastrophic illness certificate, pneumonia, and nasogastric tube use increased medical expenses and length of hospital stay. **Conclusions:** Improving COC reduces medical costs and the number of inpatient days in children with CP. Certain characteristics also influence these outcomes.

PMID: [32340141](#)

16. Parental education and the risk of cerebral palsy for children: an evaluation of causality.

Forthun I, Lie RT, Strandberg-Larsen K, Solheim MH, Moster D, Wilcox AJ, Mortensen LH, Tollånes MC.

Dev Med Child Neurol. 2020 Apr 27. doi: 10.1111/dmcn.14552. [Epub ahead of print]

AIM: To explore whether increasing parental education has a causal effect on risk of cerebral palsy (CP) in the child, or whether unobserved confounding is a more likely explanation. **METHOD:** We used data from Norwegian registries on approximately 1.5 million children born between 1967 and 2011. We compared results from a traditional cohort design with results from a family-based matched case-control design, in which children with CP were matched to their first cousins without CP. In addition, we performed a simulation study to assess the role of unobserved confounding. **RESULTS:** In the cohort design, the odds of CP were reduced in children of mothers and fathers with higher education (adjusted odds ratio [OR] 0.67, 95% confidence interval [CI] 0.60-0.75 for maternal education, and adjusted OR 0.75, 95% CI 0.67-0.85 for paternal education). In the family-based case-control design, only an association for maternal education remained (adjusted OR 0.80, 95% CI 0.64-0.99). Results from a simulation study suggested that this association could be explained by unobserved confounding. **INTERPRETATION:** A causal effect of obtaining higher education on risk of CP in the child is unlikely. Results stress the importance of continued research on the role of genetic and environmental risk factors that vary by parents' educational level.

PMID: [32339266](#)**17. The Impact of Intrathecal Baclofen Therapy on Health-related Quality of Life for Children with Marked Hypertonia.**

Stewart K, Copeland L, Lewis J.

Dev Neurorehabil. 2020 Apr 27;1-6. doi: 10.1080/17518423.2020.1753841. [Epub ahead of print]

Purpose: To investigate the effects of intrathecal baclofen therapy (ITB) on health-related quality of life for children with cerebral palsy and neurological conditions. **Method:** This study is part of a longitudinal, multicentre audit. The primary outcome measure, the Caregiver Priorities and Child Health Index of Life with Disabilities, was completed at baseline, 6 and 12 months post ITB implant. **Results:** Forty subjects with cerebral palsy and other neurological conditions demonstrated significant improvement in aspects of health-related quality of life following ITB therapy, mean change 42.3 (SD 14.9) at baseline to 53.3 (SD 14.7) at 12 months ($p < .001$). **Conclusion:** Evidence to demonstrate the utility of ITB in pediatric populations beyond spasticity and dystonia reduction is limited. Our findings suggest that ITB improves aspects of quality of life, comfort, and ease of caregiving in children with cerebral palsy and other neurological conditions.

PMID: [32338172](#)**18. What is the functional mobility and quality of life in patients with cerebral palsy following single-event multilevel surgery?**

Edwards TA, Prescott RJ, Stebbins J, Wright J, Theologis T.

J Child Orthop. 2020 Apr 1;14(2):139-144. doi: 10.1302/1863-2548.14.190148.

PURPOSE: To report functional mobility in patients with diplegic cerebral palsy (CP) at long-term follow-up after single-event multilevel surgery (SEMLS). The secondary aim was to assess the relationship between functional mobility and quality of life (QoL) in patients previously treated with SEMLS. **METHODS:** A total of 61 patients with diplegic CP, mean age at surgery 11 years, eight months (sd 2 years, 5 months), were included. A mean of eight years (sd 3 years, 10 months) after SEMLS, patients were contacted and asked to complete the Functional Mobility Scale (FMS) questionnaire over the telephone and given a weblink to complete an online version of the CP QOL Teen. FMS was recorded for all patients and CP QOL Teen for 23 patients (38%). **RESULTS:** Of patients graded Gross Motor Function Classification System (GMFCS) I and II preoperatively, at long-term follow-up the proportion walking independently at home, school/work and in the community was 71% (20/28), 57% (16/28) and 57% (16/28), respectively. Of patients graded GMFCS III preoperatively, at long-term follow-up 82% (27/33) and 76% (25/33) were walking either independently or with an assistive device at home and school/work, respectively, while

over community distances 61% (20/33) required a wheelchair. The only significant association between QoL and functional mobility was better 'feelings about function' in patients with better home FMS scores ($r = 0.55$; 95% confidence interval 0.15 to 0.79; $p = 0.01$). **CONCLUSION:** The majority of children maintained their preoperative level of functional mobility at long-term follow-up after SEMLS. **LEVEL OF EVIDENCE:** IV.

PMID: [32351627](#)

19. Contextualized Autonomy in Transitional Care for Youth With Neurologic Conditions: The Role of the Pediatric Neurologist.

Bogossian A, Majnemer A, Racine E.

J Child Neurol. 2020 Apr 26;883073820918454. doi: 10.1177/0883073820918454. [Epub ahead of print]

Youth with neurologic conditions experience multiple life transitions. The transfer from pediatric to adult health care systems exemplifies one such complex and multifaceted transition that occurs in parallel with developmental, legal, and social changes that may influence the roles and responsibilities of youth and their caregivers. As a result, ethical situations, questions, and challenges may surface in transition care to which pediatric neurologists may be confronted. In this article, we focus on the topic of autonomy and situations that may arise in transition care in the context of pediatric neurology. Building from a clinical case, we present the concept of contextualized autonomy to work through the questions that arise in the case and propose ways of thinking through those challenging situations in transition care.

PMID: [32338583](#)

20. Is it safe for extended-role radiographers to measure migration percentage in children with cerebral palsy?

Marson BA, Oakley BJ2, Srinivasan S, S S, Chell J, Halliday K, Hunter J, Price K.

Radiography (Lond). 2020 Apr 22. pii: S1078-8174(20)30048-1. doi: 10.1016/j.radi.2020.03.010. [Epub ahead of print]

INTRODUCTION: In the surveillance of children with cerebral palsy, the measurement of migration percentage is used to identify children at risk of hip dislocation. Early identification of children at risk facilitates early intervention with less invasive surgical procedures to prevent further deterioration. The aim of this study is to evaluate the safety of the measurements of migration percentage for surveillance in cerebral palsy by extended-role radiographers by evaluating the reliability and validity of measurements performed by these professionals. **METHODS:** A sample of thirty pelvic x-rays were selected from the local cerebral palsy database. A range of hip displacement was selected including some challenging borderline x-rays. All ten extended-role radiographers completed measurements using TraumaCAD which were repeated at a minimum of 4 weeks. Inter-rater and intra-rater reliability was calculated using intraclass correlation coefficients. The accuracy and safety of the system was evaluated by converting measurements into referral categories (red, amber or green) and cohen's kappa was calculated when categories were compared to measurements to orthopaedic surgeon **RESULTS:** The inter-rater reliability between radiographers was 0.938 (95% CI 0.914-0.991). The intra-rater reliability was 0.941 (95% CI 0.931-0.949). The percentage agreement was 94.8% for green, 93.8% for amber and 98.2% for red hips. The weighted kappa value was 0.923 (95% CI 0.889-0.957). **CONCLUSION:** The reliability and accuracy of radiographer measurement of migration percentage is excellent. It is safe for radiographers to calculate the migration percentage using semi-automated software for the surveillance of children with cerebral palsy. **IMPLICATIONS FOR PRACTICE:** We recommend the measurement of migration percentage may be performed by extended-role radiographers to deliver accurate and reliable measurements for use in cerebral palsy surveillance.

PMID: [32335020](#)

21. A transcranial magnetic stimulation study for the investigation of corticospinal motor pathways in children with cerebral palsy.

Tekgul H, Saz U, Yilmaz S, Polat M, Aktan G, Kose T, Kitis O, Gokben S.

J Clin Neurosci. 2020 Apr 22. pii: S0967-5868(20)30443-4. doi: 10.1016/j.jocn.2020.04.087. [Epub ahead of print]

The aim of this study is to perform transcranial magnetic stimulation (TMS)-based investigation of corticospinal motor pathways in children with cerebral palsy (CP) secondary to hypoxic-ischemic encephalopathy (HIE). TMS parameters including motor evoked potentials (MEPs) and central motor conduction time (CMCT) were recorded in 38 children with CP and 46 age-matched healthy controls. The z-score of MEPs were analyzed with respect to the types of MRI patterns of cortical involvement in children with CP. MEP latency values were correlated with the weight and height of children and to reflect the maturation of the corticospinal pathway. TMS evoked MEPs with prolonged onset latencies in 64% of children with CP while 10% of the CP group failed to elicit MEPs. Related with the MRI pattern, multicystic encephalomalacia (89%) was associated with the highest rates of abnormal cortical MEPs, as followed by periventricular leukomalacia (80%), basal ganglia involvement (66%) and focal cortical involvement (60%) patterns. Children with CP as compared with healthy controls had similar CMCT values on the upper and lower extremities in children with all cortical MR patterns. MEP abnormalities with TMS were consistent with the extent of motor cortex lesions on MRI patterns in CP children with HIE.

PMID: [32334959](#)

22. Novak and Honan reply to Foley: A red stoplight response.

Novak I, Honan I.

Aust Occup Ther J. 2020 Apr 29. doi: 10.1111/1440-1630.12665. [Epub ahead of print]

PMID: [32350867](#)

23. Spastic Diplegia in a Haitian Girl with Angelman Syndrome.

Latchman K, Nieto-Moreno M, Alberola RL.

J Pediatr Genet. 2020 Jun;9(2):104-108. doi: 10.1055/s-0039-1697029. Epub 2019 Sep 23.

Spastic diplegia, a muscle hypertonia motor syndrome, can occur in conjunction with the characteristic abnormal movement features of Angelman syndrome (AS), a neurodevelopmental disorder with primary features of ataxic gait, happy demeanor, developmental delay, speech impairment, intellectual disability, microcephaly, and seizures. Spastic diplegia is classically associated with cerebral palsy (CP), an umbrella term encompassing developmental delay, abnormal brain magnetic resonance imaging findings, and various types of CP including spastic, ataxic, dyskinetic, and mixed types. We present a 12-year-old Haitian patient of African descent with AS due to a microdeletion involving the entire UBE3A (ubiquitin-protein ligase E3A) gene and spastic diplegia. She was initially given a clinical diagnosis of CP. Cases of AS in patients of African descent have been rarely reported and this case of severe spastic diplegia, unresponsive to medical intervention, reflects a rarely reported presentation of AS in patients of African descent and possibly the first reported case of a Haitian patient with this clinical presentation. Given that deletions are the most common mechanism resulting in AS, this case report provides supportive evidence that chromosome 15q11 deletion-type AS is most frequently associated with spastic diplegia, a more severe motor impairment phenotype in AS.

PMID: [32341813](#)

Prevention and Cure

24. Magnesium sulfate for prevention of cerebral palsy: If not now, when?

Grobman WA.

BJOG. 2020 Apr 27. doi: 10.1111/1471-0528.16281. [Epub ahead of print]

The increased risks to children born preterm have been well delineated. Not only are they at risk for neonatal complications, such as necrotizing enterocolitis and respiratory distress syndrome, but they are at significantly increased risk for long-term complications such as neurodevelopmental impairment. Indeed, prematurity is a primary etiologic factor for cerebral palsy (CP).

PMID: [32339385](#)