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Interventions and Management

1. Brain Lesions as a Predictor of Therapeutic Outcomes of Hand Function in Infants With Unilateral Cerebral Palsy. Chamudot R, Parush S, Rigbi A, Gross-Tsur V.

J Child Neurol. 2018 Oct 11:883073818801632. doi: 10.1177/0883073818801632. [Epub ahead of print]

AIM: The present study aimed to investigate whether the response variability of infants to modified constraint-induced movement therapy and bimanual therapy are associated with different types of brain lesions. **METHOD:** Infants with unilateral cerebral palsy (N = 22) ages 8-15 months (mean = 10.95, standard deviation = 2.15 months) were grouped according to having either a periventricular brain lesion or a middle cerebral artery infarct lesion. Improvement in hand function was analyzed based on the mini-Assistive Hand Assessment results. **RESULTS:** Infants with periventricular brain lesion displayed greater positive response to upper limb treatment compared to those with middle cerebral artery infarct (P = .02). A significant difference in improvement according to type of treatment was found in the middle cerebral artery infarct group but not in the periventricular brain lesion. **CONCLUSION:** The present study showed an association between the type of brain lesion and the efficacy of upper limb treatment in infants. Infants with periventricular brain lesions displayed greater positive responses than those with middle cerebral artery infarct.

PMID: [30307370](#)

2. The Combined Use of Transcranial Direct Current Stimulation and Robotic Therapy for the Upper Limb. Pai MYB, Terranova TT, Simis M, Fregni F, Battistella LR.

J Vis Exp. 2018 Sep 23;(139). doi: 10.3791/58495.

Neurologic disorders such as stroke and cerebral palsy are leading causes of long-term disability and can lead to severe incapacity and restriction of daily activities due to lower and upper limb impairments. Intensive physical and occupational therapy are still considered main treatments, but new adjunct therapies to standard rehabilitation that may optimize functional outcomes are being studied. Transcranial direct current stimulation (tDCS) is a noninvasive brain stimulation technique that polarizes underlying brain regions through the application of weak direct currents through electrodes on the scalp, modulating cortical excitability. Increased interest in this technique can be attributed to its low cost, ease of use, and effects on human neural plasticity. Recent research has been performed to determine the clinical potential of tDCS in diverse conditions such as depression, Parkinson's disease, and motor rehabilitation after stroke. tDCS helps enhance brain plasticity and seems to be a promising technique in rehabilitation programs. A number of robotic devices have been developed to assist in the rehabilitation of upper limb function after stroke. The rehabilitation of motor deficits is often a long process requiring multidisciplinary approaches for a patient to achieve maximum independence. These devices do not intend to replace manual rehabilitation therapy; instead, they were designed as an additional tool to rehabilitation programs, allowing immediate perception of results and tracking of improvements, thus helping patients to stay motivated. Both tDCS and robot-assisted

therapy are promising add-ons to stroke rehabilitation and target the modulation of brain plasticity, with several reports describing their use to be associated with conventional therapy and the improvement of therapeutic outcomes. However, more recently, some small clinical trials have been developed that describe the associated use of tDCS and robot-assisted therapy in stroke rehabilitation. In this article, we describe the combined methods used in our institute for improving motor performance after stroke.

PMID: [30295660](#)

3. Effectiveness of robotics in improving upper extremity functions among people with neurological dysfunction: A Systematic Review.

Dixit S, Tedla JS.

Int J Neurosci. 2018 Oct 12:1-34. doi: 10.1080/00207454.2018.1536051. [Epub ahead of print]

PURPOSE: the primary focus of this review was to find out the effectiveness of robotics in improving upper extremity functions among people with neurological problems in the arena of physical rehabilitation. **MATERIAL AND METHODS:** Two reviewers independently scrutinized the included studies. The selected studies underwent quality assessment by PEDro scale. Randomized Controlled Trial (RCT) having a score of 4 or more were included in the review. A search was conducted in PUBMED, MEDLINE, CINAHL, EMBASE, PROQUEST, science direct, Cochrane Library, Physiotherapy Evidence Database (PEDro) and Google Scholar. **RESULTS:** A total of 202 studies were identified. After removal of duplication, inclusion and exclusion criteria's n = 23 studies were included in the review process. For analysis, only the primary outcome measures of the studies were taken into account. Studies finally included in analysis were n = 21. The included studies were 19 in stroke, 1 in cerebral palsy (CP), and 1 study in multiple sclerosis (MS). No RCTs were reportedly found in spinal cord injury, Parkinson and motor neuron disease. **CONCLUSION:** Studies related to stroke showed a clear definiteness in the improvement of upper extremity functions. Whereas on the contrary there still remains a need for quality trials in cerebral palsy, multiple sclerosis to establish the efficacy of robotics in upper extremity rehabilitation.

PMID: [30311823](#)

4. The effects of vest type dynamic elastomeric fabric orthosis on sitting balance and gross manual dexterity in children with cerebral palsy: a single-blinded randomised controlled study.

Giray E, Karadag-Saygi E, Ozsoy T, Gungor S, Kayhan O.

Disabil Rehabil. 2018 Oct 7:1-9. doi: 10.1080/09638288.2018.1501098. [Epub ahead of print]

PURPOSE: To evaluate the effects of vest type dynamic elastomeric fabric orthosis on posture and balance during sitting and gross manual dexterity and to compare the efficacy of daily wearing time of 2 h versus 6 h. **METHOD:** Twenty-four children with cerebral palsy (CP) aged 3-9 years with GMFCS levels III and IV were randomised to either of three groups: (i) a control group who received only conventional exercise therapy, (ii) dynamic elastomeric fabric orthosis 2 h group who wore the orthosis for 2 h during therapy and dynamic elastomeric fabric orthosis 6 h group who wore the orthosis for 4 h in addition to the 2 h of wear along with therapy during hospital inpatient stay for 2 weeks. Children continued to use dynamic elastomeric fabric orthosis during the post-discharge period. The primary outcome measure was the Sitting Assessment Scale. The secondary outcome measurements were the sitting dimension of Gross Motor Function Measure, Box and Block Test and Parent Satisfaction Survey. Assessments were made before treatment, at post-treatment, at 1-month post-treatment, and at 3-months post-treatment. Sitting Assessment Scale and Box and Block Test were also assessed when immediately after wearing the orthosis. This trial is registered with Clinicaltrials.gov, under number NCT03191552. **RESULTS:** All groups showed similar improvements except the control group which showed less improvement in Sitting Assessment Scale scores compared to the dynamic elastomeric fabric orthosis groups. Dynamic elastomeric fabric orthosis groups showed greater improvements compared to the control group in the Sitting Assessment Scale but not in the sitting dimension of Gross Motor Function Measure and Box and Block Test at post-treatment, at 1-month post-treatment and at 3-months post-treatment. When the dynamic elastomeric fabric orthosis groups (2 h versus 6 h) were compared, there were no significant differences in any of the assessments. The Sitting Assessment Scale and Box and Block Test scores also improved immediately after the patients put on the orthosis. At 1-month post-treatment, parents of children in the control group reported less satisfaction than parents of the children in dynamic elastomeric fabric orthosis groups. **CONCLUSIONS:** Dynamic elastomeric fabric orthosis vest has an immediate effect on the sitting balance and gross manual dexterity. It also provides improvements in posture and balance during sitting. Wearing dynamic elastomeric fabric orthosis vest for 2 h during therapy is as much effective as wearing it for 6 h in children with CP in addition to therapy to improve sitting balance. Implications for rehabilitation Dynamic elastomeric fabric orthosis vest provides improvements in sitting balance when used in addition to conventional therapy in children with cerebral palsy. Wearing dynamic elastomeric fabric orthosis for 2 h and wearing dynamic elastomeric fabric orthosis vest for 6 h

resulted in similar clinical outcomes. Dynamic elastomeric fabric orthosis vest has an immediate effect on sitting balance and gross manual dexterity in children with cerebral palsy.

PMID: [30293457](#)

5. Comparison of simultaneous static standing balance data on a pressure mat and force plate in typical children and in children with cerebral palsy.

Bickley C, Linton J, Sullivan E, Mitchell K, Slota G, Barnes D.

Gait Posture. 2018 Aug 16;67:91-98. doi: 10.1016/j.gaitpost.2018.08.012. [Epub ahead of print]

BACKGROUND: Balance testing is an important component in treatment planning and outcome assessment for children with Cerebral Palsy (CP). Objective measurement for static standing balance is typically conducted in motion labs utilizing force plates; however, a plantar pressure mat may prove to be a viable alternative for this type of balance assessment. **METHODS:** This study examined static standing balance simultaneously on a force plate and a plantar pressure mat in 30 typically developing (TD) and 30 children with CP to determine if valid measures of static standing balance could be obtained in children with CP using a pressure mat. **RESULTS:** Examination of the data provided evidence that reliable and valid measures of static standing balance can be produced with a plantar pressure mat for both groups. Five variables out of the 21 variables examined were found to be reliable and valid on both devices (pressure mat and force plate) for both subgroups (TD and CP). The variables medial/lateral (ML) average radial displacement, range moved-ML, anterior/posterior average velocity, ellipse area, and area per second were found to have high test-retest reliability ($ICC > .6$) and possess discriminant validity between the subgroups (TD vs. CP). Additionally, the ellipse area and area per second variables also had the ability to discriminate between GMFCS levels. A normative center of pressure (CoP) balance data set using all 21 variables was also established for typically developing children for both devices (pressure mat and force plate) within this study. **SIGNIFICANCE:** The ability to utilize a portable plantar pressure mat for quick and reliable standing balance measurement allows for expanded ability to capture objective data in a variety of settings thereby increasing opportunity for outcomes analysis.

PMID: [30308334](#)

6. Selective dorsal rhizotomy in ambulant children with cerebral palsy.

Wang KK, Munger ME, Chen BP, Novacheck TF.

J Child Orthop. 2018 Oct 1;12(5):413-427. doi: 10.1302/1863-2548.12.180123.

BACKGROUND: Selective dorsal rhizotomy (SDR) is a surgical procedure for treating spasticity in ambulant children with cerebral palsy (CP). However, controversies remain regarding indications, techniques and outcomes. **CURRENT EVIDENCE SUMMARY:** Because SDR is an irreversible procedure, careful patient selection, a multi-disciplinary approach in assessment and management and division of the appropriate proportion of dorsal rootlets are felt to be paramount for maximizing safety. Reliable evidence exists that SDR consistently reduces spasticity, in a predictable manner and to a substantial degree. However, functional improvements are small in the short-term with long-term benefits difficult to assess. **FUTURE OUTLOOK:** There is a need for high-quality studies utilizing long-term functional outcomes and well-matched control groups. Collaborative, multicentre efforts are required to further define the role of SDR as part of the management paradigm in maximizing physical function in spastic CP.

PMID: [30294365](#)

7. Neuromuscular correlates of motor function in cerebral palsy: towards targeted treatment.

Rose JI.

Dev Med Child Neurol. 2018 Oct 7. doi: 10.1111/dmcn.14062. [Epub ahead of print]

PMID: [30294935](#)

8. Approach to bone procedure in fixed equinovarus deformity in cerebral palsy.

Thamkunanon V, Kamisan N.

J Orthop. 2018 Sep 26;15(4):1008-1012. doi: 10.1016/j.jor.2018.09.001. eCollection 2018 Dec.

Fixed equinovarus deformity in cerebral palsy requires bone procedures for surgical correction. We reported the outcome of surgical procedure establishing the approach to multiple osteotomy and fusion to this problem. Retrospectively, 55 feet were reviewed. Step of surgical evaluation were applied to all patients by addressing each component of equinovarus deformity. 31 feet achieved correction by multiple osteotomy. Overall 78% had good outcome and maintained plantigrade foot. This study had outlined a simple surgical step-approached procedure to address fixed equinovarus deformity in cerebral palsy with high success rates. We recommended multiple bone osteotomy to preserve joint motion.

PMID: [30302034](#)**9. Kinematic adaptation and changes in gait classification in running compared to walking in children with unilateral spastic cerebral palsy.**

Krätschmer R, Böhm H, Döderlein L.

Gait Posture. 2018 Oct 3;67:104-111. doi: 10.1016/j.gaitpost.2018.09.031. [Epub ahead of print]

BACKGROUND: Classification of sagittal gait patterns in unilateral spastic cerebral palsy (CP) provides direct implication for treatment. Five types are described: type 0 has minor gait deviation; type 1 has inadequate ankle dorsiflexion in swing; type 2 has inadequate ankle dorsiflexion throughout the gait cycle; types 3 and 4 have abnormal function of the knee and hip joint respectively. During gait analysis of children with unilateral spastic CP we observed frequently that a knee flexion deficit disappeared during running. That may have an impact on classification and treatment. **RESEARCH QUESTION:** Does the classification type change while running and how do patients' kinematics adapt to running? **METHODS:** 64 children with unilateral spastic CP were classified using instrumented gait analysis for walking and running. The deviation of four parameters from typically developing children (TD) were used to distinguish between types: peak ankle dorsiflexion in swing for type 1, peak ankle dorsiflexion in stance for type 2, knee range of motion for type 3, and hip range of motion for type 4. A three-factor ANOVA for factors group (CP/TD), locomotion (walk/run) and limb side (in-/uninvolved) was conducted. **RESULTS:** The number of patients with type 1, 3 and 4 decreased considerably from walking to running, whereas, the number of type 0 and 2 patients increased. The ANOVA showed that three of four parameters of patients' pathologic limb adapt similarly to TD to running, except for the ankle dorsiflexion in stance. **SIGNIFICANCE:** Running shows that there is a natural way to resolve abnormalities. Therefore, recommended treatments of hip and knee joint abnormalities based on the walking classification can be questioned and additional running analysis may be important for surgical decision making.

PMID: [30312847](#)**10. Mechanical work, kinematics, and kinetics during sit-to-stand in children with and without spastic diplegic cerebral palsy.**

Suriyaamarit D, Boonyong S.

Gait Posture. 2018 Oct 1;67:85-90. doi: 10.1016/j.gaitpost.2018.09.030. [Epub ahead of print]

BACKGROUND: Sit-to-stand (STS) is one of the most common fundamental activity in daily life. The pathology of the neuromuscular control system in children with spastic diplegic cerebral palsy (SDCP) could contribute to atypical movement patterns leading to the inefficiency performance including the STS task. However, there was also a lack of evidence about kinematics, kinetics, and especially mechanical work during the STS task in children with SDCP aged 7-12 years old. **RESEARCH QUESTION:** What were the differences in mechanical work, kinematics and kinetics during STS task between children with SDCP and typically developing (TD) children? **METHODS:** Eleven children with SDCP (GMFCS I-II) and eleven age and gender-matched control TD children with an age range of 7-12 years were enrolled. Motion analysis and force plate systems were used to collect data. All participants performed the STS task from an adjustable chair. Independent sample t-test and two-way analysis of variance were used in this study. **RESULTS:** The children with SDCP took a longer time and used more mechanical work during STS than TD children. At the beginning of the STS task, children with SDCP showed more trunk flexion and posterior pelvic tilting; in addition, during the STS task they also presented more trunk, hip, and knee flexion than TD children. However, the children with SDCP showed less ankle dorsiflexion compared with TD children. For the kinetic variables, asymmetry was found in children with SDCP. The maximum hip and knee extension moment, plantar flexion

moment, and peak vertical ground reaction force (GRF) of the non-dominant leg were higher than the values of the dominant leg in these children. SIGNIFICANCE: Even though, children with SDPCP who are able to independently STS. They were also a mechanically less efficient performance during STS task. Therefore, this task still needs to be trained during rehabilitation sessions.

PMID: [30292914](#)

11. Differences in cardiovascular health in ambulatory persons with cerebral palsy.

McPhee PG, Wong-Pack M, Obeid J, MacDonald MJ, Timmons BW, Gorter JW.

J Rehabil Med. 2018 Oct 9. doi: 10.2340/16501977-2491. [Epub ahead of print]

OBJECTIVE: To compare cardiovascular health variables and physical activity levels of adolescents and adults with cerebral palsy who are Gross Motor Function Classification System (GMFCS) levels I and II. **METHODS:** Eleven adolescents (mean age 13.1 (standard deviation (SD) 2.1) years) and 14 adults (mean age 31.7 (SD 10.4) years) with cerebral palsy were included, grouped by their GMFCS level (level I (n = 12); level II (n = 13)). Assessments of cardiovascular health, body composition and physical activity levels were performed. Cardiovascular variables included resting blood pressure and carotid artery intima media thickness. Body composition included height, weight, body mass index, and waist circumference. Physical activity was measured using accelerometry. **RESULTS:** Adjusting for age between GMFCS levels (GMFCS I mean 17.3 (SD 5.2); GMFCS II mean 29.3 (SD 14.1) years, $p = 0.011$), significant differences were evident for moderate-to-vigorous physical activity per day (GMFCS I median 45.8 (interquartile range (IQR) 32.4-75.1); GMFCS II median 16.4 (IQR 13.0, 25.0) min/day, $p = 0.011$), height (GMFCS I mean 1.63 (SD 0.14); GMFCS II mean 1.56 (SD 0.12) m, $p = 0.010$), mean arterial pressure (GMFCS I mean 84.6 (SD 7.8); GMFCS II mean 89.4 (SD 8.5) mmHg, $p = 0.030$), and carotid artery intima media thickness (GMFCS I mean 0.431 (SD 0.06); GMFCS II mean 0.489 (SD 0.04), $p = 0.026$). **CONCLUSION:** Individuals with cerebral palsy who were GMFCS level I had lower mean arterial pressure, thinner carotid artery intima media thickness, and engaged in a greater amount of moderate-to-vigorous physical activity per day than those who were GMFCS level II. Clinicians should acknowledge that ambulatory individuals with cerebral palsy could have differing cardiovascular health profiles and should monitor these cardiovascular variables and discuss physical activity during healthcare visits, regardless of age.

PMID: [30299522](#)

12. Cardiovascular disease and other childhood-onset chronic conditions in adults with cerebral palsy.

Edwards JD.

Dev Med Child Neurol. 2018 Oct 7. doi: 10.1111/dmcn.14066. [Epub ahead of print]

PMID: [30294910](#)

13. Fatigue in adults with cerebral palsy: A three-year follow-up study.

Oude Lansink ILB, McPhee PG, Brunton LK, Gorter JW.

J Rehabil Med. 2018 Oct 9. doi: 10.2340/16501977-2493. [Epub ahead of print]

OBJECTIVES: To describe the course of fatigue over a 3-year follow-up period in adults with cerebral palsy and to investigate the association of known determinants of fatigue (i.e. demographic characteristics and/or body composition) with change in fatigue. **METHODS:** Forty-one adults with cerebral palsy from a previous study of fatigue were invited to participate in a follow-up study. Twenty-three adults with cerebral palsy (Gross Motor Function Classification System (GMFCS) levels I-V; mean age 38 years 2 months, standard deviation (SD) 14 years 1 month) agreed to participate (convenience sample). Fatigue was measured with the Fatigue Impact and Severity Self-Assessment (FISSA, range 31-157) questionnaire. The course of fatigue is described at group, subgroup (GMFCS) and individual levels. **RESULTS:** The mean FISSA score for all participants was 84.0 (SD 27.7) at baseline and 91.7 (SD 26.7) at follow-up. Despite variations among individuals in the change of fatigue, there was no statistically significant difference in FISSA score over time ($p = 0.087$, 95% confidence interval (95% CI) -16.7 to 1.22). No known determinants of fatigue predictive of change in FISSA scores were found. **DISCUSSION:** Fatigue appears to be relatively stable within adults with cerebral palsy over time, with a variable presentation between individuals and across GMFCS levels. Care providers should monitor and discuss fatigue in young individuals with cerebral palsy in order to attenuate fatigue later in life.

PMID: [30299521](#)

14. Apgar score and risk of autism.

Modabbernia A, Sandin S, Gross R, Leonard H, Gissler M, Parner ET, Francis R, Carter K, Bresnahan M, Schendel D, Hornig M, Reichenberg A.

Eur J Epidemiol. 2018 Oct 5. doi: 10.1007/s10654-018-0445-1. [Epub ahead of print]

Low Apgar score has been associated with higher risk for several neurological and psychiatric disorders, including cerebral palsy and intellectual disability. Studies of the association between Apgar score and autism spectrum disorder (ASD) have been inconsistent. We aimed to investigate (1) the association between low Apgar score at 5 min and risk for ASD, and (2) the modifying effects of gestational age and sex on this association in the largest multinational database of ASD. We included prospective data from 5.5 million individuals and over 33,000 cases of ASD from Norway, Sweden, Denmark and Western Australia who were born between 1984 and 2007. We calculated crude and adjusted risk ratios (RR) with 95% confidence intervals (95% CIs) for the associations between low Apgar score and ASD. All analyses for ASD were repeated for autistic disorder (AD). We used interaction terms and stratified analysis to investigate the effects of sex, gestational age, and birth weight on the association. In fully adjusted models, low Apgar scores (1-3) (RR, 1.42; 95% CI, 1.16-1.74), and intermediate Apgar scores (4-6) (RR, 1.50; 95% CI, 1.36-1.65) were associated with a higher RR of ASD than optimal Apgar score (7-10). The point estimates for low (RR, 1.88; 95% CI, 1.41-2.51) and intermediate Apgar score (RR, 1.54; 95% CI, 1.32-1.81) were larger for AD than for ASD. This study suggests that low Apgar score is associated with higher risk of ASD, and in particular AD. We did not observe any major modifying effects of gestational age and sex, although there seems to be substantial confounding by gestational age and birth weight on the observed association.

PMID: [30291529](#)

15. Self-care and manual ability in preschool children with cerebral palsy: a longitudinal study.

Burgess A, Boyd RN, Ziviani J, Ware RS, Sakzewski L.

Dev Med Child Neurol. 2018 Oct 7. doi: 10.1111/dmcn.14049. [Epub ahead of print]

AIM: To describe longitudinal development of self-care and its relationship to manual ability in children with cerebral palsy (CP) aged 18 months to 5 years across all functional abilities. METHOD: This was a prospective longitudinal population-based study of 290 children with CP (178 [61%] males, 112 [39%] females). Self-care was assessed using the Pediatric Evaluation of Disability Inventory (PEDI). At 60 months (n=242), children were classified using the Manual Ability Classification System (MACS); 113 in level I (47%), 61 in MACS level II (25%), 24 in MACS level III (10%), 14 in MACS level IV (6%), and 30 in MACS level V (12%). Measures were taken at 18 months, 24 months, 30 months, 36 months, 48 months, and 60 months of age. Longitudinal analyses were performed using mixed-effects linear regression models. RESULTS: Self-care development achieved by 60 months was negatively associated with the severity of manual ability impairment. Distinct self-care developmental trajectories were found with estimated changes in PEDI self-care scaled scores per month: 0.61 for MACS level I, 0.46 for MACS levels II, 0.31 for MACS level III, 0.16 for MACS level IV, and 0.03 for MACS level V. Children classified in MACS level V had the lowest level of self-care skills at 18 months and showed no progress in self-care development. INTERPRETATION: This study reports rate of self-care development in preschool children with CP. Self-care performance was highest in children with greatest manual ability. Clinicians may use rates of change to predict or monitor self-care performance. PEDI trajectories inform goal setting in discussions with families regarding expected levels of independence in self-care. WHAT THIS PAPER ADDS: Distinct self-care developmental trajectories in children with cerebral palsy were found according to Manual Ability Classification System (MACS) levels. Children in MACS levels IV and V with epilepsy did not show any significant change in self-care. Children in MACS levels IV and V without epilepsy demonstrated small yet significant gains in self-care performance.

PMID: [30294776](#)

16. Potential benefits of the cognitive orientation to daily occupational performance approach in young adults with spina bifida or cerebral palsy: a feasibility study.

Peny-Dahlstrand M, Bergqvist L, Hofgren C, Himmelmann K, Öhrvall AM.

Disabil Rehabil. 2018 Oct 8:1-12. doi: 10.1080/09638288.2018.1496152. [Epub ahead of print]

PURPOSE: People with cerebral palsy (CP) or spina bifida (SB) often struggle to perform everyday-life activities. Both groups frequently also have difficulties in creating and using strategies effectively when performing tasks. The cognitive orientation to

daily occupational performance (CO-OP) Approach combines the learning of cognitive strategies with task-specific approaches through a client-centred procedure. The aim of this study was to investigate whether the CO-OP Approach is feasible for and potentially beneficial to adolescents and young adults with CP or SB in Sweden by analysing four areas of feasibility (acceptability, efficacy, adaptation, and expansion). **METHODS:** Exploratory multiple-case study using mixed methods. Ten persons aged 16-28, five with each condition, participated in an intervention period. Assessments were performed on three occasions: baseline, post-intervention, and six-month follow-up. **RESULTS:** The result demonstrates that the CO-OP Approach has the potential to enable adolescents and young adults with either condition to achieve personal goals and to enhance their planning skills and their ability to use strategies when performing activities. This approach is also compatible with the core values of habilitation in Sweden and was found by the participants to be highly meaningful and useful. **CONCLUSIONS:** The CO-OP Approach is feasible for adolescents and young adults with SB or CP in Sweden. Implications for rehabilitation The Cognitive Orientation to daily Occupational Performance • is a feasible approach for adolescents and young adults with spina bifida and with cerebral palsy. • is a promising approach when it comes to enabling the achievement of personal goals. • might have potential to enhance executive functioning through strategy use. • is in line with the fundamental core values of disability rights of inclusion, empowerment, and participation.

PMID: [30296847](#)

17. Family-centred health care for children with cerebral palsy.

Shevell M, Oskoui M, Wood E, Kirton A, Van Rensburg E, Buckley D, Ng P, Majnemer A.

Dev Med Child Neurol. 2018 Oct 7. doi: 10.1111/dmcn.14053. [Epub ahead of print]

AIM: To identify characteristics of young children with cerebral palsy (CP), and intrinsic and extrinsic factors, that may be associated with parental perceptions regarding family-centred health care services. **METHOD:** We conducted a cross-sectional study, drawing our sample from the Canadian Cerebral Palsy Registry (CCPR). Parents rated the extent of family-centred care provided by their child's health care teams using the 56-item Measures of Process of Care (MPOC) questionnaire. Environmental and CP phenotypic variables were extracted from the CCPR for group comparisons. Low and high MPOC-56 raters were also compared. **RESULTS:** Valid responses were obtained from 282 families (90%). All MPOC-56 subscales were highly rated (median ≥ 6.0), indicating satisfaction with health care services, with the exception of the Providing General Information subscale (median 4.8, interquartile range 3.2-6.0). Parents from Nova Scotia rated all subscales significantly higher than parents from other regions. CP subtype and severity were not significantly associated with MPOC-56 subscale scores. Higher socio-economic status was associated with lower MPOC-56 subscale scores. Higher paternal educational attainment and household income were significantly associated with lower scores on the Providing General Information and Providing Specific Information about the Child subscales respectively. **INTERPRETATION:** Participants affirmed the provision of family-centred services from Canadian pediatric rehabilitation centres. Sociodemographic factors were associated with parental perceptions of family-centred services. **WHAT THIS PAPER ADDS:** Sociodemographic factors were associated with parental perceptions of family-centred care. Factors intrinsic to the child's cerebral palsy were not associated with parental perceptions.

PMID: [30294783](#)

18. Needs of families of children with Cerebral Palsy in Bangladesh: a qualitative study.

Nuri RP, Aldersey HM, Ghahari S.

Child Care Health Dev. 2018 Oct 10. doi: 10.1111/cch.12624. [Epub ahead of print]

PURPOSE: Families of children with disabilities often have needs related to the care of their child with a disability. Although there has been extensive exploration of family needs in high-income contexts, there is little known about this issue in low and middle-income countries like Bangladesh. In this study, we explored the needs of families of children with cerebral palsy in Bangladesh. Such understanding is important as it will help to improve services for children with disabilities and their families. **METHODS:** We used a qualitative approach and interviewed 20 family members of children with cerebral palsy who visited the Centre for the Rehabilitation of the Paralyzed, Bangladesh. We thematically analyzed data from semi-structured interviews. **RESULTS:** Five different themes were found on needs of families with CWDs: (a) financial needs, (b) needs for disability-related services, (c) needs for family and community cohesion, (d) informational needs, and (e) emotional needs. Participants overwhelmingly reported that financial needs were their highest priority. **CONCLUSION:** Needs of families of children with disabilities must be considered in rehabilitation services to improve children's outcomes. Further studies are required to explore needs of families of children with disabilities who do not have access to rehabilitation services.

PMID: [30304759](#)

19. Justice and Neurodevelopmental Disability: Moral-Political Philosophies, Policies, and Their Outcomes.

Racine E, Caron R, Stanton-Jean M.

Semin Pediatr Neurol. 2018 Oct;27:42-52. doi: 10.1016/j.spen.2018.03.006. Epub 2018 Mar 23.

Neurodevelopmental disabilities, such as cerebral palsy and autism, touch a population which has been dubbed to be "doubly vulnerable." Individuals with neurodevelopmental disability have conditions that impair their cognition, communication, mobility, or social interactions, and they also rely on others to make decisions on their behalf. Accordingly, these children-as described in other contributions of this special issue-are particularly prone to suffer from systemic (ie, social, economic, and political) conditions that give or prevent access to quality and timely health care and social services as well as economic opportunities. In this article, we expose 2 different views on the principle of justice (justice as equality and justice as fairness). We then examine policy approaches and general outcomes of 3 countries (Sweden, the United States of America, and the United Kingdom), which have opted for different policy orientations. The United Kingdom's targeted approach to neurodevelopmental disability seems to be generating interesting results while the more general Swedish approach is not without merits, although perhaps more difficult to apply to other countries. Given knowledge gaps, there is great need to compare different policy approaches to neurodevelopmental disability and their real-world implications on the life of individuals and their families.

PMID: [30293589](#)**20. Socioeconomic Status and Pediatric Neurologic Disorders: Current Evidence.**

Durkin MS, Yeargin-Allsopp M.

Semin Pediatr Neurol. 2018 Oct;27:16-25. doi: 10.1016/j.spen.2018.03.003. Epub 2018 Mar 23.

Socioeconomic status (SES) is an important risk factor for many neurological disorders and a determinant of health outcomes and quality of life, especially for individuals with neurologic disorders and developmental disabilities. This article focuses on the relationship between SES and pediatric epilepsy, cerebral palsy, autism spectrum disorder, and intellectual disability. Disparities in the prevalence and long-term impact of SES on functioning in persons with disabilities are observed worldwide. Clinicians can use the information presented in the article to target early identification and interventions for improving outcomes in populations most at risk for these disorders and for poor health, social, and economic outcomes.

PMID: [30293586](#)**21. Risk of Developmental Disorders in Children of Immigrant Mothers: A Population-Based Data Linkage Evaluation.**

Abdullahi I, Wong K, Mutch R, Glasson EJ, de Klerk N, Cherian S, Downs J, Leonard H.

J Pediatr. 2018 Oct 4. pii: S0022-3476(18)31221-6. doi: 10.1016/j.jpeds.2018.08.047. [Epub ahead of print]

OBJECTIVES: To evaluate the prevalence and risks of developmental disability (autism spectrum disorder, intellectual disability, and cerebral palsy) in Western Australian children of different groups of foreign-born women. **STUDY DESIGN:** Western Australian population-based linked data of 764 749 singleton live births from 1980 to 2010 were used to compare disability outcomes among children of foreign-born, Australian-born non-Indigenous, and Indigenous women. The risk of disability was assessed using multinomial logistic regression. **RESULTS:** Overall, the prevalence of any disability was lowest for the children of foreign-born mothers. From 1980 to 1996 but not from 1997 to 2010, children born to mothers from foreign-born low-income countries had an increased relative risk of autism spectrum disorder with intellectual disability, and children born to foreign-born mothers from upper-middle-income countries had an increased risk of cerebral palsy with intellectual disability. After adjusting for smoking, the relative risks of intellectual disability and cerebral palsy with intellectual disability were markedly decreased in children of Australian-born Indigenous mothers. **CONCLUSIONS:** Although we did not find among children born to foreign-born women an increased prevalence across all the measured developmental outcomes, we did observe an increased risk of autism spectrum disorder with intellectual disability and cerebral palsy with intellectual disability for mothers of some foreign-born groups. Our findings related to smoking in the Indigenous population underscore its possible role on the causal pathway to intellectual disability. Maternal migration is considered a factor on the causal pathway to intellectual disability. Maternal migration may be either a risk or a protective factor on the causal pathway to developmental disabilities and the direct role of migration is inconclusive in our study.

PMID: [30293641](#)

22. Paediatric cerebral palsy prevalence and high-risk factors in Henan Province, Central China.

Yuan J, Wang J, Ma J, Zhu D, Zhang Z, Li J.

J Rehabil Med. 2018 Oct 9. doi: 10.2340/16501977-2486. [Epub ahead of print]

OBJECTIVE: To evaluate the prevalence of, and risk factors for, cerebral palsy in Henan province, China. **METHODS:** The prevalence of cerebral palsy in children aged 0-6 years between September 2011 and September 2012 was investigated using a stratified-clustered-random sampling method. An age-, sex-, and residence-matched control group of typically developing children was recruited. Univariate analysis and multinomial logistic regression analysis were used to identify risk factors associated with cerebral palsy. **RESULTS:** The prevalence of cerebral palsy in Henan province was 2.37 per 1,000 live births. Risk factors included: moving into a newly painted room; complicating maternal diseases (infection, heart disease, hypertension, anaemia, diabetes, kidney disease) during pregnancy; high gravidity (> 3); foetal asphyxia; low birth-weight (< 2,500 g); and hypoxic-ischaemic encephalopathy. **CONCLUSION:** The prevalence of cerebral palsy in Henan province was 2.37 per 1,000 live births. Parents and clinicians should be aware of the risk factors for cerebral palsy.

PMID: [30299526](#)**23. Local injection of Endothelin-1 in the early neonatal rat brain models ischemic damage associated with motor impairment and diffuse loss in brain volume.**

Wright JL, X Chu H, Kagan BJ, Ermine CM, Kauhausen JA, Parish CL, Sobey CG, Thompson LH.

Neuroscience. 2018 Oct 6. pii: S0306-4522(18)30648-1. doi: 10.1016/j.neuroscience.2018.09.043. [Epub ahead of print]

Cerebral palsy is an irreversible movement disorder resulting from cerebral damage sustained during prenatal or neonatal brain development. As survival outcomes for preterm injury improve, there is increasing need to model ischemic injury at earlier neonatal time-points to better understand the subsequent pathological consequences. Here we demonstrate a novel neonatal ischemic model using focal administration of the potent vasoconstrictor peptide, endothelin-1 (ET-1), in newborn rats. The functional and histopathological outcomes compare favourably to those reported following the widely used hypoxic ischemia (HI) model. These include a robust motor deficit sustained into adulthood and recapitulation of hallmark features of preterm human brain injury, including atrophy of subcortical white matter and periventricular fibre bundles. Compared to procedures involving carotid artery manipulation and periods of hypoxia, the ET-1 ischemia model represents a rapid and technically simplified model more amenable to larger cohorts and with the potential to direct the locus of ischemic damage to specific brain areas.

PMID: [30300704](#)**24. Maternal and perinatal outcomes after elective labor induction at 39 weeks in uncomplicated singleton pregnancies: a meta-analysis.**

Sotiradis A, Petousis S, Thilaganathan B, Figueras F, Martins WP, Odibo AO, Dinas K, Hyett J.

Ultrasound Obstet Gynecol. 2018 Oct 8. doi: 10.1002/uog.20140. [Epub ahead of print]

OBJECTIVE: The rate of maternal and perinatal complications increases after 39 weeks in both unselected and complicated pregnancies. The aim of this study was to synthesize quantitatively the evidence on the effect of elective induction of labor at term on the risk of Cesarean section, and maternal and perinatal outcome. **METHODS:** We searched PubMed, US Registry of Clinical Trials, SCOPUS and CENTRAL databases from inception to August 2018. We additionally searched the references of retrieved articles. Eligible studies were randomized controlled trials including singleton uncomplicated pregnancies, in which participants were randomized between 39+0 and 39+6 gestational weeks to either labor induction or expectant management. The risk of bias of individual studies was assessed using the Cochrane Risk of Bias Tool. The overall quality of evidence was assessed per GRADE guideline. Primary outcomes included Cesarean section, maternal death and admission to the neonatal intensive care unit (NICU). Secondary outcomes included operative delivery, grade 3/4 perineal laceration, postpartum hemorrhage, maternal infection, hypertensive disease of pregnancy, maternal thrombotic events, length of maternal hospital stay, neonatal death, need for neonatal respiratory support, cerebral palsy, length of stay in NICU and length of neonatal hospital stay. Pooled risk ratios (RRs) were calculated using random-effects models. **RESULTS:** The meta-analysis included 5 studies (7261 cases). Labor induction was associated with decreased risk for Cesarean section (moderate quality of evidence; RR 0.86; 95% CI, 0.78-0.94; I² =0.1%), maternal hypertension (moderate quality of evidence; RR 0.65; 95% CI, 0.57-0.75; I² =0) and neonatal respiratory support (moderate quality of evidence; RR 0.73; 95% CI, 0.58-0.95; I² =0%). No significant

effects were found for the other outcomes with available data. The main limitation of our analysis was that the majority of data were derived from a single large study. A second limitation arises from the open-label design of the studies, which may theoretically affect the preparedness of the attending clinician to resort to Cesarean section. **CONCLUSIONS:** Elective induction of labor in uncomplicated singleton pregnancies from 39 weeks' gestation is not associated with maternal or perinatal complications and may reduce the risk of Cesarean section, hypertensive disease of pregnancy and need for neonatal respiratory support. This article is protected by copyright. All rights reserved.

PMID: [30298532](#)

25. Diagnosing cerebral palsy in full-term infants.

Morgan C, Fahey M, Roy B, Novak I.

J Paediatr Child Health. 2018 Oct;54(10):1159-1164. doi: 10.1111/jpc.14177.

More than 50% of infants with cerebral palsy (CP) are born at or near term, with the vast majority having pre- or perinatally acquired CP. While some have a clinical history predictive of CP, such as neonatal encephalopathy or neonatal stroke, others have no readily identifiable risk factors. Paediatricians are often required to discriminate generalised motor delay from a variety of other diagnoses, including CP. This paper outlines known causal pathways to CP in term-born infants with a focus on differential diagnosis. Early and accurate diagnosis is important as it allows prompt access to early intervention during the critical periods of brain development. A combination of clinical history taking, standard clinical examination, neuroimaging and genetic testing should be started at the time of referral. Attention to the investigation of common comorbidities of CP, including feeding and sleep difficulties, and referral to early intervention are recommended.

PMID: [30294991](#)

26. [Characteristics of patients of the Cerebral Palsy Association].

González-Alonso MY, Matía Cubillo AC.

Semergen. 2018 Oct 2. pii: S1138-3593(18)30316-2. doi: 10.1016/j.semerg.2018.07.003. [Epub ahead of print] [Article in Spanish]

INTRODUCTION: As the life expectancy has increased in individuals with cerebral palsy, this has led to being able to assess the changes in the bio-psycho-social dimensions of their health. **OBJECTIVE:** The aim of the study is to describe the characteristics of individuals with cerebral palsy and to evaluate their functional situation. **METHODS:** Cross-sectional descriptive study conducted on a sample of 26 individuals between 27 and 65 years old with cerebral palsy. Data was collected during a semi-structured interview. The Cross Motor Function Classification System (GMFCS), the Manual Ability Classification System (MACS), and the Communication Function Classification System (CFCS), were used to evaluate the functional situation. **RESULTS:** The profile of the adult seen in the Cerebral Palsy Association of Burgos, Spain, is male, over 40 years old, single, illiterate, with no professional qualification, lives in a residence, receives social benefit, and with great functional disability. **CONCLUSIONS:** The functional capacity of people with cerebral palsy who are in adult care centres is low. It emphasises the low cultural level and the lack of professional qualification and all of them have a disability that limits their ability to perform daily activities, possibly related to the high mean age.

PMID: [30290992](#)

Prevention and Cure

27. Congenital cytomegalovirus prevention, awareness and policy recommendations - a scoping study.

Midgley G, Smithers-Sheedy H, McIntyre S, Badawi N, Keogh J, Jones CA.

Infect Disord Drug Targets. 2018 Oct 8. doi: 10.2174/1871526518666181009093725. [Epub ahead of print]

Background Congenital cytomegalovirus (cCMV) is known to cause childhood deafness, neurodevelopmental disability and

death. Simple hygiene precautions are effective in reducing maternal risk of CMV infection. Objective To review i) awareness of CMV infection and available primary prevention strategies both in the community and amongst health professionals ii) available cCMV information sources in the literature, grey literature and published professional guidelines. Method Scoping study to i) identify literature pertaining to cCMV awareness amongst parents and health professionals using MedLine and CINAHL databases via EBSCO ii) review one high income country's guidelines and recommendations regarding cCMV infection and pregnancy (example country Australia) iii) grey literature for parental information. Results Worldwide awareness of cCMV and of available prevention strategies amongst women and health professionals are poor. Findings internationally suggest at least half of maternity care health professionals do not routinely provide advice to women regarding simple hygiene precautions that can reduce their risk of infection during pregnancy. Though information resources regarding cCMV are available, they are frequently not included within general healthy pregnancy advice and require individuals to search for 'congenital cytomegalovirus'. Conclusion cCMV is a preventable cause of serious congenital disability and death. Prevention opportunities are being missed because most women are not aware of cCMV or how to reduce their risk of infection in pregnancy, in part due to poor health professional awareness. New strategies to disseminate cCMV information to the community and to support health professionals to embed cCMV advice within routine pregnancy counselling is required.

PMID: [30306881](#)

28. Protection of brain development by antenatal magnesium sulphate for infants born preterm.

Chollat C, Sentilhes L, Marret S.

Dev Med Child Neurol. 2018 Oct 7. doi: 10.1111/dmcn.14038. [Epub ahead of print]

Cerebral palsy (CP) remains the most significant neurological disorder associated with preterm birth. It disrupts quality of life and places huge cost burdens on society. Antenatal magnesium sulphate administration to females before 32 weeks' gestation has proven to be an effective intervention to reduce the rate of CP. In models of hypoxia, hypoxia-ischemia, inflammation, and excitotoxicity in various animal species, magnesium sulphate preconditioning decreased the resulting lesion sizes and inflammatory cytokine levels, prevented cell death, and improved long-term cognitive and motor behaviours. In humans, meta-analyses of five randomized controlled trials using magnesium sulphate as a neuroprotectant showed prevention of CP at 2 years. The benefit remained consistent regardless of gestational age, cause of preterm birth, and total dose received. Antenatal magnesium sulphate treatment is now recommended by the World Health Organization and by many obstetric societies. Its cost-effectiveness further justifies its widespread implementation. WHAT THIS PAPER ADDS: Neuroprotective effect of magnesium sulphate to reduce cerebral palsy in infants born preterm when administered to females at risk of imminent preterm birth. Neuroprotection regardless of gestational age, cause of preterm birth, and total dose. Antenatal magnesium sulphate treatment has good cost-effectiveness.

PMID: [30294845](#)