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## Interventions and Management

### 1. The impact of combined constraint-induced and bimanual arm training program on the perceived hand-use experience of children with unilateral cerebral palsy.

Cohen-Holzer M, Sorek G, Kerem J, Katz-Leurer M.

Dev Neurorehabil. 2016 Oct 14:1-6. [Epub ahead of print]

**OBJECTIVE:** To assess change in perceived hand-use experience following a combined bimanual with constraint intervention and to examine its relationship regarding objective hand-function among children with unilateral cerebral palsy (UCP). **METHODS:** Twenty-six children with UCP received 6 hours of combined intervention daily for 10 days. The Children's Hand-use Experience Questionnaire (CHEQ), Assisting Hand Assessment (AHA), and the Jebsen-Taylor Test of Hand Function (JTTHF) assessed independence and experience, bimanual and unimanual function at baseline and 3-months post-intervention. **RESULTS:** Significant improvement over time was noted in AHA and in JTTHF scores. No significant difference was noted on the CHEQ. Although significant associations were noted between JTTHF and AHA results and CHEQ at 3-months post-intervention, no significant associations were noted between changed scores over time. **CONCLUSIONS:** Although measured hand-function and performance improved, this may not be reflected in the hand-use experience during bimanual performance following a combined program. Children's experience merits treatment strategy implementation and investigation.

[PMID: 27739919](#)

### 2. [Effects of virtual reality training on limb movement in children with spastic diplegia cerebral palsy].

[Article in Chinese]

Ren K, Gong XM, Zhang R, Chen XH.

Zhongguo Dang Dai Er Ke Za Zhi. 2016 Oct;18(10):975-979.

**OBJECTIVE:** To study the effects of virtual reality (VR) training on the gross motor function of the lower limb and the fine motor function of the upper limb in children with spastic diplegia cerebral palsy. **METHODS:** Thirty-five children with spastic diplegia cerebral palsy were randomly assigned to VR training group (n=19) and conventional training group (n=16). The conventional training group received conventional physical therapy and occupational therapy for three months. The VR training group received VR training and occupational therapy for three months. Grip and visual-motor integration subtests in Peabody Developmental Motor Scales-2 were used to evaluate the fine movement in patients before and after treatment. The D and E domains of the 88-item version of the Gross Motor Function Measure (GMFM-88), Modified Ashworth Scale (MAS), and Berg Balance Scale (BBS) were used to evaluate the gross movement in patients before and after treatment.

**RESULTS:** Before treatment, there were no significant differences in grip, visual-motor integration, fine motor development quotient, scores of D and E domains of GMFM-88, MAS score, or BBS score between the two groups ( $P>0.05$ ). After treatment, all the indices were significantly improved in the VR training group compared with the conventional training group ( $P<0.05$ ). **CONCLUSIONS:** VR training can effectively improve the gross motor function of the lower limb and the fine motor function of the upper limb in children with spastic diplegia cerebral palsy.

[PMID: 27751214](#)

### **3. No Decrease in Muscle Strength after Botulinum Neurotoxin-A Injection in Children with Cerebral Palsy.**

Eek MN, Himmelmann K.

Front Hum Neurosci. 2016 Oct 6;10:506. eCollection 2016.

Spasticity and muscle weakness is common in children with cerebral palsy (CP). Spasticity can be treated with botulinum neurotoxin-A (BoNT-A), but this drug has also been reported to induce muscle weakness. Our purpose was to describe the effect on muscle strength in the lower extremities after BoNT-A injections in children with CP. A secondary aim was to relate the effect of BoNT-A to gait pattern and range of motion. Twenty children with spastic CP were included in the study, 8 girls and 12 boys (mean age 7.7 years). All were able to walk without support, but with increased muscle tone interfering with motor function and gait pattern. Sixteen children had unilateral spastic CP and four bilateral spastic CP. Twenty-four legs received injections with BoNT-A in the plantar flexor muscles. The children were tested before treatment, around 6 weeks after at the peak effect of BoNT-A, and at 6 months after treatment, with measurement of muscle strength, gait analysis, and range of motion. There were no differences in muscle strength in plantar flexors of treated legs at peak effect compared to baseline. Six months after treatment, there was still no change in untreated plantar flexor muscles, but an increasing trend in plantar flexor strength in legs treated with BoNT-A. Parents reported positive effects in all children, graded as: small in three children, moderate in eight, and large in nine children. The gait analysis showed a small improvement in knee extension at initial contact, and there was a small increase in passive range of motion for ankle dorsiflexion. Two children had a period with transient weakness and pain. We found that voluntary force production in plantar flexor muscles did not decrease after BoNT-A, instead there was a trend to increased muscle strength at follow-up. The increase may be explained as an effect of the blocking of involuntary nerve impulses, leading to an opportunity to using and training the muscles with voluntary control. Adequate muscle strength is important for maintaining the ability to walk and knowledge of how a treatment affects muscle strength is useful when selecting interventions.

[PMID: 27766077](#)

### **4. Single-level selective dorsal rhizotomy for spastic cerebral palsy.**

Graham D, Aquilina K, Cawker S, Paget S, Wimalasundera N.

J Spine Surg. 2016 Sep;2(3):195-201.

The management of cerebral palsy (CP) is complex and requires a multidisciplinary approach. Selective dorsal rhizotomy (SDR) is a neurosurgical technique that aims to reduce spasticity in the lower limbs. A minimally invasive approach to SDR involves a single level laminectomy at the conus and utilises intraoperative electromyography (EMG). When combined with physiotherapy, SDR is effective in selected children and has minimal complications. This review discusses the epidemiology of CP and the management using SDR within an integrated multidisciplinary centre. Particular attention is given to the single-level laminectomy technique of SDR and its rationale, and the patient workup, recovery and outcomes of SDR.

[PMID: 27757432](#)

## 5. A Systematic Review of the Effects of Single-Event Multilevel Surgery on Gait Parameters in Children with Spastic Cerebral Palsy.

Lamberts RP, Burger M, du Toit J, Langerak NG.

PLoS One. 2016 Oct 18;11(10):e0164686. doi: 10.1371/journal.pone.0164686. eCollection 2016.

**BACKGROUND:** Three-dimensional gait analysis (3DGA) is commonly used to assess the effect of orthopedic single-event multilevel surgery (SEMLS) in children with spastic cerebral palsy (CP). **PURPOSE:** The purpose of this systematic review is to provide an overview of different orthopedic SEMLS interventions and their effects on 3DGA parameters in children with spastic CP. **METHODS:** A comprehensive literature search within six databases revealed 648 records, from which 89 articles were selected for the full-text review and 24 articles (50 studies) included for systematic review. The Oxford Centre for Evidence-Based Medicine Scale and the Methodological Index for Non-Randomized Studies (MINORS) were used to appraise and determine the quality of the studies. **RESULTS:** Except for one level II study, all studies were graded as level III according to the Oxford Centre for Evidence-Based Medicine Scale. The MINORS score for comparative studies (n = 6) was on average 15.7/24, while non-comparative studies (n = 18) scored on average 9.8/16. Nineteen kinematic and temporal-distance gait parameters were selected, and a majority of studies reported improvements after SEMLS interventions. The largest improvements were seen in knee range of motion, knee flexion at initial contact and minimal knee flexion in stance phase, ankle dorsiflexion at initial contact, maximum dorsiflexion in stance and in swing phase, hip rotation and foot progression angles. However, changes in 3DGA parameters varied based on the focus of the SEMLS intervention. **DISCUSSION:** The current article provides a novel overview of a variety of SEMLS interventions within different SEMLS focus areas and the post-operative changes in 3DGA parameters. This overview will assist clinicians and researchers as a potential theoretical framework to further improve SEMLS techniques within different SEMLS focus groups. In addition, it can also be used as a tool to enhance communication with parents, although the results of the studies can't be generalised and a holistic approach is needed when considering SEMLS in a child with spastic CP.

[PMID: 27755599](#)

## 6. Bone mineral density and vitamin D status in children with epilepsy, cerebral palsy, and cerebral palsy with epilepsy.

Tosun A, Erisen Karaca S, Unuvar T, Yurekli Y, Yenisey C, Omurlu IK.

Childs Nerv Syst. 2016 Oct 18. [Epub ahead of print]

**PURPOSE:** We aimed to evaluate the relationship between bone mineral density (BMD) disorders and possible risk factors in patients with epilepsy only (EO), cerebral palsy only (CPO), and cerebral palsy-epilepsy (CP + E). **METHODS:** A total of 122 patients [EO (n = 54), CPO (n = 30), CP + E (n = 38)] and 30 healthy children were evaluated. BMD was only measured in patient groups, not in control subjects. BMD of lumbar vertebrae was determined by dual energy X-ray absorptiometry (DXA). An abnormal BMD was defined as low or low normal BMD. **RESULTS:** Low BMD rate in EO, CPO, and CP + E group was 3.7, 50, and 39.5 %, respectively. Abnormal BMD values were significantly related to inadequate dietary Ca intake (p = 0.017), severe intellectual disability (p < 0.001), and immobility (p = 0.018). In multivariate regression analysis, the risk of abnormal BMD was higher (3.9-fold) in patients not able to walk independently than the others (p = 0.029). However, serum Ca-Vitamin D levels, insufficient exposure to sunlight, low BMI, and use of AED were not correlated with abnormal BMD. **CONCLUSION:** Abnormal BMD is a common problem in patients with CP and CP + E. Abnormal BMD was related to the severity of CP, but not to vitamin D levels or AED treatment.

[PMID: 27757568](#)

## 7. Four years survival and marginal bone loss of implants in patients with Down syndrome and cerebral palsy.

Corcuera-Flores JR, López-Giménez J, López-Jiménez J, López-Giménez A, Silvestre-Rangil J, Machuca-Portillo G.

Clin Oral Investig. 2016 Oct 14. [Epub ahead of print]

**OBJECTIVES:** To evaluate implant survival rate and marginal bone loss (MBL) after 4 years in patients with Down syndrome and cerebral palsy, compared with a healthy control group. **MATERIAL AND METHODS:** The case group comprises 102 implants in 19 patients (71 cerebral palsy, 21 Down syndrome), and the control group comprises 70 implants in 22 healthy patients. One implant per patient was selected (n = 41 implants) to take clustering effects into account. MBL was measured

using two panoramic radiographs (after surgery and 4 years later). Lagervall-Jansson's Index was used. Statistics used are chi-squared test and Haberman's post hoc test. p Value is significant at <0.05. RESULTS: MBL was significantly higher in the cases in all samples ( $p < 0.001$ ) and when one implant was selected per patient ( $p < 0.05$ ). More implants were lost in the cases ( $p < 0.01$ ), especially those with a higher MBL ( $p < 0.01$ ). MBL ( $p < 0.05$ ) and implant loss ( $p < 0.01$ ) increased with age in the cases. The three-unit fixed dental prosthesis (FDP) showed higher MBL ( $p < 0.05$ ). Down syndrome had a higher MBL than cerebral palsy (entire sample  $p < 0.0001$ , one implant per patient  $p < 0.05$ ). All patients with Down syndrome saw some damage to bone support (entire sample  $p < 0.0001$ ; one implant per patient  $p < 0.05$ ). Implant loss occurred only in Down syndrome ( $p < 0.00001$ ). CONCLUSIONS: MBL and implant loss 4 years after placement are higher in neuropsychiatric disabilities. Down syndrome has a higher risk of MBL and implant loss; therefore, special precautions should be taken when deciding on treatment for these patients. CLINICAL RELEVANCE: As a consequence of this pilot study, professionals should be very cautious in placing implants in patients with Down syndrome.

[PMID: 27743213](#)

### **8. Association of Gross Motor Function Classification System Level and School Attendance with Bone Mineral Density in Patients With Cerebral Palsy.**

Jung KJ, Kwon SS, Chung CY, Lee KM, Sung KH, Cho BC, Chung MK, Moon SJ, Kim J, Park MS.

J Clin Densitom. 2016 Oct 11. pii: S1094-6950(16)30189-5. doi: 10.1016/j.jocd.2016.09.002. [Epub ahead of print]

The present study aimed to evaluate bone mineral density (BMD) in children and adolescents with cerebral palsy (CP) and to critically analyze the effects of a variety of factors, particularly the Gross Motor Function Classification System (GMFCS) level, the Caregiver Priorities and Child Health Index of Life with Disabilities questionnaire, and the Pediatric Outcomes Data Collection Instrument (PODCI), on BMD. Fifty patients with CP who underwent dual-energy X-ray absorptiometry were included. Collected data included the extent of involvement, muscle tone, demographic data, factors determined through chart review, and laboratory results. Factors associated with BMD in this group were analyzed by performing multiple regression analysis. The mean Z-scores in male and female patients were  $-3.252 \pm 1.822$  and  $-3.789 \pm 1.764$ , respectively, in the proximal part of the femur and  $-2.219 \pm 1.323$  and  $-2.451 \pm 1.434$ , respectively, in the lumbar spine. In multiple regression analysis, the GMFCS level and the average frequency of missed school in the PODCI were significant factors associated with both femur and lumbar spine BMD. Both the GMFCS level and school attendance were independently associated with BMD and should be considered for the prevention and management of osteoporosis in patients with CP.

[PMID: 27742529](#)

### **9. Hypertonia Assessment Tool: Reliability and Validity in Children With Neuromotor Disorders.**

Marsico P, Frontzek-Weps V, Balzer J, van Hedel HJ.

J Child Neurol. 2016 Oct 14. pii: 0883073816671681. [Epub ahead of print]

The Hypertonia Assessment Tool is a 7-item instrument that discriminates spasticity, dystonia, and rigidity on 3 levels: item scores, subtype, and hypertonia diagnosis for each extremity. We quantified the inter- and intrarater reliability using Kappa statistics, Gwet's first-order agreement coefficient (both with 95% confidence interval), and percentage agreement for all levels. For validity, we compared the Hypertonia Assessment Tool subtype with the clinical diagnosis provided by the physicians. Two physiotherapists tested 45 children with neuromotor disorders. The interrater reliability ( $n = 45$ ) of the Hypertonia Assessment Tool subtype was moderate to substantial whereas the intrarater reliability ( $n = 42$ ) was almost perfect. The Hypertonia Assessment Tool showed good agreement in detecting spasticity. On the contrary, there was a higher presence of dystonia of 24% to 25% tested with the Hypertonia Assessment Tool compared to the clinical diagnosis. Even some individual items showed lower agreement between raters; the Hypertonia Assessment Tool subtypes and diagnosis were reliable. Validity of the Hypertonia Assessment Tool to test spasticity is confirmed, whereas, for dystonia and rigidity, further studies are needed.

[PMID: 27742862](#)

### 10. Effects of botulinum toxin serotype A on sleep problems in children with cerebral palsy and on mothers sleep quality and depression.

Binay Safer V, Ozbudak Demir S, Ozkan E, Demircioglu Guneri F.

Neurosciences (Riyadh). 2016 Oct;21(4):331-337. doi: 10.17712/nsj.2016.4.20160207.

**OBJECTIVE:** To evaluate botulinum toxin serotype A (BoNT-A) effects on sleep problems in children with cerebral palsy (CP) and on mothers' sleep quality and depression at multiple time points. **METHODS:** This is a single center, cross sectional, and observational study was conducted to assess children with CP who were admitted. We recruited children with CP who were admitted to Ministry of Health Physical Medicine and Rehabilitation Training and Research Hospital, Ankara, Turkey between September 2012 and April 2014 for the BoNT-A injection for lower limb spasticity. Sleep quality of children with CP were determined at baseline and at the first, third and sixth month after the BoNT-A injection. Sleep quality Pittsburgh Sleep Quality Index (PSQI) and depression (by Beck Depression Inventory-II Turkish version) in mothers were also assessed. **RESULTS:** Twenty-four children with CP (7.05+/-2.69 years) underwent final assessment. Their bedtime resistance (11.71+/-3.26 versus (vs) 10+/-2.75,  $p<0.01$ ), sleep anxiety (8.00+/-2.57 vs. 7.13+/-2.27,  $p=0.046$ ) and daytime sleepiness (11.67+/-2.14 vs. 10.25+/-1.96,  $p<0.01$ ) were significantly improved in the first month after the BoNT-A injection. In accordance with this, PSQI and BDI scores of the mothers decreased in the first month after the BoNT-A injection. Thereafter, BDI scores continued to decrease, whereas PSQI slightly increased in the third month. **CONCLUSION:** The BoNT-A injection for spasticity in children with CP may have the potential to improve sleep quality in children with CP and their primary caregiver, the mother, as well as to reduce depression in the mother.

[PMID: 27744462](#)

### 11. Proxy-reported quality of life in adolescents and adults with dyskinetic cerebral palsy is associated with executive functions and cortical thickness.

Laporta-Hoyos O, Ballester-Plané J, Póo P, Macaya A, Meléndez-Plumed M, Vázquez E, Delgado I, Zubiaurre-Elorza L, Botellero VL, Narberhaus A, Toro-Tamargo E, Segarra D, Pueyo R.

Qual Life Res. 2016 Oct 20. [Epub ahead of print]

**PURPOSE:** Quality of life (QOL) is a key outcome for people with cerebral palsy (CP), and executive functioning is an important predictor of QOL in other health-related conditions. Little is known about this association in CP or about its neural substrate. We aim to analyze the influence of executive functioning (including cognitive flexibility) as well as that of other psychological, motor, communication and socioeconomic variables on QOL and to identify neuroanatomical areas related to QOL in adolescents and adults with CP. **METHODS:** Fifty subjects diagnosed with dyskinetic CP (mean age 25.96 years) were recruited. Their caregivers completed the primary caregiver proxy report version of the CP QOL-Teen questionnaire. Motor status, communication, IQ, four executive function domains, anxiety/depression and socioeconomic status were evaluated. Correlations and multiple linear regression models were used to relate CP QOL domains and total score to these variables. Thirty-six participants underwent an MRI assessment. Correlations were examined between cortical thickness and CP QOL total score and between cortical thickness and variables that might predict the CP QOL total score. **RESULTS:** Executive functions predict scores in four domains of CP QOL (General well-being and participation, Communication and physical health, Family health and Feelings about functioning) in the regression model. Among the cognitive domains that comprise executive function, only cognitive flexibility measured in terms of performance on the Wisconsin card sorting test (WCST) predicts the CP QOL total score. Monthly income, fine motor functioning and communication ability predict scores on the domains Access to services and Family Health, Feelings about functioning and School well-being, respectively. The clusters resulting from the correlation between cortical thickness and both CP QOL total score and WCST performance overlapped in the posterior cingulate and precuneus cortices. **CONCLUSIONS:** Cognitive flexibility predicts proxy report CP QOL-Teen total score in dyskinetic CP. This relationship has its anatomical correlate in the posterior cingulate and precuneus cortices.

[PMID: 27766516](#)

## 12. Impact of Cerebral Visual Impairments on Motor Skills: Implications for Developmental Coordination Disorders.

Chokron S, Dutton GN.

Front Psychol. 2016 Oct 4;7:1471. eCollection 2016.

Cerebral visual impairment (CVI) has become the primary cause of visual impairment and blindness in children in industrialized countries. Its prevalence has increased sharply, due to increased survival rates of children who sustain severe neurological conditions during the perinatal period. Improved diagnosis has probably contributed to this increase. As in adults, the nature and severity of CVI in children relate to the cause, location and extent of damage to the brain. In the present paper, we define CVI and how this impacts on visual function. We then define developmental coordination disorder (DCD) and discuss the link between CVI and DCD. The neuroanatomical correlates and aetiologies of DCD are also presented in relationship with CVI as well as the consequences of perinatal asphyxia (PA) and preterm birth on the occurrence and nature of DCD and CVI. This paper underlines why there are both clinical and theoretical reasons to disentangle CVI and DCD, and to categorize the features with more precision. In order to offer the most appropriate rehabilitation, we propose a systematic and rapid evaluation of visual function in at-risk children who have survived preterm birth or PA whether or not they have been diagnosed with cerebral palsy or DCD.

[PMID: 27757087](#)

## 13. The Effect of Biomechanical Constraints on Neural Control of Head Stability in Children With Moderate-to-Severe Cerebral Palsy.

da Costa CS, Saavedra SL, Rocha NA, Woollacott MH.

Phys Ther. 2016 Oct 6. [Epub ahead of print]

**BACKGROUND:** External support has been viewed as an important biomechanical constraint for children with deficits in postural control. Nonlinear analysis of head stability is necessary to confirm benefits of interaction between external trunk support and level of trunk control. **OBJECTIVE:** To compare the effect of biomechanical constraints (trunk support) on neural control of head stability during development of trunk control. **DESIGN:** Quasi-experimental repeated measure study. **METHODS:** Fifteen children (4-16 years) with moderate (Gross Motor Function Classification System (GMFCS) IV; n=8; 4 males) or severe (GMFCS V; n=7; 4 males) CP were compared to previous longitudinal data from TD infants (3-9 months of age). Kinematic data were used to document head sway with external support at four levels (axillae, mid-rib, waist, and hip). Complexity, predictability and active degrees of freedom (DOF) for both AP and ML directions were assessed. **RESULTS:** Irrespective of level of support, CP groups had lower complexity, increased predictability and greater DOF ( $p<0.001$ ). The effect of support differed based on the child's segmental level of control. GMFCS V and youngest TD groups demonstrated better head control with increased complexity and decreased predictability with higher levels of support. GMFCS IV group had the opposite effect, showing decreased predictability, increased complexity and DOF with lower levels of support. **CONCLUSIONS:** The effect of external support varies depending on the child's level of control and diagnostic status. Children with GMFCS V and young TD infants had better outcomes with external support, but external support was not enough to completely correct for influence of CP. Children with GMFCS IV performed worse with support at axillae or midribs suggesting that too much support can interfere with postural sway quality.

[PMID: 27758963](#)

## 14. Dental health of children with cerebral palsy.

Jan BM, Jan MM.

Neurosciences (Riyadh). 2016 Oct;21(4):314-318. doi: 10.17712/nsj.2016.4.20150729.

Cerebral palsy (CP) is a common chronic motor disorder with associated cognitive, communicative, and seizure disorders. Children with CP have a higher risk of dental problems creating significant morbidity that can further affect their wellbeing and negatively impact their quality of life. Screening for dental disease should be part of the initial assessment of any child with CP. The objective of this article is to present an updated overview of dental health issues in children with CP and outline important preventative and practical strategies to the management of this common comorbidity. Providing adequate oral care requires adaptation of special dental skills to help families manage the ongoing health issues that may arise. As oral health is increasingly recognized as a foundation for general wellbeing, caregivers for CP patients should be considered an important

component of the oral health team and must become knowledgeable and competent in home oral health practices.

[PMID: 27744459](#)

### **15. Ageing with cerebral palsy; what are the health experiences of adults with cerebral palsy? A qualitative study.**

Mudge S, Rosie J, Stott S, Taylor D, Signal N, McPherson K.

BMJ Open. 2016 Oct 13;6(10):e012551. doi: 10.1136/bmjopen-2016-012551.

**OBJECTIVE:** To enhance understanding of the experiences of ageing with cerebral palsy (CP) in adulthood with a particular focus on experiences with health services. **DESIGN:** A qualitative descriptive methodology was applied to capture adults' views of ageing with CP and related interactions with health services. Semistructured interviews were undertaken with data systematically coded and interpreted by grouping information into categories. Themes that encompassed the categories were identified through thematic analysis. **SETTING:** All healthcare settings. **PARTICIPANTS:** 28 adults (14 women) with CP, aged 37-70 years. **RESULTS:** 5 themes covered the breadth of participants' experiences: (1) acceptance of change; (2) exploring identity: cerebral palsy as only one part of self; (3) taking charge of help; (4) rethinking the future and (5) interacting with health professionals. Being seen and being heard were the features described in positive healthcare interactions. Participants also valued health professionals who reflected on who holds the knowledge?; demonstrated a willingness to learn and respected participants' knowledge and experience. **CONCLUSIONS:** Our findings could, and arguably should, inform more responsive strategies for disabled people in health services and, indeed, all health consumers. Our study supports other findings that impairments related to CP change and, for many, severity of disabling impact increases with age. Increased interactions with health and rehabilitation professionals, as a consequence of these changes, have the potential to impact the person's healthcare experience either positively or negatively. A 'listening health professional' may bridge their knowledge gap and, in recognising the person's own expertise, may achieve three things: a more contextualised healthcare intervention; a better healthcare experience for the person with CP and positive impact on the person's sense of autonomy and identity by recognising their expertise. Future research should identify whether this approach improves the healthcare experience for adults living with CP.

[PMID: 27737885](#)

### **16. "Thrust into adulthood": Transition experiences of young adults with cerebral palsy.**

Bagatell N, Chan D, Rauch KK, Thorpe D.

Disabil Health J. 2016 Oct 3. pii: S1936-6574(16)30136-4. doi: 10.1016/j.dhjo.2016.09.008. [Epub ahead of print]

**BACKGROUND:** The transition to adulthood, the gradual change in roles and responsibilities, is identified as a challenging time for adolescents and young adults with physical disabilities, including those with cerebral palsy. Health care, education, employment, independent living, and community engagement have been identified as areas of concern. However, relatively little research has been done to understand the experiences, perceptions, and needs of individuals with cerebral palsy as they transition toward adulthood. **OBJECTIVE:** The objective of this study was to explore the transition experiences, perceptions, and needs of young adults with cerebral palsy living in one state in the southeastern United States. **METHODS:** Focus groups with nine young adults with cerebral palsy (19-34 years) were conducted. The focus group interview explored the preparation for transition and experiences navigating adulthood. The audio-recorded groups were transcribed and analyzed using thematic analysis. **RESULTS:** Young adults with cerebral palsy identified numerous challenges associated with navigating adulthood. The main themes were: 1) being thrust into adulthood; 2) navigating systems and services; 3) understanding and managing my body; and 4) dealing with stereotypes and prejudice. **CONCLUSIONS:** The findings highlight the need for a holistic approach to transition with a focus on building capacity and empowerment. To navigate complex systems of care, "navigators" or "facilitators" are needed. Additionally, practitioners and service providers in adult systems need further education about cerebral palsy.

[PMID: 27756560](#)

## Prevention and Cure

### 17. Determinants of developmental outcomes in a very preterm Canadian cohort.

Synnes A, Luu TM, Moddemann D, Church P, Lee D, Vincer M, Ballantyne M, Majnemer A, Creighton D, Yang J, Sauve R, Saigal S, Shah P, Lee SK; Canadian Neonatal Network and the Canadian Neonatal Follow-Up Network.

Arch Dis Child Fetal Neonatal Ed. 2016 Oct 6. pii: fetalneonatal-2016-311228. doi: 10.1136/archdischild-2016-311228. [Epub ahead of print]

**OBJECTIVES:** Identify determinants of neurodevelopmental outcome in preterm children. **METHODS:** Prospective national cohort study of children born between 2009 and 2011 at <29 weeks gestational age, admitted to one of 28 Canadian neonatal intensive care units and assessed at a Canadian Neonatal Follow-up Network site at 21 months corrected age for cerebral palsy (CP), visual, hearing and developmental status using the Bayley Scales of Infant and Toddler Development-Third Edition (Bayley-III). Stepwise regression analyses evaluated the effect of (1) prenatal and neonatal characteristics, (2) admission severity of illness, (3) major neonatal morbidities, (4) neonatal neuroimaging abnormalities, and (5) site on neurodevelopmental impairment (NDI) (Bayley-III score < 85, any CP, visual or hearing impairment), significant neurodevelopmental impairment (sNDI) (Bayley-III < 70, severe CP, blind or hearing aided and sNDI or death. **RESULTS:** Of the 3700 admissions without severe congenital anomalies, 84% survived to discharge and of the 2340 admissions, 46% (IQR site variation 38%-51%) had a NDI, 17% (11%-23%) had a sNDI, 6.4% (3.1%-8.6%) had CP, 2.6% (2.5%-13.3%) had hearing aids or cochlear implants and 1.6% (0%-3.1%) had a bilateral visual impairment. Bayley-III composite scores of <70 for cognitive, language and motor domains were 3.3%, 10.9% and 6.7%, respectively. Gestational age, sex, outborn, illness severity, bronchopulmonary dysplasia, necrotising enterocolitis, late-onset sepsis, retinopathy of prematurity, abnormal neuroimaging and site were significantly associated with NDI or sNDI. Site variation ORs for NDI, sNDI and sNDI/death ranged from 0.3-4.3, 0.04-3.5 and 0.12-1.96, respectively. **CONCLUSION:** Most preterm survivors are free of sNDI. The risk factors, including site, associated with neurodevelopmental status suggest opportunities for improving outcomes.

[PMID: 27758929](#)

### 18. Motor Cortex Plasticity in Children With Spastic Cerebral Palsy: A Systematic Review.

de Almeida Carvalho Duarte N, Collange Grecco LA, Zanon N, Galli M, Fregni F, Santos Oliveira C.

J Mot Behav. 2016 Oct 18:1-10. [Epub ahead of print]

A review of the literature was performed to answer the following questions: Does motor cortex excitability correlate with motor function? Do motor cortex excitability and cortex activation change after a rehabilitation program that results in improvements in motor outcomes? Can the 10-20 electroencephalography (EEG) system be used to locate the primary motor cortex when employing transcranial direct current stimulation? Is there a bihemispheric imbalance in individuals with cerebral palsy similar to what is observed in stroke survivors? the authors found there is an adaptation in the geometry of motor areas and the cortical representation of movement is variable following a brain lesion. The 10-20 EEG system may not be the best option for locating the primary motor cortex and positioning electrodes for noninvasive brain stimulation in children with cerebral palsy.

[PMID: 27754798](#)

### 19. Influence of maternal obesity on the long-term health of offspring.

Godfrey KM, Reynolds RM, Prescott SL, Nyirenda M, Jaddoe VW, Eriksson JG, Broekman BF.

Lancet Diabetes Endocrinol. 2016 Oct 10. pii: S2213-8587(16)30107-3. doi: 10.1016/S2213-8587(16)30107-3. [Epub ahead of print]

In addition to immediate implications for pregnancy complications, increasing evidence implicates maternal obesity as a major determinant of offspring health during childhood and later adult life. Observational studies provide evidence for effects of maternal obesity on her offspring's risks of obesity, coronary heart disease, stroke, type 2 diabetes, and asthma. Maternal obesity could also lead to poorer cognitive performance and increased risk of neurodevelopmental disorders, including cerebral palsy. Preliminary evidence suggests potential implications for immune and infectious-disease-related outcomes. Insights from



experimental studies support causal effects of maternal obesity on offspring outcomes, which are mediated at least partly through changes in epigenetic processes, such as alterations in DNA methylation, and perhaps through alterations in the gut microbiome. Although the offspring of obese women who lose weight before pregnancy have a reduced risk of obesity, few controlled intervention studies have been done in which maternal obesity is reversed and the consequences for offspring have been examined. Because the long-term effects of maternal obesity could have profound public health implications, there is an urgent need for studies on causality, underlying mechanisms, and effective interventions to reverse the epidemic of obesity in women of childbearing age and to mitigate consequences for offspring.

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