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Interventions and Management

1. Dev Neurorehabil. 2011;14(3):145-55. doi: 10.3109/17518423.2011.568994.

Activity participation of children with complex communication needs, physical disabilities and typically-developing peers.

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OBJECTIVE: To describe and compare the context of participation of children with physical disabilities and complex communication needs (Group CCN) in out-of-school activities with children with physical disabilities only (Group PD) and typically-developing peers (Group TD). **METHOD:** A cross-sectional, matched, multi-group design was used. Thirty-nine participants between 10-15 years of age were administered the Children's Assessment of Participation and Enjoyment. **RESULTS:** Kruskal-Wallis analyses revealed that there were significant differences among the three groups for overall location, enjoyment of the activities and with whom they did the social and self-improvement activities with. Mean trends showed that Group CCN participated in activities closer to home rather than in the community, were restricted in social participation and reported higher levels of enjoyment in activity participation than the other two groups. **CONCLUSIONS:** Group CCN appeared to experience differences in participation when compared to peers with and without disability.

[PMID: 21548855](#) [PubMed - indexed for MEDLINE]

2. Clin Orthop Relat Res. 2011 Sep 15. [Epub ahead of print]

Are Muscle Volume Differences Related to Concentric Muscle Work During Walking in Spastic Hemiplegic Cerebral Palsy?

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BACKGROUND: Individuals with spastic hemiplegic cerebral palsy are typically high functioning and walk without assistive devices. The involved limb is usually smaller and shorter, although it is not clear whether the difference in muscle volume has an impact on walking capacity. **QUESTIONS/PURPOSES:** We determined the volume of

muscles important for propulsion and related that volume to concentric muscle work during walking on the hemiplegic and noninvolved sides in patients with cerebral palsy. **PATIENTS AND METHODS:** We studied 46 patients (mean age, 17.6 years; range, 13-24 years) with spastic hemiplegic cerebral palsy. We assessed muscle volume using MRI and concentric muscle work in the sagittal plane from the hip, knee, and ankle using three-dimensional gait analysis. Patients were classified by Winters' criteria to assess the involvement of cerebral palsy and movement pattern during walking. **RESULTS:** On the hemiplegic side, muscles were smaller, except for the gracilis muscle, and concentric muscle work from the ankle plantar flexors, knee extensors, and hip flexors and extensors was lower compared to the noninvolved side. Hip extensor work was higher on the hemiplegic and the noninvolved sides compared to a control group of 14 subjects without cerebral palsy. Hemiplegic to noninvolved volume ratios correlated with work ratios ($r = 0.40-0.66$). The Winters classification and previous calf muscle surgery predicted work ratios. **CONCLUSIONS:** Our observations of smaller muscles on the hemiplegic side and changes in muscle work on both sides can help us distinguish between primary deviations that may potentially be treatable and compensatory mechanisms that should not be treated.

[PMID: 21918799](#) [PubMed - as supplied by publisher]

3. Acta Neurochir (Wien). 2011 Sep 11. [Epub ahead of print]

Treatment of secondary dystonia with a combined stereotactic procedure: long-term surgical outcomes.

Kim JP, Chang WS, Chang JW.

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OBJECTIVE: There is some debate about the effects of pallidal deep brain stimulation (DBS) or lesioning on secondary dystonia. We applied a multimodal method to maximize the treatment effects of deep brain stimulation in patients with secondary dystonia. **METHODS:** Between March 2003 and January 2009, four patients underwent bilateral globus pallidus internus (GPi) DBS and six patients underwent bilateral GPi DBS plus unilateral thalamotomy for treatment of cerebral palsy (CP). Among the patients with secondary dystonia without CP, five were also treated by DBS. We classified patients with generalized secondary dystonia with cerebral palsy into group I and patients with focal dystonia without CP into group II. Clinical outcome assessments were based on Burke-Fahn-Marsden Dystonia Rating Scale movement and disability scores. Health-related quality of life was assessed with a 36-item short-form general health survey questionnaire preoperatively and at the last follow-up. **RESULTS:** The movement and disability scores of group I-A had improved by 32.0% ($P = 0.285$) and 14.3% ($P = 0.593$), respectively, at the last follow-up compared with baseline. The movement and disability scores of group I-B had improved by 31.5% and 0.18% at the last follow-up compared with baseline, respectively. In comparison with patients in group I-A, patients in group I-B showed a significant improvement in movement scores for the contralateral arm ($P = 0.042$). Group II patients showed a marked improvement in movement and disability scores of 77.7% ($P = 0.039$) and 80.0% ($P = 0.041$), respectively. **CONCLUSIONS:** We demonstrated that DBS plus unilateral ventralis oralis thalamotomy for CP patients with fixed states in the upper extremities is useful not only to treat secondary dystonic movement but also to improve quality of life. In group II patients with post-traumatic dystonia and tardive dyskinesia, we achieved excellent clinical outcomes using a stereotactic procedure.

[PMID: 21909834](#) [PubMed - as supplied by publisher]

4. Adapt Phys Activ Q. 2011 Oct;28(4):354-67.

Soccer-specific endurance and running economy in soccer players with cerebral palsy.

Kloyiam S, Breen S, Jakeman P, Conway J, Hutzler Y.

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The purpose of this study was to describe running economy, soccer specific endurance, and selected kinematic running criteria in soccer players with cerebral palsy (SPCP) and to compare them with values of position-matched players without CP. Fourteen international, male soccer players with cerebral palsy completed the "Yo-Yo"

intermittent recovery run level 1 (IRL-1) test to assess soccer-specific endurance and a submaximal running test on a treadmill to determine running economy. The mean IRL-1 distance covered by the SPCP of the Irish CP team was found to be 43-50% below the mean distance attained by position-matched soccer players without disability, while running economy was found to be within the range of that reported for able-bodied athletes. No relationship could be found between the level of CP-ISRA classification and soccer-specific endurance or running economy in this group of elite level SPCP. Though small in number, these data support a further examination of the relationship between CP classification and sport-specific performance.

[PMID: 21914907](#) [PubMed - in process]

5. Can Fam Physician. 2011 Sep;57(9):1006-73.

Use of botulinum toxin A in management of children with cerebral palsy.

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Question: What is the role of intramuscular botulinum toxin injections in the management of spasticity and related morbidity in children with cerebral palsy? Answer: When botulinum toxin A is injected into the limbs of children with spastic paresis, it induces temporary reduction in muscle tone. It also promotes better motor function when used in combination with conservative treatments such as physiotherapy. Although there is a growing body of evidence for its effective and safe treatment, there is still a lack of consensus on dose, treatment regimens, and the best integration with other clinical modalities.

[PMID: 21918142](#) [PubMed - in process]

6. Chiropr Man Therap. 2011 Sep 13;19(1):20. [Epub ahead of print]

A survey of accessibility and utilisation of chiropractic services for wheelchair-users in the United Kingdom: What are the issues?

McKay ND, Langworthy J.

BACKGROUND: People with physical disabilities experience barriers to healthcare across all services despite a legal and moral obligation to the contrary. Complementary medicine is considered as supplementary to conventional care and integration of these approaches is essential to achieve optimal care. This paper explores the utilisation of chiropractic services and practitioner experiences of treating wheelchair-users which appears under-reported. **METHODS:** A 20 item questionnaire was posted to 250 randomly selected chiropractors registered with the General Chiropractic Council. Follow-up questionnaires were sent 7 days after the initial return date. Quantitative data were subjected to frequency analysis. **RESULTS:** The response rate was 64% (n=161). The majority (66%) of chiropractors had been in practice less than 10 years and were practice owners (50%). Fifty-two percent of chiropractors sampled had treated a patient in a wheelchair in the previous 5 years. The majority (87%) had treated between 1 and 5 such patients. Patients with multiple sclerosis, stroke and cerebral palsy most commonly presented for treatment. The majority of patients' presenting complaint was musculoskeletal in origin, primarily for pain control. Only 13% of respondents worked in a fully accessible clinic. Impracticality of alterations was the most common reason for inaccessibility. **CONCLUSIONS:** Wheelchair-users seem to be an underserved patient group in relation to chiropractic services. Chiropractic management is primarily utilised for pain control in patients with physical disabilities in which mobility may be improved or maintained. Co-management of wheelchair-users with GPs appears to be desirable in order to achieve optimal patient care however more research is required regarding the efficacy of chiropractic treatment for a range of disabling conditions. Physical access was identified as a key barrier to accessing care.

[PMID: 21914167](#) [PubMed - as supplied by publisher]

7. Clin Orthop Surg. 2011 Sep;3(3):211-6. Epub 2011 Aug 19.**Prevalence of Obesity in Ambulatory Patients with Cerebral Palsy in the Korean Population: A Single Institution's Experience.**

Kwon DG, Kang SC, Chung CY, Lee SH, Lee KM, Choi IH, Cho TJ, Yoo WJ, Park YJ, Park MS.

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BACKGROUND: There is a worldwide tendency of an increasing prevalence of obesity. Therefore, this study aimed at determining whether such a trend exists among cerebral palsy (CP) patients. We also tried to compare this trend with the trend in the general population. We also discuss the importance of obesity trends in CP patients. **METHODS:** This retrospective study was performed on 766 ambulatory patients who were diagnosed with CP since 1996 in our institution. The associations among the prevalence of obesity and the body mass index, age, gender, the type of CP, the gross motor function classification system and the time of survey were investigated. **RESULTS:** The overall prevalence of obesity was 5.7%, and the overall prevalence of obesity together with being overweight was 14.6% for the ambulatory patients with CP. The prevalence of obesity and of obesity together with being overweight did not show a statistically significant temporal increase. On the other hand, age and gender were found to affect the body mass index of the ambulatory CP patients ($p < 0.001$ and 0.003 , respectively). **CONCLUSIONS:** The extent of obesity and being overweight in the ambulatory patients with CP in this study was far less than that reported in the United States (US). In addition, it appears that the differences of the prevalence of obesity in children and adolescents between those with and without CP are disappearing in the US, whereas the differences of the prevalence of obesity in children and adolescents between those with and without CP seem to be becoming more obvious in Korea. Accordingly, care should be taken when adopting the data originating from the US because this data might be affected by the greater prevalence of obesity and the generally higher body mass indices of the US.

[PMID: 21909468](#) [PubMed - in process] PMID: PMC3162201

8. J Child Neurol. 2011 Sep 12. [Epub ahead of print]**The ICF-CY Perspective on the Neurorehabilitation of Cerebral Palsy: A Single Case Study.**

Trabacca A, Russo L, Losito L, De Rinaldis M, Moro G, Cacudi M, Gennaro L.

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Starting from the case of a 12-year-old boy with dyskinetic (athetoid-dystonic subtype) cerebral palsy, the authors apply the International Classification of Functioning, Disability and Health for Children and Youth (ICF-CY) of the World Health Organization (WHO) as a comprehensive documentation tool to guide the pathway of care and illustrate a multidisciplinary and interdisciplinary neurorehabilitation team approach. The ICF-CY provides a common and universal language for describing and measuring health and disability in the first 2 decades of life. Despite the fact that this is a single case design, the authors consider it useful for the identification of an ICF-CY core set for the description of children with cerebral palsy. The results of this single case study are preliminary and need to be tested in a large trial of children with cerebral palsy.

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9. J Oral Pathol Med. 2011 Sep 11. doi: 10.1111/j.1600-0714.2011.01074.x. [Epub ahead of print]**Oral motor performance in spastic cerebral palsy individuals: are hydration and nutritional status associated?**

Santos MT, Batista R, Previtali E, Ortega A, Nascimento O, Jardim J.

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Background: Previous studies reported alterations in salivary parameters in cerebral palsy (CP) individuals; however, none of these considered oral motor performance as possibly responsible for these conditions. The aim of this study was to investigate the influence of oral motor performance on the nutritional status and salivary parameters in individuals with CP. **Methods:** Forty-three individuals aged 11-19 years-old, with spastic CP were included in this study. Oral motor performance was evaluated using the Oral Motor Assessment Scale, which classified the individuals into two groups: subfunctional or functional. Unstimulated saliva was collected and the flow rate was calculated (ml/min). Salivary osmolality was measured using a freezing point depression osmometer. Blood samples were collected to evaluate complete blood count, total protein, albumin/globulin ratio and transferrin levels. **Results:** The subfunctional (n = 21) and the functional group (n = 22) did not differ regarding sex (P = 0.193), however the functional group was older (P = 0.023) and had a higher mean BMI (P < 0.001). The subfunctional CP group presented a reduction in salivary flow rate (36.4%) (P < 0.01) and an increase in salivary osmolality (35.5%) (P < 0.001) compared to the functional group. Slightly lower values for red blood cells (millions/mm³) (P < 0.001), hemoglobin (g/dl) (P < 0.009), hematocrit (%) (P = 0.001), number of platelets (N/mm³), total protein (g/dl) and albumin/globulin ratio (P = 0.003 and P = 0.036, respectively) were determined for the subfunctional group, but within the normal range of normality. **Conclusion:** Cerebral palsy individuals appear to present impaired adequate hydration due to compromised oral motor performance.

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10. J Trop Pediatr. 2011 Sep 15. [Epub ahead of print]**Quality of Life in Parents/Caretakers of Children with Cerebral Palsy in Kampong Cham, Cambodia.**

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The purpose of this study was to investigate QOL in parents/caretakers of children with cerebral palsy in the province of Kampong Cham, Cambodia. Forty parents/caretakers of children with cerebral palsy aged 1-13 years (F19/M21) participated in this study. The study was carried out using the Comprehensive Quality of Life Scale A5 (ComQOL-A5) questionnaire. Results point out three major domains where quality of life is unsatisfactory: health, material well-being and emotional well-being. Of these areas, QOL in the health domain demonstrates the lowest scores. Results support a further commitment in providing comprehensive rehabilitation for parents and their children with CP in Kampong Cham. This study identifies the need for further research on QOL in parents/caretakers of children with CP in Cambodia and the need for development of valid and reliable QOL instruments targeting the developing world.

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11. Neurocase. 2011 Sep 15. [Epub ahead of print]**Working memory and mental imagery in Cerebral Palsy: A single case investigation.**

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In this study we describe visuospatial working memory and visual mental imagery of a child with Cerebral Palsy. Beyond a moderate impairment of visuomotor integration skills, cognitive level and memory span, poor performance emerged in figures reconstruction, in memorizing matrix patterns and movements along a path. No such deficits were observed in recalling figures and their positions on a grid and learning groups of words using a visual imagery strategy. This case highlights that impaired action execution impairs performance in imagery tasks as well, but not when alternative strategies (e.g., verbal encoding) can be adopted. Results are discussed considering recent evidence on working memory and visual imagery links, and their role in motor rehabilitation training.

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Prevention and Cure

12. Pediatr Int. 2011 Sep 14. doi: 10.1111/j.1442-200X.2011.03480.x. [Epub ahead of print]**Outcomes of very low birth weight infants at three years of age born in 2003-2004 in Japan.**

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Objectives. To describe and compare neurodevelopmental outcomes with birth weight (BW) groups at 250g intervals of very low birth weight (VLBW) infants at 3 years of age in a multicenter cohort in Japan. **Methods.** 3104 VLBW infants born in 2003 and 2004 registered in a NICU-network database were followed in the study. Neurodevelopmental impairment (NDI) was defined as any of the following impairments: cerebral palsy (CP), unilateral or bilateral blindness, severe hearing impairment, or developmental delay; developmental quotient (DQ) <70 measured using the Kyoto Scale of Psychological Development test or judgment by physicians in infants without the test. **Results.** 257 infants died and follow-up data were obtained from 1826 infants. Of the 1826 infants, 155 (8.5%) had CP, 25 (1.4%) had visual impairment, and 12 (0.7%) had hearing impairment. Of the 1197 infants DQ measured, 184 (15.4%) had DQ < 70. The proportion of NDI in the evaluated infants was 19.2% (n = 350), ranging from 11.9% (BW 1251-1500g) to 42.0% (BW ≤ 500g). Odds ratios (95%CI) of NDI or death against the group BW 1251-1500g were 20.62 (13.29-31.97) in BW ≤ 500g, 7.25 (5.45-9.64) in BW 501-750g, 2.85 (2.12-3.82) in BW 751-1000g and 1.18 (0.85-1.64) in BW 1001-1250g. **Conclusion.** The increasing proportion of NDI or death, an indicator of adverse outcome, was associated with decrement in the BW of the groups. Although we have to consider a bias due to loss of follow-up data, the incidence of NDI was similar to previous overseas cohort studies despite the higher survival proportion in our study.

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13. Pediatr Neurol. 2011 Oct;45(4):229-32.**Predicting comorbidities with neuroimaging in children with cerebral palsy.**

Legault G, Shevell MI, Dagenais L; Quebec Cerebral Palsy Registry (Registre de la paralysie cérébrale au Québec [REPACQ]) Consortium.

Division of Pediatric Neurology, Montreal Children's Hospital-McGill University Health Center, Montreal, Quebec, Canada.

A population-based registry was used to ascertain whether neuroimaging findings of children with cerebral palsy could predict the occurrence of certain comorbidities. Neuroimaging findings and comorbidities data were extracted from the Quebec Cerebral Palsy Registry for children born in a 4-year birth interval (1999-2002) covering half of the province's population. Neuroimaging studies were classified into 10 mutually exclusive categories (periventricular white matter injury/leukomalacia, cerebral malformation, cerebral vascular accident, deep gray matter injury, superficial gray matter injury, diffuse gray matter injury, intracranial hemorrhage, infection, nonspecific findings, and normal). Comorbidities studied included cortical blindness, severe auditory impairment, inability to communicate verbally, assisted feeding, and the presence of afebrile seizures in the prior 12 months. Neuroimaging results were available for a total of 213 children. Only deep gray matter injury (defined as signal abnormality or volume loss in subcortical gray matter, $n = 9$) was significantly ($P < 0.05$) linked with the occurrence of both the inability to communicate verbally ($n = 5$, 55.6% vs $n = 46$, 22.5%, $P = 0.04$) and with a higher mean number of comorbidities (1.67 vs 0.70, $P < 0.01$), and therefore with increased burden of comorbidities. These findings may improve our ability to prognosticate the outcome of children with cerebral palsy, enabling targeted early direct interventions.

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