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Interventions and Management

1. Phys Occup Ther Pediatr. 2011 Aug 15. [Epub ahead of print]

Reliability of the Quality of Upper Extremity Skills Test for Children with Cerebral Palsy Aged 2 to 12 Years.

Thorley M, Lannin N, Cusick A, Novak I, Boyd R.

Queensland Cerebral Palsy Health Service, Royal Children's Hospital, Herston Australia.

Aim: To investigate reliability of the Quality of Upper Extremity Skills Test (QUEST) scores for children with cerebral palsy (CP) aged 2-12 years. **Method:** Thirty-one QUESTs from 24 children with CP were rated once by two raters and twice by one rater. Internal consistency of total scores, inter- and intra-rater reliability findings for total, domain, and item scores were calculated. **Results:** Total scores inter-rater reliability, Intra-class Correlation Coefficient (ICC) was 0.86, and for intra-rater reliability, ICC was 0.96. Domains had high reliability (ICC > 0.80) within raters and between raters except for grasp (moderate at ICC = 0.67). Item inter-rater reliability was moderate or better for 80% of items; item intra-rater reliability was moderate or better for 87% of items. Total score internal consistency was high ($\alpha = 0.97$). **Implications:** The QUEST has proven reliability for children with CP aged 18 months to 8 years. This study demonstrates strong reliability for children aged 2-12 years.

PMID: 21838618 [PubMed - as supplied by publisher]

2. Disabil Rehabil. 2011 Aug 19. [Epub ahead of print]

Effect of treatment environment on modified constraint-induced movement therapy results in children with spastic hemiplegic cerebral palsy: a randomized controlled trial.

Rostami HR, Malamiri RA.

Department of Occupational Therapy, Musculoskeletal Rehabilitation Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

Purpose: To determine the effects of treatment environment (home and clinic) on results of modified constraint-induced movement therapy (modified CIMT) in children with spastic hemiplegic cerebral palsy. **Method:** In a single-

blinded, randomized, controlled trial, 14 children with spastic hemiplegic cerebral palsy (5 females, 9 males; mean age: 74 months) received 15 hours of modified CIMT, occurring three times/week for 10 sessions every other day in two randomly assigned groups. Each session lasts one and half hours. Treatment environment for intervention group (n = 7) was home and for control group (n = 7) was clinic. Measures were conducted pre, post and 3 months after treatment period by pediatrics motor activity log and subtests 5 (upper limb coordination) and 8 (upper limb speed and dexterity) of Bruininks-Oseretsky test of motor proficiency. Sample randomization and data analysis by analysis of variance with repeated measures were conducted by SPSS-16 software in α level set at $p < 0.05$. Results: All subjects showed significant improvement ($p < 0.01$) in post-test measures except subtest 5 of Bruininks-Oseretsky test of motor proficiency. In contrast to clinic group, subjects in home showed significantly continued improvement at follow-up session in all measures. Conclusions: Modified CIMT is effective in improving upper limb function in children with spastic hemiplegic cerebral palsy. In addition, more improved performance in home group places the practice in natural context as the preferred method for treatment of these children.

PMID: 21851293 [PubMed - as supplied by publisher]

3. Eur J Paediatr Neurol. 2011 Aug 13. [Epub ahead of print]

Botulinum toxin type A treatment in children with cerebral palsy: Evaluation of treatment success or failure by means of goal attainment scaling.

Desloovere K, Schörkhuber V, Fagard K, Van Campenhout A, De Cat J, Pauwels P, Ortibus E, De Cock P, Molenaers G.

Clinical Motion Analysis Laboratory, UZ Pellenberg, Belgium; Department of Rehabilitation Sciences, KU-Leuven, Belgium.

BACKGROUND: There is considerable variability in the amount of response to BTX-A treatment between and within patients with cerebral palsy (CP). **AIMS:** The purpose of this retrospective cohort study was to evaluate the clinical responsiveness of Botulinum toxin type A (BTX-A) treatment in children with CP and specifically delineate features of treatment success and failure. **METHODS:** Four hundred and thirty-eight children (251 boys, 187 girls; mean age 8 years 2 months, SD 4 years) were included into the study. Goal Attainment Scaling (GAS) was used to classify and evaluate treatment efficacy. Two study groups were defined: one group with an excellent response ($GAS \geq 60.0$) and one group with a lack of response ($GAS \leq 40.0$) to BTX-A. **RESULTS:** Seventy-five patients (17.1%) had an excellent response and treatment was found to be unsuccessful for 31 patients (7.1%). Children with a lack of response to BTX-A were significantly older compared to children with a high responsiveness ($p=0.0013$). In the latter group, more children received multi-level injections and fewer children had injections in proximal parts of the lower limb compared to the low responsiveness group ($p=0.0024$). Moreover, there was a significant difference in the use of different types of casts between both study groups ($p=0.0263$). **CONCLUSION:** Age, level of treatment and casting seem to be crucial features of BTX-A treatment success or failure in children with CP.

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4. J Pediatr Orthop. 2011 Sep;31(6):668-73.

Changes in health-related quality of life after spinal fusion and scoliosis correction in patients with cerebral palsy.

Bohtz C, Meyer-Heim A, Min K.

Department of Rehabilitation, University Children's Hospital Zurich †Department of Orthopaedic Surgery, Balgrist Clinic, University of Zurich, Switzerland.

BACKGROUND: The literature is scarce on the impact of spinal fusion for scoliosis in patients with cerebral palsy (CP) regarding the health-related quality of life (HRQL). The purpose of this study was to evaluate the outcome of surgical scoliosis correction measured by the subjective change in the HRQL and the objective radiologic changes. Factors that could influence the subjective outcome were examined to investigate their correlation to the results of

HRQL. METHODS: A retrospective review of 50 consecutive patients with CP, who had spinal fusion for scoliosis with minimal 2-year follow-up was carried out. Radiographic data were obtained from preoperative, postoperative, and last follow-up examinations. The assessment of the HRQL was done through a modified version of the "Caregiver Priorities and Child Health Index of Life with Disabilities" questionnaire, assessed by the caregivers of the patients. RESULTS: There was a significant improvement ($P=0.001$) of HRQL after the operation. The satisfaction rate of the patients with the outcome of the operation was 91.7%. There was an average of 64.3% scoliosis correction, 57.7% pelvic tilt correction, 53% improvement of apical vertebral rotation, and 67.2% improvement of apical vertebral translation. At the last follow-up, the average scoliosis angle was 32.0 degrees and pelvic tilt was 8.8 degrees. Weak but not significant correlation between the amount of scoliosis correction and the subjective change in the HRQL could be established ($R=0.321$, $P=0.078$). No correlation between the occurrence of complications and changes in the HRQL ($P=0.122$) or the satisfaction rate with the outcome of the operation ($P=0.764$) was found. Extension of spinal fusion to sacropelvis had no influence on the occurrence of complications ($P=0.42$) or on the changes in HRQL ($P=0.71$). CONCLUSIONS: Life quality improved after surgical scoliosis correction in patients with CP. There is a high satisfaction rate of patients and their caregivers. Subjective changes in HRQL after the operation do not correlate with objective radiographic changes brought about by the operation, which indicates that the present operation indications and achieved correction are adequate to achieve an improvement of the subjective HRQL in this patient group.

LEVEL OF EVIDENCE: Therapeutic level IV, retrospective study.

PMID: 21841443 [PubMed - in process]

5. Dev Med Child Neurol. 2011 Aug 16. doi: 10.1111/j.1469-8749.2011.04077.x. [Epub ahead of print]

Hip joint pain in spastic dislocation: aetiological aspects.

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Aim: Children with severe forms of cerebral palsy (CP) are at high risk of hip joint displacement. Various studies have found that the pain from affected joints occurs in 40 to 84% of studied individuals. The purpose of this study was to establish a correlation between the density of nociceptors localized in selected areas of the spastic dislocated hip joint and clinical evidence of hip joint pain in children with CP. Method: Nineteen samples of articular capsule and 19 samples of teres ligaments, collected during open hip joint reduction from 19 non-ambulatory children with spastic CP (Gross Motor Function Classification System level V; mean age 9y 6mo; 10 males, nine females), were studied. Pain was assessed using the numeric rating scale completed by caregivers. The density of nociceptive fibres was compared between the children with painful and children with painless hip joints, using S-100 and substance P monoclonal antibodies. Results: The presence of S-100 protein and substance P were significantly increased ($p=0.024$ and $p=0.02$ respectively) in the children with painful hip joints. There were significantly positive correlations between the intensity of pain and the density of nerve fibres with S-100 protein (teres ligament, $p=0.001$; joint capsule, $p=0.032$) as well as substance P (teres ligament, $p=0.001$). Interpretation: Direct and indirect inflammatory factors, present in dislocated hip joints with cartilage damage in children with spastic CP, lead to hip joint sensitization.

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PMID: 21848874 [PubMed - as supplied by publisher]

6. J Pediatr Orthop. 2011 Sep;31(6):648-54.**Acetabular deficiency in spastic hip subluxation.**

Chang CH, Kuo KN, Wang CJ, Chen YY, Cheng HY, Kao HK.

*Department of Pediatric Orthopaedics ‡Department of Radiology, Chang Gung Memorial Hospital, Chang Gung University †College of Medicine, Taipei Medical University §Department of Orthopaedic Surgery, National Taiwan University Hospital, Taipei, Taiwan.

BACKGROUND: The direction of spastic hip subluxation is generally agreed to be posterolateral; however, the location of acetabular deficiency is still controversial. This study aims to define the degree and location of acetabular deficiency that is crucial in choosing acetabuloplasty method. **METHODS:** Twenty-five children with spastic cerebral palsy, average aged 7.1 years (range, 4.4 to 9.6 y), underwent 3-dimensional computed tomography (CT) studies of the pelvis. Mean Reimers migration percentage of the 50 hips was 32.6% (range, 16% to 66%). Twenty-eight hips were nonsubluxated and the other 22 hips were subluxated (migration percentage >30%). The 3-dimensional image of pelvis was realigned and a series of 9 section planes were formed to represent the whole iliac root. The CT acetabular indexes were measured and compared to define the deficiency. The data of 5 children without hip problem was retrieved as control. **RESULTS:** Spastic nonsubluxated hips had similar CT acetabular indexes to normal hips. The differences between spastic subluxated hips and normal hips, from anterosuperior to posterosuperior aspects of acetabulum, were 14.8 degrees (A60 degrees), 11.2 degrees (A45 degrees), 10.8 degrees (A30 degrees), 9.9 degrees (A15 degrees), 9.7 degrees (0 degree), 9.5 degrees (P15 degrees), 9.8 degrees (P30 degrees), 9.8 degrees (P45 degrees), and 5.3 degrees (P60 degrees). The differences were significant in all directions and greater in the anterior aspect of the acetabulum. **CONCLUSIONS:** The definition of pathology is defined by the deviation from normal physiological status. Acetabular dysplasia in spastic hip subluxation is global and more apparent in the anterior aspect.

LEVEL OF EVIDENCE: Diagnostic II.

PMID: 21841440 [PubMed - in process]

7. Med Biol Eng Comput. 2011 Aug 18. [Epub ahead of print]**Design of a novel mobility device controlled by the feet motion of a standing child: a feasibility study.**

Schoepflin ZR, Chen X, Ragonesi CB, Galloway JC, Agrawal SK.

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Self-generated mobility is a major contributor to the physical, emotional, cognitive, and social development of infants and toddlers. When young children have disorders that hinder self locomotion, their development is at risk for delay. Independent mobility via traditional power mobility devices may prevent this delay, but do little to encourage the child's development of gross motor skills. This research aims to develop a bio-driven mobile-assistive device that is controlled and driven by moving the feet, which may encourage the development of gross motor skills. In this study, system feasibility is shown by experiments on five typically developing toddlers and one special needs toddler with spastic cerebral palsy. Children were placed in the bio-driven device and instructed to navigate through a maze. All subjects were able to successfully complete the maze in multiple trials. In addition, two toddlers showed evidence of improved driving skill by completing the maze in shorter times in successive trials on a given testing day. The results suggest that such a device is feasible for purposeful driving. Recommendations are given for the device and protocol redesign for related future testing.

PMID: 21850470 [PubMed - as supplied by publisher]

8. Dev Med Child Neurol. 2011 Jul;53(7):579. doi: 10.1111/j.1469-8749.2011.03979.x. Epub 2011 Apr 18.

'Instead of certainty we have search ...'.

Carlberg EB.

Department of Women's and Children's Health, Karolinska Institutet, Stockholm, Sweden.

Comment on

Dev Med Child Neurol. 2011 Jul;53(7):615-20.

Dev Med Child Neurol. 2011 Jul;53(7):621-9.

PMID: 21501159 [PubMed - indexed for MEDLINE]

9. Lancet Neurol. 2011 Sep;10(9):844-52.

Cerebral palsy: clinical care and neurological rehabilitation.

Aisen ML, Kerkovich D, Mast J, Mulroy S, Wren TA, Kay RM, Rethlefsen SA.

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Cerebral palsy (CP) is defined as motor impairment that limits activity, and is attributed to non-progressive disturbances during brain development in fetuses or infants. The motor disorders of CP are frequently accompanied by impaired cognition, communication, and sensory perception, behavioural abnormalities, seizure disorders, or a combination of these features. CP is thought to affect three to four individuals per 1000 of the general population. The incidence, prevalence, and most common causes of CP have varied over time because of changes in prenatal and paediatric care. Medical management of children and adults involves care from primary-care physicians with input from specialists in neurology, orthopaedics, and rehabilitation medicine. Physicians should also work in conjunction with rehabilitation therapists, educators, nurses, social care providers, and schoolteachers. The focus of rehabilitation treatment has recently shifted to neurological rehabilitation in response to increasing evidence for neuroplasticity. This approach aims to improve development and function by capitalising on the innate capacity of the brain to change and adapt throughout the patient's life. As the life expectancy of individuals with CP approaches that of the general population, therapies must be developed that address the needs of adults ageing with disability.

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10. Paediatr Anaesth. 2011 Jun;21(6):630-5. doi: 10.1111/j.1460-9592.2011.03560.x. Epub 2011 Mar 18.

Transition from pediatric to adult health services: the perioperative care perspective.

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Increasing numbers of children with congenital and chronic diseases are surviving beyond adolescence. Consequently, arrangements must be put in place to ensure that these groups of patients continue to receive high-quality care into adulthood. Although some medical disciplines have reacted positively to this growing challenge, perioperative care has lagged behind. This review explores some of the difficulties in delivering optimal perioperative care in the transitional period. Key issues, including the paucity of experience in the management of pediatric diseases among adult-trained clinicians and unfamiliarity with child/family focused care, are discussed. We provide some suggestions for the development of transitional healthcare policies.

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11. PM R. 2011 Aug 17. [Epub ahead of print]

Measuring Care and Comfort in Children With Cerebral Palsy: The Care and Comfort Caregiver Questionnaire.

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OBJECTIVE: To evaluate the psychometric properties of the Care and Comfort Caregiver Questionnaire (CareQ), which was developed to measure the perceived effort of caregivers in providing care for children with moderate to severe cerebral palsy (CP). **DESIGN:** Cross-sectional data collection from a representative sample of a large racially/ethnically diverse geographic region. **SETTING:** Outpatient CP clinics at a metropolitan rehabilitation institution. **PARTICIPANTS:** A total of 100 primary caregivers of children with CP whose Gross Motor Function Classification System (GMFCS) levels were III-V. **METHODS:** The CareQ was administered to primary caregivers of children with CP. Internal consistency of the CareQ and its 3 domains (Personal Care, Positioning/Transfers, and Comfort) were evaluated with the Cronbach α . Construct validity of the CareQ was evaluated by its correlation with the Pediatric Functional Independence Measure (WeeFIM). Associations between CareQ scores and child and caregiver characteristics were assessed. **RESULTS:** Mean CareQ scores for children with GMFCS levels III, IV, and V were 30.6, 42.8, and 45.1, respectively ($P < .01$). The Cronbach α was 0.90 for total CareQ and 0.93, 0.80, and 0.82 for its Personal Care, Positioning/Transfers, and Comfort domains, respectively. Total CareQ and WeeFIM scores were negatively correlated ($r = -.22$; $P = .03$). Total CareQ scores were positively correlated with the child's age ($r = .38$; $P < .01$) and with body weight ($r = .37$; $P < .01$); however, no caregiver characteristics were associated with CareQ scores. **CONCLUSIONS:** The CareQ is a concise and internally consistent measure of difficulty of care as perceived by caregivers of children whose GMFCS levels were III-V. Further investigation should include assessment of responsiveness of the CareQ to changes in the child's functional status over time and/or with rehabilitation interventions.

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12. Value Health. 2011 Jul-Aug;14(5):705-11. Epub 2011 Apr 30.

Incorporating Children's and Their Parents' Perspectives into Condition-Specific Quality-of-Life Instruments for Children with Cerebral Palsy: A Qualitative Study.

Parkinson KN, Rice H, Young B.

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OBJECTIVES: This study investigated the extent of agreement between children with cerebral palsy (CP) and their parents concerning their views on what contributed to the children's quality of life. It also investigated how well an Australian condition-specific health-related quality of life self-report measure for children with CP, the Cerebral Palsy Quality of Life Questionnaire for Children (CP QOL-Child), mapped to the views of UK children and parents. **METHODS:** UK children with CP aged 8 to 13 years and their parents participated in qualitative interviews about their perspectives on the child's quality of life. **RESULTS:** The interviews with 28 children and 35 parents showed considerable overlap but also some divergence. For example, both parties considered social relationships to be important, but children described how they enjoyed being on their own at times whereas parents tended not to value time spent alone for children. The CP QOL-Child covered most themes considered to be important to the children's quality of life. Omissions included relationships with extended family members, restful recreational activities and associated possessions, relaxing, tiredness, negative emotions, and safety. **CONCLUSIONS:** Both children's and parents' views are required for the development of child health-related quality of life instruments. The

CP QOL-Child has good coverage of many aspects discussed in the interviews. Cultural differences may account for its omission of some topics considered important by UK children and parents. Rewording of many of the CP QOL-Child's items and further work on item content would optimize its suitability for UK children and possibly for children elsewhere.

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PMID: 21839409 [PubMed - in process]

13. East Asian Arch Psychiatry. 2011 Jun;21(2):64-72.

The development of a strength-focused mutual support group for caretakers of children with cerebral palsy.

Fung BK, Ho SM, Fung AS, Leung EY, Chow SP, Ip WY, Ha KW, Barlaan PI.

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OBJECTIVE: To examine the efficacy of a strength-focused mutual support group for reducing stress and enhancing psychological well-being of the caretakers of children with cerebral palsy. **METHODS:** This pre- and post-intervention outcome study, conducted by Department of Orthopaedics and Traumatology, Duchess of Kent Children's Hospital, recruited 12 primary caretakers of children with cerebral palsy in Hong Kong. A strength-focused support group manual was developed to help such caretakers to identify and cultivate the character strengths of their children and enhance their own positive emotions. Participants were asked to complete a full set of questionnaires at 3 time-points: before and immediately after the intervention (consisting of 4 weekly sessions), and after the 1-month follow-up booster session. Two additional questionnaires were administered before each session to check mood. Parenting stress, anxiety, depression, social support, hope, and other psychological well-being measures were also assessed. **RESULTS:** Half of the caretakers (n = 6) who had attended the full intervention programme were included in the data analysis. Participants exhibited a significantly lower level of parental stress and higher hope level both after the 4 intervention sessions and at the booster session. Their perceived social support was significantly increased when the group was ongoing but not after it ended. **CONCLUSION:** This group intervention programme could effectively help caretakers reduce their parenting stress and enhance their hopefulness. Launching a similar programme with more sessions and regular follow-up sessions might help maintain positive effects and establish a social support network.

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14. Physiol Meas. 2011 Aug 18;32(10):1529-1539. [Epub ahead of print]

Comparison of blood volume pulse and skin conductance responses to mental and affective stimuli at different anatomical sites.

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Measurements of blood volume pulse (BVP) and skin conductance are commonly used as indications of psychological arousal in affective computing and human-machine interfaces. To date, palmar surfaces remain the primary site for these measurements. Placement of sensors on palmar surfaces, however, is undesirable when recordings are fraught with motion and pressure artifacts. These artifacts are frequent when the human participant has involuntary movements as in hyperkinetic cerebral palsy. This motivates the use of alternative measurement sites. The present study examined the correlation between measurements of blood volume pulse and skin conductance obtained from three different sites on the body (fingers, toes and ear for BVP; fingers, toes and arch of the foot for skin conductance) in response to cognitive and affective stimuli. The results of this pilot study indicated significant inter-site correlation among signal features derived from different sites, with the exception of BVP amplitude, the number of electrodermal reactions and the slope of the electrodermal activity response. We attribute

these differences in part to inter-site discrepancies in local skin conditions, such as skin temperature. Despite these differences, significant changes from baseline were present in the responses to the cognitive and affective stimuli at non-palmar sites, suggesting that these sites may provide viable signal measurements for use in affective computing and human-machine interface applications.

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15. Fiziol Zh. 2011;57(2):58-65.

Age-dependent peculiarities of the functional state of cardiovascular system in children with cerebral palsy [Article in Ukrainian]

[No authors listed]

The age-dependent peculiarities of the functional state of the cardiovascular system (CVS) in children of 7-9 years old with cerebral palsy (CP) with moderately marked functional disorders have been studied. Statistically significant age difference in multiple indicators of central circulation has been detected. Age-dependent peculiarities of hemodynamic response in children with CP in response to dosed physical load have been revealed. The adaptive capacity of the CVS was calculated by the method of comparative analysis of the amplitude and the variation heart rate monitoring. We found that 38% of the studied children had a high level of adaptive capacity of the CVS, while 50% of the children had a low level of adaptive capacity of the CVS.

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Prevention and Cure

16. Dev Med Child Neurol. 2011 Aug 12. doi: 10.1111/j.1469-8749.2011.04079.x. [Epub ahead of print]

Cerebral palsy among children born moderately preterm or at moderately low birthweight between 1980 and 1998: a European register-based study.

Andersen GL, Romundstad P, Cruz JD, Himmelmann K, Sellier E, Cans C, Kurinczuk JJ, Vik T.

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Aim: The aim of this study was to describe trends in prevalence, subtypes, and severity among children with cerebral palsy (CP) born moderately preterm (MPT; gestational age 32-36wks) or at moderately low birthweight (MLBW; 1500-2499g) in Europe. **Method:** We conducted trend analyses of data from 903 children with CP born between 1980 and 1998 who were MPT (gestational age 32-36wks), taken from 11 registers in the Surveillance of Cerebral Palsy in Europe database and from 1835 children with CP who were born at moderately low birthweight (1500-2499g), taken from 14 registers in the Surveillance of Cerebral Palsy in Europe database. **Results:** The overall annual prevalence of CP in children born MPT varied between 12.2 (95% confidence interval [CI] 8.5-17.1) per 1000 live births in 1983 and 4.5 (95% CI 3.2-6.3) per 1000 in 1997. There was a significant decrease in the prevalence over time adjusted for register, with an annual change in prevalence of -3% (95% CI -5 to -2%). This was due to a decrease in the prevalence of bilateral spastic CP (annual change -5%; 95% CI -7 to -3%). **Interpretation:** There was a trend towards a decrease in the prevalence of CP among children born MPT, but no difference in prevalence among children born at MLBW. Both results may represent an improvement in perinatal and neonatal care.

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17. Dev Med Child Neurol. 2011 Aug 12. doi: 10.1111/j.1469-8749.2011.04089.x. [Epub ahead of print]

Do we know what the prevalence of cerebral palsy is?

Day SM.

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PMID: 21838815 [PubMed - as supplied by publisher]

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