

Monday 17 June 2013

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy.

Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. This free weekly bulletin is just one of our activities. Please find out more at www.cpresearch.org.au

Professor Nadia Badawi

Macquarie Group Foundation Chair of Cerebral Palsy
PO Box 560, Darlinghurst, New South Wales 2010 Australia

Interventions and Management

1. BMC Neurol. 2013 Jun 11;13(1):57. [Epub ahead of print]

Australian Cerebral Palsy Child Study: Protocol of a prospective population based study of motor and brain development of preschool aged children with cerebral palsy.

Boyd RN, Jordan R, Pareezer L, Moodie A, Finn C, Luther B, Arnfield E, Pym A, Craven A, Beall P, Weir K, Kentish M, Wynter M, Ware R, Fahey M, Rawicki B, McKinlay L, Guzzetta A.

BACKGROUND: Cerebral palsy (CP) results from a static brain lesion during pregnancy or early life and remains the most common cause of physical disability in children (1 in 500). While the brain lesion is static, the physical manifestations and medical issues may progress resulting in altered motor patterns. To date, there are no prospective longitudinal studies of CP that follow a birth cohort to track early gross and fine motor development and use Magnetic Resonance Imaging (MRI) to determine the anatomical pattern and likely timing of the brain lesion. Existing studies do not consider treatment costs and outcomes. This study aims to determine the pathway (s) to motor outcome from diagnosis at 18 months corrected age (c.a.) to outcome at 5 years in relation to the nature of the brain lesion (using structural MRI). **METHODS:** This prospective cohort study aims to recruit a total of 240 children diagnosed with CP born in Victoria (birth years 2004 and 2005) and Queensland (birth years 2006--2009). Children can enter the study at any time between 18 months to 5 years of age and will be assessed at 18, 24, 30, 36, 48 and 60 months c.a. Outcomes include gross motor function (GMFM-66 & GMFM-88), Gross Motor Function Classification System (GMFCS); musculoskeletal development (hip displacement, spasticity, muscle contracture), upper limb function (Manual Ability Classification System), communication difficulties using Communication and Symbolic Behaviour Scales-Developmental Profile (CSBS-DP), participation using the Paediatric Evaluation of Disability Inventory (PEDI), parent reported quality of life and classification of medical and allied health resource use and determination of the aetiology of CP using clinical evaluation combined with MRI. The relationship between the pathways to motor outcome and the nature of the brain lesion will be analysed using multiple methods including non-linear modelling, multilevel mixed-effects models and generalised estimating equations. **DISCUSSION:** This protocol describes a large population-based study of early motor development and brain structure in a representative sample of preschool aged children with CP, using direct clinical assessment. The results of this study will be published in peer reviewed journals and presented at relevant international conferences.

Trial registration: ACTRN1261200169820.

[PMID: 23758951](https://pubmed.ncbi.nlm.nih.gov/23758951/) [PubMed - as supplied by publisher]

2. Dev Med Child Neurol. 2013 Jun 11. doi: 10.1111/dmcn.12178. [Epub ahead of print]**Fractures in children with cerebral palsy: a total population study.**

Uddenfeldt Wort U, Nordmark E, Wagner P, Düppe H, Westbom L.

Department of Clinical Sciences (Malmö), Social Medicine and Global Health, Lund University, Malmö, Sweden.

AIM: To analyse factors associated with fractures in children with cerebral palsy (CP) in different levels of Gross Motor Function Classification System (GMFCS). **METHOD:** This was an epidemiological retrospective study of a total population of 536 children (214 females, 322 males) with CP born between 1990 and 2005. CP type was unilateral spastic (n=159), bilateral spastic (n=225), ataxic (n=60), dyskinetic (n=80), and mixed type (n=12); 384 children were in Gross Motor Function Classification Scale (GMFCS) levels I-III and 152 children were in GMFCS levels IV-V. Data were collected for a 9-year period on sex, CP-type, GMFCS level, gastrostomy, height, weight, the use of a standing device, antiepileptic drug (AED) therapy, and fractures. **RESULTS:** The risk of fracture in the total population of children with CP was similar to that for typically developing children. The risk for fractures of those in GMFCS levels I-III was not significantly associated with any of the studied risk factors. The risk of fractures for those in GMFCS levels IV-V on AED therapy was a twofold increase ($p=0.004$). The risk for fractures without trauma in children with stunted growth (height for age < -3 SD) and those who did not use standing devices was significantly increased: adjusted incidence rate ratio (AIRR) 4.16 ($p=0.011$) and 3.66 ($p=0.010$) respectively. Results regarding gastrostomy feeding for those in GMFCS levels IV-V were conflicting: a gastrostomy was associated with a reduced risk of fractures with trauma, but with increased risk of fractures without trauma (AIRR 0.10, $p=0.003$ and 4.36, $p=0.012$) respectively. **INTERPRETATION:** Children in GMFCS levels I-III had a similar incidence and pattern for fractures as normally developing children. Those in GMFCS levels IV-V had stunted growth, often a sign of longstanding undernourishment, and were associated with an increased risk of fractures. Children using standing devices had a fourfold reduction of fractures without trauma. Regular loading exercises and early adequate nutritional intake could prevent fractures in severe CP.

© 2013 Mac Keith Press.

[PMID: 23750743](#) [PubMed - as supplied by publisher]

3. Eur J Paediatr Neurol. 2013 Jun 4. pii: S1090-3798(13)00063-9. doi: 10.1016/j.ejpn.2013.04.006. [Epub ahead of print]**Lower limb functioning and its impact on quality of life in ambulatory children with cerebral palsy.**

Jaspers E, Verhaegen A, Geens F, Van Campenhout A, Desloovere K, Molenaers G.

KU Leuven, Department of Rehabilitation Sciences, Belgium; Department of Health Sciences and Technology, ETH Zurich, Switzerland.

BACKGROUND: Children with cerebral palsy (CP) are confronted on a daily basis with their motor problems affecting gait, which might impact on their quality of life (QOL). **AIM:** The goal of this study was to evaluate the impact of gross motor and gait function on QOL in ambulatory children with CP attending regular school. **METHODS:** A condition-specific questionnaire (CP QOL-Child), including a parent/proxy and child self-report, was used to assess the relation between patient characteristics, lower limb impairments and functioning, and the different aspects of the child's QOL. Data on therapy management, lower limb impairments, and gross motor and gait function was collected for 81 children with CP (10.5 ± 3.0 years). CP QOL-Child questionnaires were completed by a parent/proxy for all 81 children and by 39 of the children over 9 years. **RESULTS:** The mean self-reported QOL score (78.2 ± 9.6) was significantly higher than the mean parent/proxy reported score (73.9 ± 10.2). Lower limb spasticity and higher frequency of BTX-A injections correlated with worse scores for the pain and impact of disability domain. Results further showed the adverse impact of the severity of gait pathology on QOL perception for the parents/proxy and the child self-report. Gait speed was an important factor for the parents/proxy, though correlated less with self-perceived QOL for the children. **CONCLUSIONS:** Children and parents identified similar factors that adversely affect QOL, whereby the amount of gait pathology was shown to play a crucial role. Only gait speed seemed to be of higher importance for the parents compared to the children.

Copyright © 2013 European Paediatric Neurology Society. Published by Elsevier Ltd. All rights reserved.

[PMID: 23755939](#) [PubMed - as supplied by publisher]

4. Neurorehabil Neural Repair. 2013 Jun 10. [Epub ahead of print]

A Home-Based Program Using Patterned Sensory Enhancement Improves Resistance Exercise Effects for Children With Cerebral Palsy: A Randomized Controlled Trial.

Wang TH, Peng YC, Chen YL, Lu TW, Liao HF, Tang PF, Shieh JY.

National Taiwan University, Taipei, Taiwan, ROC.

BACKGROUND: Neurologic music therapy has demonstrated improved walking performance in persons with neurologic disease; however, little evidence supports the use of music with functional resistance exercise to improve motor capacity and daily functions for children with cerebral palsy. **OBJECTIVE:** To investigate the effect of additional patterned sensory enhancement (PSE) music combined with exercise for children with spastic diplegia. **METHODS:** An assessor-blind, randomized controlled trial with 6- and 12-week follow-ups was carried out. Thirty-six children with spastic diplegia, aged 5 to 13 years, were assigned to a PSE group (n = 18) or a no-music group (n = 18). Both groups received 6-week, home-based, loaded sit-to-stand exercise, but only the PSE group exercised with prerecorded PSE music. The primary outcome was Gross Motor Function Measure (GMFM). Secondary outcomes included Pediatric Evaluation of Disability Inventory (PEDI) mobility and self-care domains, 1-repetition maximum of sit-to-stand, and walking speeds. **RESULTS:** Three children did not complete the program. Intention-to-treat analysis showed both groups improved in GMFM D, E, and Goal dimensions; Functional Skills Scales of PEDI mobility domain; and 1-repetition maximum of sit-to-stand at posttest and follow-ups (P = .005). The PSE group improved significantly greater than the no-music group in the GMFM D and Goal dimensions (P < .005) after training, and the improvement persisted for at least 6 or 12 weeks (P = .013). No significant improvements in the rest PEDI scales and walking speeds were found. **CONCLUSIONS:** Adding neurologic music therapy to functional resistance exercise could induce greater improvements in gross motor capacity for children with cerebral palsy.

[PMID: 23757295](#) [PubMed - as supplied by publisher]

5. Arch Phys Med Rehabil. 2013 Jun 5. pii: S0003-9993(13)00421-8. doi: 10.1016/j.apmr.2013.05.012. [Epub ahead of print]

Effects of Home-Based Locomotor Treadmill Training on Gross Motor Function in Young Children with Cerebral Palsy: A Quasi-Randomized Controlled Trial.

Mattern-Baxter K, McNeil S, Mansoor JK.

Assistant Professor, Department of Physical Therapy, California State University, Sacramento, 6000 J Street, Sacramento, CA 95819. Electronic address: kbaxter@csus.edu.

OBJECTIVE: To examine the effects of an intensive, home-based program of treadmill training on motor skills related to walking in pre-ambulatory children with cerebral palsy (CP). **Design:** Quasi-randomized controlled trial **Setting:** Homes of the participants **PARTICIPANTS:** Twelve children with CP with Gross Motor Function Classification System levels I and II were assigned to the intervention group (n=6) [mean age 21.76 months (6.50)] and control group (n=6) [mean age of 21.25 (6.07)]. All children were tested pre-intervention, post-intervention, at a 1-month and at a 4-month follow-up **INTERVENTIONS:** All children received their weekly scheduled physical therapy sessions at their homes. In addition, children in the intervention group walked on a portable treadmill in their homes 6 times per week, twice daily for 10-20 minute sessions, for 6 weeks. The intervention was carried out by the children's parents with weekly supervision by a physical therapist **MAIN OUTCOME MEASURES:** Gross Motor Function Measure-66 (GMFM-66) Dimensions D/E, Peabody Developmental Motor Scales-2 (PDMS-2), Pediatric Evaluation of Disability Inventory (PEDI), Timed 10-meter Walk Test (10MWT) and Functional Mobility Scale (FMS). The Friedman test and Mann-Whitney-U test was conducted for within-group and between-group differences, respectively. **RESULTS:** There was a significant between-group treatment effect for the PDMS-2 at post-test (p=0.01) and 1-month post-intervention follow-up (p=0.09) as well as for the PEDI (p=0.01) at post-test, the 1-month post-intervention (p=0.009) and the 4-month post-intervention follow-up (p=0.04). The FMS was significant at the post-test (p=0.04). **CONCLUSION:** Home-based treadmill training accelerates the attainment of

walking skills and decreases the amount of support used for walking in young children with CP.
Copyright © 2013 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

[PMID: 23747646](#) [PubMed - as supplied by publisher]

6. Dev Med Child Neurol. 2013 Jun 13. doi: 10.1111/dmcn.12181. [Epub ahead of print]

The reliability and validity of a research-grade pedometer for children and adolescents with cerebral palsy.

Maher C, Kenyon A, McEvoy M, Sprod J.

School of Health Sciences, University of South Australia, Adelaide, SA, Australia.

AIM: The aim of this study was to determine the reliability, validity, and optimal placement of pedometers in children with cerebral palsy (CP) who ambulate without aids. **METHOD:** Seventeen participants aged 7 to 17 years with CP (eight males, nine females; mean age 12y 4mo; SD 3y 2mo), who could ambulate without aids, wore four New Lifestyles pedometers (NL-1000) on an elasticized waist belt. Fourteen participants had hemiplegia, two diplegia, and one triplegia; all were classified in Gross Motor Function Classification System (GMFCS) level I (n=8) or II (n=9). Participants completed 3-minute walking and running trials around an indoor course and were videotaped to verify the actual number of steps taken during each trial. Inter-pedometer reliability was determined by comparing pedometer readings using intraclass correlation coefficients (ICCs). Validity was determined by comparing pedometer step counts with video step counts using ICC, t-tests, and Bland-Altman plots. Optimal pedometer placement was determined using Wilcoxon signed-rank tests to compare the percentage error for pedometers positioned on the dominant and non-dominant hips. **RESULTS:** Excellent reliability (ICC 0.88-0.99) and validity (ICC 0.78-0.95) were demonstrated with no significant difference between the video step counts and pedometer step counts. There was no significant difference between the step counts recorded by pedometers on the dominant and non-dominant hips. **INTERPRETATION:** This study showed that NL-1000 pedometers have a high degree of reliability and validity in ambulant children with CP in controlled conditions.

© 2013 Mac Keith Press.

[PMID: 23763550](#) [PubMed - as supplied by publisher]

7. J Pediatr Orthop. 2013 Jul-Aug;33(5):501-4. doi: 10.1097/BPO.0b013e318288b3e7.

Repeat hamstring lengthening for crouch gait in children with cerebral palsy.

Rethlefsen SA, Yasmeh S, Wren TA, Kay RM.

*Children's Orthopaedic Center, Children's Hospital Los Angeles †Department of Orthopaedic Surgery, Keck School of Medicine ‡Departments of Radiology and Biomedical Engineering, University of Southern California, Los Angeles, CA.

BACKGROUND: Progressive crouch gait occurs in patients with cerebral palsy with increasing age. Hamstring lengthening improves crouch in these patients, but hamstring contractures can recur over time. The purpose of this study was to determine whether revision hamstring lengthening is as effective as primary lengthening in improving crouched gait. **METHODS:** Retrospective review was performed for 39 patients with static encephalopathy, average age 10±4 years, who underwent hamstring lengthening. Twenty-one subjects underwent a single hamstring lengthening (HSL group), and 18 underwent repeat HSL (rHSL group). Range of motion (ROM) and kinematic measures from preoperative and postoperative gait analysis testing were compared within and between groups using t tests, χ tests, and multiple regression analyses as appropriate. **RESULTS:** A total of 15/21 subjects in the HSL group (71%) improved stance knee extension by =10 degrees, as compared with 5/18 (28%) in the rHSL group (P=0.007). The HSL group had improved popliteal angle, static knee and hip extension ROM, and knee flexion at initial contact and in stance phase (P<0.003). No such improvements were seen in the rHSL group. Popliteal angle, knee and hip extension ROM, and knee flexion at initial contact and in stance phase had significantly greater improvement in the HSL than the rHSL group (P<0.01). These differences persisted after adjusting for preoperative minimum hip flexion in stance, the only variable that differed between groups preoperatively. **CONCLUSIONS:** Repeat hamstring lengthening may delay progressive crouch, but does not result

in long-term correction of crouch gait. Recurrent crouch may be caused by other factors such as quadriceps insufficiency, and may reflect the natural history of CP. Patients with recurrent crouch after hamstring lengthening are likely to benefit more from alternative surgical interventions to improve their knee position and function during gait.

LEVEL OF EVIDENCE: Level IV-case series.

[PMID: 23752146](#) [PubMed - in process]

8. J Pediatr Orthop. 2013 Jul-Aug;33(5):505-10. doi: 10.1097/BPO.0b013e3182924677.

Outcomes after salvage procedures for the painful dislocated hip in cerebral palsy.

Wright PB, Ruder J, Birnbaum MA, Phillips JH, Herrera-Soto JA, Knapp DR.

Department of Orthopedic Surgery and Rehabilitation, University of Mississippi Medical Center, Jackson, MS.

BACKGROUND: The painful dislocated hip in the setting of cerebral palsy is a challenging problem. Many surgical procedures have been reported to treat this condition with varying success rates. The purpose of this study is to retrospectively evaluate and compare the outcomes of 3 different surgical procedures performed at our institution for pain relief in patients with spastic quadriplegic cerebral palsy and painful dislocated hips. **METHODS:** A retrospective chart review of the surgical procedures performed by 5 surgeons for spastic, painful dislocated hips from 1997 to 2010 was performed. The procedures identified were (1) proximal femoral resection arthroplasty (PFRA); (2) subtrochanteric valgus osteotomy (SVO) with femoral head resection; and (3) proximal femur prosthetic interposition arthroplasty (PFIA) using a humeral prosthesis. Outcomes based on pain and range of motion were determined to be excellent, good, fair, or poor by predetermined criteria. **RESULTS:** Forty-four index surgeries and 14 revision surgeries in 33 patients with an average follow-up of 49 months met the inclusion criteria. Of the index surgeries, 12 hips were treated with a PFRA, 21 with a SVO, and 11 with a PFIA. An excellent or good result was noted in 67% of PFRA, 67% of SVOs, and 73% of PFIA. No statistical significance between these procedures was achieved. The 14 revisions were performed because of a poor result from previous surgery, demonstrating a 24% reoperation rate overall. No patients classified as having a fair result underwent revision surgery. All patients receiving revision surgery were eventually classified as having an excellent or good result. **CONCLUSIONS:** Surgical treatment for the painful, dislocated hip in the setting of spastic quadriplegic cerebral palsy remains unsettled. There continue to be a large percentage of failures despite the variety of surgical techniques designed to treat this problem. These failures can be managed, however, and eventually resulted in a good outcome. We demonstrated a trend toward better outcomes with a PFIA, but further study should be conducted to prove statistical significance.

LEVEL OF EVIDENCE: III.

[PMID: 23752147](#) [PubMed - in process]

9. J Pediatr Orthop. 2013 Jul-Aug;33(5):494-500. doi: 10.1097/BPO.0b013e318288b42a.

Conflict of interest in the assessment of botulinum toxin A injections in patients with cerebral palsy: a systematic review.

Sung KH, Chung CY, Lee KM, Lee YK, Lee SY, Lee J, Choi IH, Cho TJ, Yoo WJ, Park MS.

*Department of Orthopaedic Surgery, Kwandong University Myongji Hospital, Kyungki †Medical Research Collaboration Center, Seoul National University Bundang Hospital, Kyungki ‡Department of Orthopaedic Surgery, Seoul National University Children's Hospital, Seoul, Korea.

BACKGROUND: The efficacy of using botulinum toxin A injections in cerebral palsy (CP) is controversial. The financial conflict of interest related to medical research can affect the conclusion of an evidence-based review. This study was performed to determine as to what proportion of studies on botulinum toxin A injections in patients with CP was sponsored by the industry and whether the assessments of botulinum toxin injection in CP were associated with industry support. Studies were identified with a search of the PubMed database (January 1991 to November

2011). All prospective, comparative, English language studies on the use of botulinum toxin A injections in patients with CP were included. A total of 374 articles were screened, 128 potentially eligible full articles were retrieved, and 66 studies met our inclusion criteria. The funding sources of the articles were reviewed, and qualitative conclusions regarding the effect of botulinum toxin A injection were classified as being either favorable, neutral, or unfavorable. RESULTS: Of 66 eligible articles, 28 were funded by the industry, and 25 were not. The other 13 studies did not include information on the funding source. A significant association was observed between the funding source and qualitative conclusions ($P=0.042$). Fifteen (53.6%) of the 28 industry-sponsored studies had favorable conclusions, whereas only 5 (20%) of the 25 non-industry-sponsored studies had favorable conclusions. CONCLUSIONS: About half of studies on the effect of botulinum toxin A in CP were sponsored by the industry. This systematic review revealed that the qualitative conclusions in those studies are more favorable to the use of the botulinum toxin A than the non-industry-sponsored studies. Clinicians should be aware of an industry-related conflict of interest regarding reports on the efficacy of botulinum toxin A injections in patients with CP.

LEVEL OF EVIDENCE: Level II-therapeutic study.

[PMID: 23752145](#) [PubMed - in process]

10. J Pediatr Orthop. 2013 Jul-Aug;33(5):479-87. doi: 10.1097/BPO.0b013e318285c507.

What's the Evidence? Systematic Literature Review of Risk Factors and Preventive Strategies for Surgical Site Infection Following Pediatric Spine Surgery.

Glantzbecker MP, Riedel MD, Vitale MG, Matsumoto H, Roye DP, Erickson M, Flynn JM, Saiman L.

*Department of Orthopaedic Surgery, Harvard Medical School, Children's Hospital Boston, Boston, MA
 †Departments of Orthopaedic Surgery ‡Pediatrics, Columbia University ¶Department of Infection Prevention & Control, New York-Presbyterian Hospital, New York, NY ‡Department of Orthopaedic Surgery, University of Colorado, Denver, CO §Department of Orthopaedic Surgery, University of Pennsylvania, Philadelphia, PA.

BACKGROUND: Despite relatively high rates of surgical site infections (SSIs) after pediatric spine surgery, practice guidelines are absent. We performed a systematic review of the literature, determining the level of evidence for risk factors for SSIs and prevention practices to reduce SSIs following pediatric spine surgery. METHODS: The search utilized the root search words "spine," "scoliosis," and "infection" resulting in 9594 abstracts. Following removal of duplicate abstracts, those that assessed only SSI rates, SSI treatment, nonoperative spine infections, or adult populations, 57 relevant studies were rated for level of evidence and graded using previously validated scales. RESULTS: Very few studies lead to grade A (good evidence) or grade B (fair evidence) recommendations. Ceramic bone substitute did not increase the risk of SSIs when compared with autograft (grade A). Comorbid medical conditions, particularly cerebral palsy or myelodysplasia; urinary or bowel incontinence; nonadherence to antibiotic prophylaxis protocols; and increased implant prominence increase the risk of SSIs (grade B). SSIs caused by gram-negative bacilli were more frequent in neuromuscular populations and first-generation stainless steel implants increased the risk of delayed infection compared to newer generation titanium implants (grade B). Evaluations of other risk factors for SSIs yielded conflicting or poor-quality evidence (grade C); these included malnutrition or obesity; number of levels fused or fusion extended to the sacrum/pelvis; blood loss; and use of allograft. Insufficient evidence (0 to 1 published studies) was available to recommend numerous practices shown to reduce SSI risk in other populations such as chlorhexidine skin wash the night before surgery, preoperative nasal swabs for *Staphylococcus aureus*, chlorhexidine skin disinfection, perioperative prophylaxis with intravenous vancomycin, vancomycin, or gentamicin powder in the surgical site or graft. CONCLUSIONS: Few studies have evaluated risk factors and preventive strategies for SSIs following pediatric spine surgery. This systematic review documents the relative lack of evidence supporting SSI prevention practices and highlights priorities for research.

LEVEL OF EVIDENCE: Level III therapeutic study.

[PMID: 23752143](#) [PubMed - in process]

11. Spine (Phila Pa 1976). 2013 Jun 11. [Epub ahead of print]**Laminoplasty and pedicle screw fixation for cervical myelopathy associated with athetoid cerebral palsy: minimum 5-year follow-up.**

Demura S, Murakami H, Kawahara N, Kato S, Yoshioka K, Tsuchiya H.

*Department of Orthopaedic Surgery, Kanazawa University, Kanazawa, Japan †Department of Orthopaedic Surgery, Kanazawa Medical University, Kanazawa, Japan.

Study design. Retrospective case series. **Objective.** To evaluate the outcomes following laminoplasty and posterior spinal fusion utilizing pedicle screws for cervical myelopathy associated with athetoid cerebral palsy. **Summary of Background data.** A variety of surgical procedures have been reported including decompression without fusion, spinal fusion by anterior, posterior or circumferential approach in this population. However, involuntary neck movements bring risk of postoperative neurological deterioration due to progression of kyphosis, pseudoarthrosis or adjacent segmental degeneration. **Methods.** A consecutive series of 17 patients who underwent midline T-saw laminoplasty and posterior spinal fusion using pedicle screws were retrospectively reviewed. There were 8 female and 9 male with a mean age at the time of surgery of 52 years. The mean follow-up was 71 months. Radiographic measures were made in change of Cobb angle of sagittal plane from C2 to C7 and accuracy of pedicle screws. Barthel index (BI) which shows independence in activities of daily life and the Japanese Orthopaedic Association (JOA) score were also evaluated. **Results.** Preoperative Cobb angle of sagittal plane from C2 to C7 measured 11.0 ± 14.5 degrees of kyphosis which improved to 1.5 ± 12.7 degrees postoperatively ($p < 0.05$). Solid posterior bony fusion was achieved in all cases without rigid orthosis such as Halo vest. There were two cases of adjacent segmental instability, which required additional surgery. Nineteen (13%) out of the 138 screws showed deviation from the pedicle with postoperative computed tomography. However, there were no neurovascular complications during or after the surgery in any cases. Postoperative JOA score and BI significantly improved in $32 \pm 16\%$, and $48 \pm 26\%$ respectively. **Conclusions.** Laminoplasty and pedicle screw fixation provided strong internal fixation and improved neurological function and activities of daily living for cervical myelopathy associated with athetoid cerebral palsy.

[PMID: 23759815](#) [PubMed - as supplied by publisher]

12. Res Dev Disabil. 2013 Jun 6;34(9):2507-2513. doi: 10.1016/j.ridd.2013.05.001. [Epub ahead of print]**Practicing a matching movement with a mirror in individuals with spastic hemiplegia.**

Smorenburg AR, Ledebt A, Deconinck FJ, Savelsbergh GJ.

Institute for Biomedical Research into Human Movement and Health, School of Health Care Science, Manchester Metropolitan University, John Dalton Building, Oxford Road, Manchester M1 5GD, United Kingdom. Electronic address: a.r.p.smorenburg@vu.nl.

This experimental study aimed to determine the effect of practicing a position matching task with (mirror) visual feedback of the less-impaired arm on the matching accuracy of the impaired arm in children and adolescents with spastic hemiparetic cerebral palsy. Practice consisted of 40 trials of bimanual target matching, where one group received regular visual feedback and a second group received mirror visual feedback of the less-impaired arm. On three occasions (pre, post, and after a 1-week-retention) position sense (matching accuracy measured as the endpoint error in cm) of the impaired arm was tested with a unimanual and bimanual matching task, performed without any visual information of either hand. Matching accuracy of the impaired arm was better in the post-test than in the pre-test, but this improvement was similar for both practice groups. In the retention-test, accuracy had returned to pre-test-level, which might be ascribed to the short duration of the practice period. These outcomes suggest that practicing a matching task with visual feedback of the less-impaired arm might help to improve the matching accuracy of the impaired arm in individuals with spastic hemiparetic cerebral palsy.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 23751296](#) [PubMed - as supplied by publisher]

13. Indian J Pediatr. 2013 Jun 11. [Epub ahead of print]**Bilateral Submandibular Duct Transposition with Sublingual Gland Excision for Cerebral Palsy Children with Drooling.**

Chakravarti A, Gupta R, Garg S, Aneja S.

Department of Otorhinolaryngology & Head and Neck Surgery, Lady Hardinge Medical College, New Delhi, 110001, India, drachakravarti@yahoo.co.in.

[PMID: 23749376](#) [PubMed - as supplied by publisher]

14. Res Dev Disabil. 2013 Jun 6;34(9):2493-2499. doi: 10.1016/j.ridd.2013.05.003. [Epub ahead of print]**Association between executive/attentional functions and caries in children with cerebral palsy.**

Dourado MD, Andrade PM, Ramos-Jorge ML, Moreira RN, Oliveira-Ferreira F.

Department of Dentistry, Federal University of Vales do Jequitinhonha e Mucuri - UFVJM, Diamantina, MG 39100-000, Brazil. Electronic address: mauricio_mrd@hotmail.com.

The aim of the present study was to evaluate the existence of an association between attention/executive functions and the development of dental caries in individuals with cerebral palsy (CP). Seventy-six children with CP were selected from a physical rehabilitation center and a school serving children with disabilities. The control group was made up of 89 children without neurological impairment. Socioeconomic status, presence of teeth with cavities due to caries, degree of motor impairment and intellectual, executive and attentional functions were assessed. Mean age of participants was 8.9 years (SD=3.56). The CP group had a significantly lower performance ($p < 0.05$, Mann-Whitney test) on the intelligence, attentional function and executive function tests in comparison to the control group. Controlling for the clinical diagnosis (CP or control group), motor impairment and intellectual function, the significant explanatory variables for the presence of teeth with cavities were performance on the Complex Rey figure test (OR=0.941) and the Digit Span subtest of the Wechsler Intelligence Scale for Children in backward order (OR=0.581). After controlling for intellectual function, clinical diagnosis and motor impairment, deficits in executive and attentional functions increased the odds of developing dental caries in children with cerebral palsy.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 23751295](#) [PubMed - as supplied by publisher]

15. Pol Merkur Lekarski. 2013 Apr;34(202):210-3.**Refractive errors in patients with cerebral palsy [Article in Polish]**

Mrugacz M, Bandzul K, Kulak W, Poppe E, Jurowski P.

Uniwersytet Medyczny w Białymstoku, Klinika Okulistyki Dzieciqcej.

Ocular changes are common in patients with cerebral palsy (CP) and they exist in about 50% of cases. The most common are refractive errors and strabismus disease. The aim of the paper was to estimate the relativeness between refractive errors and neurological pathologies in patients with selected types of CP. MATERIAL AND METHODS. The subject of the analysis was showing refractive errors in patients within two groups of CP: diplegia spastica and tetraparesis, with nervous system pathologies taken into account. Results. This study was proven some correlations between refractive errors and type of CP and severity of the CP classified in GMFCS scale. CONCLUSIONS: Refractive errors were more common in patients with tetraparesis than with diplegia spastica. In the group with diplegia spastica more common were myopia and astigmatism, however in tetraparesis - hyperopia.

[PMID: 23745327](#) [PubMed - in process]

16. J Paediatr Child Health. 2013 Jun 9. doi: 10.1111/jpc.12254. [Epub ahead of print]**Relationships between sleep disruptions, health and care responsibilities among mothers of school-aged children with disabilities.**

Bourke-Taylor H, Pallant JF, Law M, Howie L.

Department of Occupational Therapy, School of Primary Health Care, Faculty of Medicine, Nursing and Health Sciences, Monash University - Peninsula Campus, Frankston, Australia.

AIM: Sleep problems are more common among children with disabilities. Mothers are likely to provide night-time care. Mothers of children with disabilities are known to experience high levels of stress and mental health issues compared with other mothers. Relationships between a child's sleep problems, and chronic maternal sleep interruption and subjective health have not been researched. **METHOD:** Cross-sectional mail-out survey with follow-up phone call was used. Instruments included the Short Form 36 version 2 and instruments that measured maternal, child and sleep characteristics. Descriptive statistics examined characteristics of participants and correlation, and Kruskal-Wallis test was used to determine important maternal and child characteristics around sleep issues. **RESULTS:** All mothers (n = 152) cared for a school-aged child with a developmental disability including autism spectrum disorder (n = 94) and cerebral palsy (n = 29). Nearly half (49%) of the mothers were awoken more than 4 nights/week. Three distinct sleep groups were identified: no sleep interruption; sleep interruption once/night, 4 nights/week; and more frequent interruption. Mothers experiencing the most sleep interruptions reported significantly poorer health on six Short Form 36 version 2 dimensions. Night-time caregiving was associated with higher child care needs rather than children's diagnoses. Mothers who experienced more sleep interruption also participated less in health-promoting activities (active leisure, time with socially supportive others) during the day. **CONCLUSION:** This study identifies a group of mothers with chronic sleep interruption and demonstrates related poor maternal subjective health and lower participation in health activities that may service to support maternal health. Mothers with children with the highest daytime care needs also experienced high night-time care responsibilities. Changes to service provision are recommended to identify mothers in need of additional supports and services.

© 2013 The Authors. Journal of Paediatrics and Child Health © 2013 Paediatrics and Child Health Division (Royal Australasian College of Physicians).

[PMID: 23745960](#) [PubMed - as supplied by publisher]

17. Child Care Health Dev. 2013 Jul;39(4):500-11. doi: 10.1111/cch.12060.**The Questionnaire of Young People's Participation (QYPP): a new measure of participation frequency for disabled young people.**

Tuffrey C, Bateman BJ, Colver AC.

Solent NHS Trust, Child Health Services, Fareham, UK.

INTRODUCTION: The concept of participation was introduced by the World Health Organisation in the International Classification of Functioning, Disability and Health, 2001. Instruments to measure participation have been developed for children and adults, but none specifically for adolescents. Adolescence is a life stage with distinct patterns of participation, and previous research has shown that young people with disabilities have poorer participation than the general population. The aim of this study was to develop a measure of participation frequency, covering all major domains, for young people with cerebral palsy (CP). CP was chosen as an exemplar because it is a significant cause of disability in young people, with affected individuals experiencing a range of different impairments of varying severity. **METHODS:** A pool of 88 items was developed using the published literature, existing measures and qualitative data from young people. The item pool was revised following expert review by 17 experts. Cognitive interviews on the items were carried out with 12 young people and 12 carers; field-testing was then undertaken with 107 young people with CP aged 13-21 years, and 540 young people from the general population to enable item reduction and to examine reliability and construct validity. **RESULTS:** The content review resulted in a 92-item draft questionnaire, content validity index of 93%. Cognitive interviews led to further wording changes. Following field-testing, the questionnaire was shortened to 45 items. Known-groups validity was demonstrated by correlation with impairment severity. Test-retest reliability was satisfactory for all domains. Internal

consistency varied between domains. **CONCLUSION:** This is the first instrument developed specifically to measure frequency of participation across multiple domains for young people with disability. Use of the questionnaire in research and clinical work will enable its properties to be better understood and its generalizability to wider groups to be clearer.

© 2013 John Wiley & Sons Ltd.

[PMID: 23763251](#) [PubMed - in process]

18. Child Care Health Dev. 2013 Jul;39(4):552-61. doi: 10.1111/cch.12048.

'I could never do that before': effectiveness of a tailored Internet support intervention to increase the social participation of youth with disabilities.

Raghavendra P, Newman L, Grace E, Wood D.

Disability & Community Inclusion, Faculty of Health Sciences, Flinders University, Adelaide, SA, Australia.

BACKGROUND: Youth use the Internet for a variety of purposes including social networking. Youth with disabilities are limited in their social networks and friendships with peers. The aim was to investigate the effectiveness of tailored one-on-one support strategies designed to facilitate social participation of youth with disabilities through the use of the Internet for social networking. **METHODS:** Eighteen youth aged 10-18 years with cerebral palsy, physical disability or acquired brain injury received support, training and assistive technology at their home to learn to use the Internet for building social networks. The Canadian Occupational Performance Measure (COPM) and Goal Attainment Scale (GAS) were used to evaluate objective changes in performance and satisfaction. Interviews with the youth identified subjective changes they experienced through participation in the programme and to determine whether and how the intervention influenced their social participation. **RESULTS:** Youth showed an increase in performance and satisfaction with performance on identified goals concerning social networking on the COPM; Paired T-test showed that these differences were statistically significant at $P < 0.001$. GAS T-scores demonstrated successful outcomes (>50) for 78% of the youth. Interviews showed that youth were positive about the benefits of hands-on training at home leading to increased use of the Internet for social networking. **CONCLUSIONS:** The Internet could be a viable method to facilitate social participation for youth with disabilities. Youth identified the benefits of one-to-one support at home and training of the family compared with typical group training at school. Despite its success with this group of youth, the time and effort intensive nature of this approach may limit the viability of such programmes. Further longitudinal research should investigate whether Internet use is sustained post intervention, and to identify the factors that best support ongoing successful and safe use.

© 2013 John Wiley & Sons Ltd.

[PMID: 23763256](#) [PubMed - in process]

19. Res Dev Disabil. 2013 Jun 7;34(9):2621-2634. doi: 10.1016/j.ridd.2013.05.013. [Epub ahead of print]

Determinants of participation in leisure activities among adolescents with cerebral palsy.

Shikako-Thomas K, Shevell M, Schmitz N, Lach L, Law M, Poulin C, Majnemer A; The QUALA Group.

School of Physical and Occupational Therapy, McGill University, Canada. Electronic address: keiko.thomas@mail.mcgill.ca.

Studies have identified restrictions in engagement in leisure activities for adolescents with disabilities. Participation is a complex construct and likely influenced by a variety of factors. These potential determinants have not yet been sufficiently explored in the population of adolescents with cerebral palsy (CP). The objective of this study is to estimate the potential influence of adolescent characteristics and environmental factors as determinants of participation in leisure activities for adolescents with CP. A cross-sectional design was used. Participants were adolescents (12-19 years old) with cerebral palsy. Participants were assessed with the Vineland Adaptive Behavior Scale - II, Gross Motor Function Measure, Gross Motor Function Classification System, Manual Ability Classification System and completed the Self-Perception Profile for Adolescents, Dimensions of Mastery

Questionnaire, Strengths and Difficulties Questionnaire, Family Environment Scale, the European Child Environment Questionnaire and the Preferences for Activities of Children. The main outcome measure was the Children's Assessment of Participation and Enjoyment. 187 adolescents (age M=15.4; SD=2.2) completed the study. Multivariate models of participation in leisure revealed associations with factors related to the adolescents' functional characteristics and attitudes, the family environment, socioeconomic status, and contextual factors such as school type, and collectively explained from 28% (diversity of skill-based activities) up to 48% (intensity and diversity of self-improvement activities) of the variance in intensity and diversity in five leisure participation domains (diversity: $r^2=.33$ recreational; $r^2=.39$ active-physical; $r^2=.33$ social activities). Adolescent's mastery motivation, self-perception and behavior were individually associated with participation in different activity domains, but did not strongly predict participation within multivariate models, while preferences for activities were strong predictors of participation in all domains, except for skill-based activities. Engagement in different types of leisure activities is important for adolescents' development and well-being. Health care professionals should consider adolescents' and families' characteristics to promote participation in leisure activities.
Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 23751302](#) [PubMed - as supplied by publisher]

20. Cien Saude Colet. 2013 Jun;18(6):1705-15.

Parental stress in families of children with cerebral palsy: an integrative review [Article in Portuguese]

Ribeiro MF, Porto CC, Vandenberghe L.

This article aims to select, evaluate and interpret critically the bibliographic production focused on the stress experienced by parents/caregivers of children with cerebral palsy. An integrative literature review was conducted. Sources for this search were the Virtual Health Library (VHL), the United States National Library of Medicine (PubMed) and manual search of references from the selected studies. It was decided to select studies published between 1998 and 2011. The sample included 13 articles. Parents of children with cerebral palsy have higher stress levels than parents of children without disabilities. Behavioral problems, psychological disorders and emotional needs of children were factors commonly associated with high levels of stress. Satisfaction with social support, satisfaction with the parental role, a good family rapport, an emotional bond between father/mother and child, spousal support and the sense of being an active participation in social life help reduce stress levels. Parents of children with cerebral palsy are likely to have their health affected by higher levels of stress. Thus, health professionals should give them special attention.

[PMID: 23752537](#) [PubMed - in process]

21. Rev Med Brux. 2013 Mar-Apr;34(2):70-8.

Clinical examination of children with cerebral palsy: is there a consensus between clinicians? [Article in French]

Bonnechère B, Wermenbol V, Dan B, Degelaen M, Salvia P, Rooze M, Van Sint Jan S.

Laboratoire d'Anatomie, de Biomécanique et d'Organogenèse (LABO), Faculté de Médecine, ULB, Bruxelles.
bbonnech@ulb.ac.be

Diagnosis and most of all classification of children with cerebral palsy (CP) remain a challenge for clinicians. To help them in this process, clinicians can rely on several clinical testing procedures as well as complementary investigations. The goal of this study was to determine which clinical tests found in the literature are the most frequently used in common practice in Belgium. Forty tests have been found in the literature. They have been sorted into five different categories: quantitative evaluation of motor function, spasticity evaluation, orthopaedic testing, upper limb evaluation and complementary investigations. Seven clinicians (five medical doctors and two physiotherapists) with a mean experience of sixteen years with CP children answered the questionnaire. Concerning the quantitative evaluation of motor function the most used tests are: Gross Motor Function Classification System, Manual Ability Classification System and the Pediatric Evaluation of Disability Inventory (PEDI). As regards spasticity, Ashworth scale is more frequently used than Tardieu test. No trend currently exist for the upper limb evaluation, but it was noted that these tests are rarely used in clinical practice. We observed a

significant use of gait analysis at diagnosis and follow-up of CP children. We conclude that there are large differences between clinicians for clinical examination of CP children. This lack of consensus makes patient data comparison difficult between clinical centers. This seems to indicate that a homogenization effort should be organized if one wishes to better stimulate collaborations between centers.

[PMID: 23755713](#) [PubMed - in process]

Prevention and Cure

22. Case Rep Transplant. 2013;2013:951827. doi: 10.1155/2013/951827. Epub 2013 May 15.

First autologous cell therapy of cerebral palsy caused by hypoxic-ischemic brain damage in a child after cardiac arrest-individual treatment with cord blood.

Jensen A, Hamelmann E.

Campus Clinic Gynecology, Ruhr-University Bochum, Universitätsstrasse 140, 44799 Bochum, Germany.

Each year, thousands of children incur brain damage that results in lifelong sequelae. Therefore, based on experimental evidence, we explored the therapeutic potential of human cord blood, known to contain stem cells, to examine the functional neuroregeneration in a child with cerebral palsy after cardiac arrest. The boy, whose cord blood was stored at birth, was 2.5 years old and normally developed when global ischemic brain damage occurred resulting in a persistent vegetative state. Nine weeks later, he received autologous cord blood (91.7 mL, cryopreserved, 5.75×10^8 mononuclear cells) intravenously. Active rehabilitation (physio- and ergotherapy) was provided daily, follow-up at 2, 5, 12, 24, 30, and 40 months. At 2-months follow-up the boy's motor control improved, spastic paresis was largely reduced, and eyesight was recovered, as did the electroencephalogram. He smiled when played with, was able to sit and to speak simple words. At 40 months, independent eating, walking in gait trainer, crawling, and moving from prone position to free sitting were possible, and there was significantly improved receptive and expressive speech competence (four-word sentences, 200 words). This remarkable functional neuroregeneration is difficult to explain by intense active rehabilitation alone and suggests that autologous cord blood transplantation may be an additional and causative treatment of pediatric cerebral palsy after brain damage.

[PMID: 23762741](#) [PubMed]

23. Res Dev Disabil. 2013 Jun 6;34(9):2500-2506. doi: 10.1016/j.ridd.2013.05.030. [Epub ahead of print]

Children with cerebral palsy and periventricular white matter injury: Does gestational age affect functional outcome?

Harvey AR, Randall M, Reid SM, Lee KJ, Imms C, Rodda J, Eldridge B, Orsini F, Reddihough D.

Royal Children's Hospital, Flemington Road, Parkville, 3052 Victoria, Australia; Murdoch Childrens Research Institute, 50 Flemington Road, Parkville, 3052 Victoria, Australia; University of Melbourne, Parkville, Australia. Electronic address: adrienne.harvey@rch.org.au.

This study aimed to determine differences in functional profiles and movement disorder patterns in children aged 4-12 years with cerebral palsy (CP) and periventricular white matter injury (PWMI) born >34 weeks gestation compared with those born earlier. Eligible children born between 1999 and 2006 were recruited through the Victorian CP register. Functional profiles were determined using the Gross Motor Function Classification System (GMFCS), Manual Abilities Classification System (MACS), Communication Function Classification System (CFCS), Functional Mobility Scale (FMS) and Bimanual Fine Motor Function (BFMF). Movement disorder and topography were classified using the Surveillance of Cerebral Palsy in Europe (SCPE) classification. 49 children born >34 weeks (65% males, mean age 8y 9mo [standard deviation (SD) 2y 2mo]) and 60 children born =34 weeks (62% males, mean age 8y 2mo [SD 2y 2mo]) were recruited. There was evidence of differences between the groups for the GMFCS ($p=0.003$), FMS 5, 50 and 500 ($p=0.003$, 0.002 and 0.012), MACS ($p=0.04$) and CFCS ($p=0.035$), with

a greater number of children born =34 weeks more severely impaired compared with children born later. Children with CP and PWMI born >34 weeks gestation had milder limitations in gross motor function, mobility, manual ability and communication compared with those born earlier.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 23747939](#) [PubMed - as supplied by publisher]

24. J Dev Behav Pediatr. 2013 Jun;34(5):369-74. doi: 10.1097/DBP.0b013e31829455d8.

Do politics affect prevalence? An overview and the case of cerebral palsy.

Dalembert G, Brosco JP.

Department of Pediatrics, Miller School of Medicine, University of Miami, Miami, FL.

Many factors must be considered when assessing estimates of prevalence, including research methods and quality of the work by the research team. Broad social and political forces also influence estimates of prevalence, as seen in the case of autism and intellectual disability. Indeed, researchers themselves may be influenced by broader sociopolitical factors in ways that they do not recognize. To further explore the relationship of prevalence to sociopolitical factors, we reviewed the historical prevalence of cerebral palsy (CP) (as a proxy for physical disability) in the late 20th century. We hypothesized that increased awareness of physical impairments associated with the disability rights movement of the 1970s would increase the prevalence of CP, primarily because of changes in case definition. Although prevalence of CP did rise slightly in the 1980s, we conclude that this change is better explained by increased survival of low birth weight infants, which is only indirectly related to the disability rights movement.

[PMID: 23751888](#) [PubMed - in process]

25. Sichuan Da Xue Xue Bao Yi Xue Ban. 2013 Mar;44(2):270-3.

Influence of neonatal diseases and treatments on the development of cerebral palsy in preterm infant [Article in Chinese]

Yu T, Rong L, Wang Q, You Y, Fu JX, Kang LM, Wu YQ.

Department of Pediatrics, West China Second Hospital, Sichuan University, Chengdu 610041, China.

OBJECTIVE: To investigate the risk factors of cerebral palsy development in preterm infants. METHODS: This study included 203 preterm infants (gestation age < 37 weeks) diagnosed with cerebral palsy (CP) and 220 preterm infants without cerebral palsy or any other severe neurological disorders during April 2005 to August 2011. The risk factors in the development of cerebral palsy, including the diseases of premature infants and the treatments in neonatal period, were analyzed by multiple logistic regression analysis. RESULTS: Multivariate logistic analysis for the risk factors associated with cerebral palsy in neonatal period found significant differences in the occurrence of periventricular leukomalacia (PVL, OR = 39.87, P < 0.05), hypoxia-ischemic encephalopathy (HIE, OR = 4.24, P < 0.05), hypoglycemia of neonatal (OR = 2.18, P < 0.05), neonatal hyperbilirubinemia (OR = 1.72, P < 0.05), continuous positive airway pressure (CPAP, OR = 0.21, P < 0.05). CONCLUSION: The factors including PVL, HIE, hypoglycemia, and neonatal jaundice may increase the risk in the development of CP in preterm infant, while CPAP may decrease the risk of cerebral palsy.

[PMID: 23745270](#) [PubMed - in process]

26. Sichuan Da Xue Xue Bao Yi Xue Ban. 2013 Mar;44(2):265-9.

Developing early intervention and follow-up system for premature infants of brain injury [Article in Chinese]

Luo R, De-Zhi M.

Department of Pediatrics, West China Second Hospital, Sichuan University, Chengdu 610041, China.

As the increasing trend of survival rate for premature birth, especially in early preterm infants, it calls more and more attention to neurologic sequelae of premature birth. Besides cerebral palsy, there are high incidences of neuropsychological disorders in premature infants, such as learning and social communication problems, which sometimes remain a challenge for the quality of life even in their adulthood. In order to solve these difficult situation and problems, more and more medical research and clinical efforts have being focused on the mechanism of brain injury, neurological sequelae of premature birth, early intervention and follow-up for premature. Hereby we are discussing our works for brain injury in preterm the mechanism of neurological sequelae, assessment methods and early intervention, to provide rationale for the establishment of early intervention and follow-up system for premature infants with brain injury.

[PMID: 23745269](#) [PubMed - in process]

Subscribe to CP Research News

To subscribe to this research bulletin, please complete the online form at www.cpresearch.org/subscribe/researchnews You can bookmark this form on the home screen of your smart phone and also email the link to a friend.

To unsubscribe, please email researchnews@cerebralpalsy.org.au with 'Unsubscribe' in the subject line, and your name and email address in the body of the email.