

Monday 12 April 2010

This free weekly bulletin lists the latest research on cerebral palsy (CP), as indexed in the NCBI, PubMed (Medline) and Entrez (GenBank) databases. These articles were identified by a search using the key term "cerebral palsy".

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Interventions

1. *Phys Occup Ther Pediatr.* 2010 May;30(2):150-63.

Changes in trunk and head stability in children with cerebral palsy after hippotherapy: a pilot study.

Shurtleff TL, Engsborg JR.

Human Performance Laboratory, Program in Occupational Therapy, Washington University School of Medicine, St. Louis, MO 63110, USA. tshurtleff@wustl.edu

Hippotherapy (HPOT) is a therapy that uses horse movement. This pilot investigation objectively evaluated the efficacy of HPOT in improving head/trunk stability in children with cerebral palsy (CP). The participants were six children with spastic diplegia and six children without disability. Head and trunk stability was challenged by using a motorized barrel and measured by a video motion capture system before and after a 12-week intervention of 45 min of HPOT a week. The variables measured were anterior-posterior (AP) translation of the head, and spine at five points and average AP head angles. At pre-testing, children with CP demonstrated significant differences in AP translation and AP head rotation compared with children without disability. Following HPOT, children with CP demonstrated significant reductions in head rotation and AP translation at C7, eye, and vertex. At post-testing, translation at C7 did not differ significantly between children with CP and children without disability. After HPOT intervention, children with CP reduced their AP head rotation and translation, suggesting that they had increased stability of the head and trunk in response to perturbations at the pelvis. The findings suggest that HPOT might improve head and trunk stability in children with CP.

PMID: 20367519 [PubMed - in process]

2. *Phys Occup Ther Pediatr.* 2010 May;30(2):139-49.

Reliability of the functional mobility scale for children with cerebral palsy.

Harvey AR, Morris ME, Graham HK, Wolfe R, Baker R.

McMaster Child Health Research Institute, Hamilton, Ontario, Canada. harvey.adrienne@gmail.com

This study examined inter-rater reliability of the Functional Mobility Scale (FMS) for children with cerebral palsy (CP) and the presence of rater bias. A consecutive sample of 118 children with CP, 2-18 years old (mean 10.3 years, SD 3.6), was recruited from a hospital setting. Children were classified using the gross motor function classification system (GMFCS) with 13 in Level I, 49 in Level II, 44 in Level III, and 12 in Level IV. Each child was independently scored on the FMS by two raters. Raters were randomly assigned from a sample of 44 orthopaedic surgeons, hospital-based physiotherapists, and community-based physiotherapists. Quadratic weighted kappa coefficients for mobility ratings varied from 0.86 to 0.92 for the three distances, indicating substantial chance corrected agreement. Levels of agreement were similar when administering the scale in person and by telephone, suggest-

ing that the FMS can be administered by either method. There was a tendency for surgeons to rate mobility higher than physiotherapists, however, only one of the comparisons was statistically significant. The FMS is a reliable tool that can be used by clinicians to assess mobility in children with CP.

PMID: 20367518 [PubMed - in process]

3. Phys Occup Ther Pediatr. 2010 May;30(2):125-38.

Stationary cycling and children with cerebral palsy: case reports for two participants.

Siebert KL, DeMuth SK, Knutson LM, Fowler EG.

South Bay Medical Therapy Unit, California Children's Services of Los Angeles County, USA.

These case reports describe a stationary cycling intervention and outcomes for two child participants (P1 and P2) with spastic diplegic cerebral palsy. Each child completed a 12-week, 30-session cycling intervention consisting of strengthening and cardiorespiratory fitness phases. P1 exhibited higher training intensities, particularly during the cardiorespiratory phase. Average training heart rates were 59% and 35% of maximum heart rate for P1 and P2, respectively. Lower extremity peak knee flexor and extensor moments, gross motor function (Gross Motor Function Measure (GMFM-66)), preferred walking speed (thirty-second walk test), and walking endurance (600-yard walk-run test) were measured pre- and postintervention. Changes in outcome measurements corresponded with differences in exercise intensity. Greater gains in peak knee extensor moments, GMFM-66 scores (+4.2 versus +0.9), 600-yard walk-run test (-29% versus 0%) occurred for P1 versus P2, respectively. Preferred walking speeds did not increase substantially for P1 and decreased for P2.

PMID: 20367517 [PubMed - in process]

4. Disabil Rehabil. 2010 Apr 7. [Epub ahead of print]

Reliability and cross-cultural validation of the Turkish version of Manual Ability Classification System (MACS) for children with cerebral palsy.

Akpinar P, Tezel CG, Eliasson AC, Icagasioglu AI.

Department of Physical Medicine and Rehabilitation, Goztepe Education and Research Hospital, Istanbul, Turkey.

Purpose. To determine the reliability and cross-cultural validation of the Turkish translation of the Manual Ability Classification System (MACS) for children with cerebral palsy (CP) and to investigate the relation to gross motor function and other comorbidities. **Methods.** After the forward and backward translation procedures, inter-rater and test-retest reliability was assessed between parents, physiotherapists and physicians using the intra-class correlation coefficient (ICC). Children (N = 118, 4 to 18 years, mean age 9 years 4 months; 68 boys, 50 girls) with various types of CP were classified. Additional data on the Gross Motor Function Classification System (GMFCS), intellectual delay, visual acuity, and epilepsy were collected. **Results.** The inter-rater reliability was high; the ICC ranged from 0.89 to 0.96 among different professionals and parents. Between two persons of the same profession it ranged from 0.97 to 0.98. For the test-retest reliability it ranged from 0.91 to 0.98. Total agreement between the GMFCS and the MACS occurred in only 45% of the children. The level of the MACS was found to correlate with the accompanying comorbidities, namely intellectual delay and epilepsy. **Conclusion.** The Turkish version of the MACS is found to be valid and reliable, and is suggested to be appropriate for the assessment of manual ability within the Turkish population.

PMID: 20373857 [PubMed - as supplied by publisher]

5. BMC Public Health. 2010 Apr 6;10(1):179. [Epub ahead of print]

A prospective, longitudinal study of growth, nutrition and sedentary behaviour in young children with cerebral palsy.

Bell KL, Boyd RN, Tweedy SM, Weir KA, Stevenson RD, Davies PS.

BACKGROUND: Cerebral Palsy is the most common cause of physical disability in childhood, occurring in one in 500 children. It is caused by a static brain lesion in the neonatal period leading to a range of activity limitations. Oral motor and swallowing dysfunction, poor nutritional status and poor growth are reported frequently in young children with cerebral palsy and may impact detrimentally on physical and cognitive development, health care utilisation, participation and quality of life in later childhood. The impact of modifiable factors (dietary intake and physical activity) on growth, nutritional status, and body composition (taking into account motor severity) in this population is poorly understood. This study aims to investigate the relationship between a range of factors - linear growth, body composition, oral motor and feeding dysfunction, dietary intake, and time spent sedentary (adjusting for motor severity) - and health outcomes, health care utilisation, participation and quality of life in young children with cerebral palsy (from corrected age of 18 months to 5 years). **Design/Methods:** This prospective, longitudinal, population-based study aims to recruit a total of 240 young children with cerebral palsy born in Queensland, Australia between 30th September 2006 and 31st December 2009. Data collection will occur at three time points for each child: 17 - 25 months corrected age, 35 - 37 months and 59 - 61 months. Outcomes to be assessed include linear growth, weight, body composition, dietary intake, oral motor and feeding ability, time spent sedentary, participation, medical resource use and quality of life. **DISCUSSION:** This protocol describes a study that will provide the first longitudinal description of the relationship between functional attainment and modifiable lifestyle factors (dietary intake and time spent sedentary) on the growth, body composition and nutritional status of young children with cerebral palsy across all levels of functional ability.

PMID: 20370929 [PubMed - as supplied by publisher]

6. Gait Posture. 2010 Apr 6. [Epub ahead of print]

Three-dimensional kinematics of the upper limb during a Reach and Grasp Cycle for children.

Butler EE, Ladd AL, Louie SA, Lamont LE, Wong W, Rose J.

Department of Bioengineering, Stanford University, United States; Department of Orthopaedic Surgery, Stanford University School of Medicine, United States; Motion & Gait Analysis Laboratory, Lucile Packard Children's Hospital at Stanford, United States.

The ability to reach, grasp, transport, and release objects is essential for activities of daily living. The objective of this study was to develop a quantitative method to assess upper limb motor deficits in children with cerebral palsy (CP) using three-dimensional motion analysis. We report kinematic data from 25 typically developing (TD) children (11 males, 14 females; ages 5-18 years) and 2 children with spastic hemiplegic CP (2 females, ages 14 and 15 years) during the Reach and Grasp Cycle. The Cycle includes six sequential tasks: reach, grasp cylinder, transport to mouth (T(1)), transport back to table (T(2)), release cylinder, and return to initial position. It was designed to represent a functional activity that was challenging yet feasible for children with CP. For example, maximum elbow extension was 43±11 degrees flexion in the TD group. Consistent kinematic patterns emerged for the trunk and upper limb: coefficients of variation at point of task achievement for reach, T(1), and T(2) for trunk flexion-extension were (.11, .11, .11), trunk axial rotation (.06, .06, .06), shoulder elevation (.13, .11, .13), elbow flexion-extension (.25, .06, .23), forearm pronation-supination (.08, .10, .11), and wrist flexion-extension (.25, .21, .22). The children with CP demonstrated reduced elbow extension, increased wrist flexion and trunk motion, with an increased tendency to actively externally rotate the shoulder and supinate the forearm during T(1) compared to the TD children. The consistent normative data and clinically significant differences in joint motion between the CP and TD children suggest the Reach and Grasp Cycle is a repeatable protocol for objective clinical evaluation of functional upper limb motor performance. Copyright © 2010 Elsevier B.V. All rights reserved.

PMID: 20378351 [PubMed - as supplied by publisher]

7. Clin Neurophysiol. 2010 Apr 1. [Epub ahead of print]**Developmental changes in somatosensory processing in cerebral palsy and healthy individuals.**

Riquelme I, Montoya P.

Department of Nursing and Physiotherapy, University of the Balearic Islands, Palma de Mallorca, Spain.

OBJECTIVE: Cerebral palsy (CP) is a motor disorder that causes physical disability in human development. Recent work has shown that somatosensory deficits are a serious problem for people with CP. There is however no information about the influence of age on brain correlates of tactile sensitivity. **METHODS:** Proprioception, touch and pain pressure thresholds, as well as somatosensory evoked potentials (SEP) elicited by tactile stimulation in lips and thumbs were examined in 15 children with CP (range 5-14y), 14 adults with CP (range 22-55y), 15 healthy children (range 5-14y), and 15 healthy adults (range 22-42y). **RESULTS:** Children with CP as compared to healthy controls showed more reduced sensitivity for non-painful stimuli, but enhanced sensitivity for painful stimuli. Early SEP amplitudes (P50 and P100) were more enhanced in children and adults with CP than in healthy participants. A functional hemispheric asymmetry was observed in CP when left- and right-side body parts were stimulated. **CONCLUSIONS:** Data suggest the possibility that altered somatosensory brain processing in CP might be reflecting an enhanced excitability of the somatosensory cortex. **SIGNIFICANCE:** Assessment of somatosensory functions may have implications for future neuromodulatory treatment of pain complaints and motor rehabilitation programs in children and adults with cerebral palsy. Copyright © 2010 International Federation of Clinical Neurophysiology. Published by Elsevier Ireland Ltd. All rights reserved.

PMID: 20363181 [PubMed - as supplied by publisher]

8. Aust Fam Physician. 2010 Mar;39(3):165-7.**Health care services for adults with cerebral palsy.**

Field B, Scheinberg A, Cruickshank A.

Rehabilitation Medicine, Westmead Hospital, Sydney, New South Wales. bfield@med.usyd.edu.au

BACKGROUND: Increasing numbers of young adults with cerebral palsy (CP) are transitioning to adult services from coordinated multidisciplinary paediatric hospital services. Limitations on provision of adult services include inadequate funding, lack of trained staff, and fragmented medical, surgical and allied health teams. **OBJECTIVE:** This article summarises changes in treatments for children with CP over the past 2 decades and the implications for adult health care services. A multidisciplinary clinic for adults with CP at a tertiary adult teaching hospital in Sydney (New South Wales) is described. **DISCUSSION:** Over the past 2 decades, interventions such as botulinum toxin-A, intrathecal baclofen infusion, gastrostomy feeding and single event multilevel orthopaedic surgery have improved the lives of children with CP. These interventions are generally delivered within multidisciplinary rehabilitation programs in paediatric hospitals. As the most recent cohorts of children move into adulthood, they, and their carers, have expectations of similarly structured services in the adult health care sector. The Children's Hospital at Westmead and Westmead Hospital, together with The Spastic Centre of New South Wales, recognised this need and developed a multidisciplinary consultative clinic for adults with CP.

PMID: 20369122 [PubMed - in process]

9. Gait Posture. 2010 Apr 1. [Epub ahead of print]**Walking abilities of young adults with cerebral palsy: Changes after multilevel surgery and adolescence.**

Gannotti ME, Gorton GE 3rd, Nahorniak MT, Masso PD.

Physical Therapy Department, University of Hartford, West Hartford, 200 Bloomfield Avenue, West Hartford, CT 06111, United States.

Although there is some evidence to support the efficacy of single event multilevel surgery (SEMLS) in the short

term for improving walking abilities in children with cerebral palsy (CP), long term effects are not known. It is hypothesized: (1) SEMLS improves walking abilities; (2) in young adulthood abilities deteriorate beyond pre-operative status; (3) walking abilities deteriorate from adolescence to young adulthood and are associated with weight status increase. Twenty-three young adults (mean age 25.5 years, range 20-36) with spastic CP Gross Motor Functional Classification Scale Level II (n=11) or III (n=12) returned for follow up three dimensional gait analysis (3DGA). Gillette Gait Index (GGI) was used as a general indicator of walking abilities. Eleven subjects had 3DGA prior to multilevel orthopedic surgery and 12 subjects had 3DGA after the age of 10 with no interventions in the interim. GGI(s) were graphed over time. Ten of 11 subjects (91%) who had multilevel surgery either improved (n=6) or maintained pre-operative walking abilities (n=4) based on GGI. Ten of 12 subjects (83%) who had 3DGA after the age of 10 but no interventions in the interim maintained (n=8) or improved (n=2) walking abilities. No associations were found between declines in walking abilities and increased weight status. After SEMLS, walking abilities in young adulthood were comparable to pre-operative status. A decline in walking abilities was not observed from adolescence to young adulthood. Copyright © 2010 Elsevier B.V. All rights reserved.

PMID: 20363137 [PubMed - as supplied by publisher]

10. *Int J Rheum Dis.* 2009 Dec;12(4):361-5.

Skin, muscle and joint disease from the 17th century: scurvy.

Lau H, Massasso D, Joshua F.

Department of Rheumatology, Liverpool Hospital, Liverpool, NSW, Australia. hermanlau@inet.net.au

We report three cases of scurvy, with differing musculoskeletal presentations, from a tertiary teaching hospital in Sydney, Australia. Case 1 was a man with cerebral palsy who presented with knee swelling following a minor injury. In Case 2, a patient with thalassaemia major presented with purpuric rash, difficulty walking and distal thigh swelling and ecchymosis. Case 3 was a man with Down's syndrome who presented with acute ankle arthritis. Scurvy in Cases 1 and 3 were related to abnormal dietary preferences, whereas in Case 2, scurvy was thought to be related to thalassaemia. All three cases responded rapidly to vitamin C replacement. The subjects did not appear malnourished as they had adequate carbohydrate and protein intake.

PMID: 20374377 [PubMed - in process]

Epidemiology / Aetiology / Diagnosis & Early Treatment

Please note: This is not yet a comprehensive outline of cerebral palsy prevention literature. It is expected that more research will be included when the search terms are expanded to include key terms other than "cerebral palsy". It is a work-in-progress and it will be expanded in coming months.

11. *Gynecol Obstet Fertil.* 2010 Apr 6. [Epub ahead of print]

Cerebral palsy and perinatal asphyxia (I- Diagnosis). [Article in French]

Boog G.

Service de gynécologie-obstétrique, hôpital Mère-Enfant, CHU de Nantes, 1, quai Moncoussu, 44000 Nantes, France.

Cerebral palsy (CP) is a group of disorders of the development of movement and posture, causing activity limitations, that are attributed to nonprogressing disturbances that occurred in the developing fetal or infant brain. The motor abnormalities are often accompanied by disturbances of sensation, perception, cognition, behavior and/or by a seizure disorder. The prevalence of CP has not decreased in developed countries over the past 30 years, despite the widespread use of electronic fetal heart rate monitoring and a 5- to 6-fold increase in the cesarean delivery rate. In the term newborn, CP may be attributed to perinatal asphyxia in case of metabolic acidosis in the cord blood (pH<7.00 and base deficit>12mmol/L), followed by a moderate or severe neonatal encephalopathy within 24 hours and a further neurological impairment characterized by spastic quadriplegia and dyskinesia/dystonia. Dating the

time of fetal asphyxia during delivery is possible when there are acute catastrophic complications during labor and unexpected acute or progressive fetal heart rate anomalies after a normal admission test, when there is a need for intensive neonatal resuscitation, a multi-organ failure within 72 hours of birth and visualization of acute non focal cerebral abnormalities, mainly by early magnetic resonance imaging (MRI). MRI sequences show either a brain-damaged pattern of the central basal ganglia, thalami and posterior limbs of internal capsules with relative cortical sparing, in acute, near-total asphyxial insults manifested by a continuous bradycardia or a pattern of cortical injury in the watershed zones and relative sparing of the central grey matter, in prolonged partial asphyxia, manifested by late or atypical variable decelerations with progressive fetal tachycardia, loss of reactivity and absent fluctuation. Prolongation of either type of asphyxial insult results in more global brain damage. In order to differentiate a CP occurring after perinatal asphyxia from other neurological sequelae in relation with infection, hemorrhage, stroke, malformations, genetic or metabolic diseases, it is essential that a definitive information from the brain by MRI and an extensive histological examination of the placenta are at disposal. Copyright © 2010. Published by Elsevier SAS.

PMID: 20378389 [PubMed - as supplied by publisher]

12. Pediatrics. 2010 Apr 5. [Epub ahead of print]

Impact of Very Preterm Birth on Health Care Costs at Five Years of Age.

Korvenranta E, Lehtonen L, Rautava L, Häkkinen U, Andersson S, Gissler M, Hallman M, Leipälä J, Peltola M, Tammela O, Linna M; for the PERFECT Preterm Infant Study Group.

Department of Pediatrics, Turku University Hospital, Turku, Finland;

Objective: We assessed the effects of very preterm birth (gestational age <32 weeks or birth weight <1501 g) and prematurity-related morbidities on health care costs during the fifth year of life. **Methods:** The study population consisted of 588 very preterm children and 176 term control subjects born in 2001-2002. Costs of hospitalizations, visits to health care professionals and therapists, and the use of other social welfare services were assessed during the fifth year of life. Hospital visits were derived from register data and other health care contacts, and the use of social welfare services were derived from parental reports. The effects of 6 prematurity-related morbidities (cerebral palsy [CP], seizure disorder, obstructive airway disease, hearing loss, visual disturbances or blindness, and other ophthalmologic problems) on the costs of health care were studied. **Results:** The average health care costs during the fifth year of life were 749euro in the term control subjects, 1023euro in the very preterm children without morbidities, and 3265euro in those with morbidities. The costs of social welfare services and therapies exceeded the hospitalization costs in all groups. Among children who were born preterm, CP was associated with 5125euro higher costs, whereas later obstructive airway diseases increased the costs by 819euro compared with individuals without these morbidities. **Conclusions:** The health care costs during the fifth year of life in very preterm children with morbidities were 4.4-fold and in those without morbidities 1.4-fold compared with those of term control subjects. This emphasizes the importance of prevention of morbidities, especially CP, to reduce the long-term costs of prematurity.

PMID: 20368320 [PubMed - as supplied by publisher]

13. Acta Paediatr. 2010 Apr 1. [Epub ahead of print]

The changing panorama of cerebral palsy in Sweden. X. Prevalence and origin in the birth-year period 1999-2002.

Himmelman K, Hagberg G, Uvebrant P.

Queen Silvia Children's Hospital, Sahlgrenska Academy at the University of Gothenburg, Göteborg, Sweden.

Aim: The tenth report from the western-Swedish study of the prevalence and origin of cerebral palsy (CP). **Methods:** A population-based study covering 85,737 live births in the area in 1999-2002. Birth characteristics and neuroimaging findings were recorded, prevalence was calculated and aetiology was analysed. **Results:** CP was found in 186 children. The crude prevalence was 2.18 per 1,000 live births. The gestational age-specific prevalence for < 28 gestational weeks was 55.6 per 1,000 live births, while it was 43.7 for 28-31 weeks, 6.1 for 32-36 weeks and 1.43 per 1,000 for > 36 weeks. There was a female majority among children born at term and a male predominance in chil-

dren born preterm. Hemiplegia accounted for 38%, diplegia for 32%, tetraplegia for 7%, while 17% had dyskinetic CP and 5% ataxia. Neuroimaging showed white-matter lesions in 31% and cortical/subcortical lesions in 29%. The aetiology was considered to be prenatal in 36%, peri/neonatal in 42%, while it remained unclassified in 21%. Conclusion: The decrease in CP prevalence observed since the 1980s had ceased. An increase in children born at term and in dyskinetic CP was found. In children born before 28 weeks of gestation, the prevalence decreased significantly. White-matter and cortical/subcortical lesions dominated on neuroimaging.

PMID: 20377538 [PubMed - as supplied by publisher]

14. *Am J Obstet Gynecol.* 2010 Mar;202(3):e9; author reply e9-10. Epub 2009 Nov 4.

What gestation cut-off should be used for magnesium sulfate treatment of women threatening to deliver preterm?

Knight DB, Gardener GJ.

Comment on:

Am J Obstet Gynecol. 2009 Jun;200(6):595-609.

PMID: 19889392 [PubMed - indexed for MEDLINE]

15. *Adv Appl Microbiol.* 2010;71C:1-19. Epub 2010 Feb 20.

Influence of Escherichia coli Shiga Toxin on the Mammalian Central Nervous System.

Obata F.

Abstract

In severe cases of the infectious disease by Shiga toxin-producing *Escherichia coli* (STEC), patients display renal dysfunction known as hemolytic uremic syndrome (HUS) and central nervous system (CNS) failure. Among those severe symptoms, patients with CNS dysfunction with HUS have a greater chance of getting severe sequelae and mortality than with HUS alone. Autopsy of the CNS shows mostly edema and hypoxic-ischemic changes, often with microhemorrhages. Magnetic resonance imaging (MRI) of brains of patients confirms hemorrhagic component involvement. This suggests the weakening of the blood-brain barrier (BBB) during the disease. Also, cerebrospinal fluid (CSF) analysis shows the weakening of the blood-CSF barrier. Although evidence of vascular involvement in CNS exists, the typical observation of microthrombosis in renal pathology is often absent in CNS. Importantly, there are people who develop CNS symptoms before the onset of HUS. This suggests direct involvement of Shiga toxin (Stx) in CNS disease which is in addition to renal involvement. The advantages of animal models are that Stx receptor expression in normal CNS tissue can be determined, and changes in histopathology, hematology, and serum and CSF contents can be analyzed at several different time points, which allow investigation of the nature of the disease. Importantly, in animal models with either STEC oral inoculation or purified Stx injection, paralysis of extremities is commonly observed. This shows the central role of Stx in CNS dysfunction in this disease. It is anticipated that precise mechanisms of Stx influence in the CNS will be delineated, and this information will lead to effective therapeutics in the near future. Copyright © 2010 Elsevier Inc. All rights reserved.

PMID: 20378049 [PubMed - as supplied by publisher]