

Monday 9 August 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. Clin Rehabil. 2010 Aug 4. [Epub ahead of print]

Children with cerebral palsy: a systematic review and meta-analysis on gait and electrical stimulation.

Cauraugh JH, Naik SK, Hsu WH, Coombes SA, Holt KG.

Applied Physiology and Kinesiology Department, University of Florida, USA.

Objective: To conduct a systematic review and meta-analysis using the International Classification of Functioning to determine the summary effect of electrical stimulation on impairment and activity limitations relevant to gait problems of children with cerebral palsy. **Methods:** We identified 40 cerebral palsy and electrical stimulation studies, and 17 gait studies qualified for inclusion. Applying enablement classification methods to walking abnormalities created two subgroups: impairment (N = 14) and activity limitations (N = 15). Overall, 238 participants experienced electrical stimulation treatments and 224 served as a no stimulation control group. Calculations followed conventional data extraction and meta-analysis techniques: (a) individual standardized mean differences, (b) summary effect size, (c) I (2) heterogeneity test, (d) fail-safe N analysis and (e) moderator variable analyses. **Results:** Common outcome measures associated with impairment (n = 3) and activity limitations (n = 6) were submitted to separate random effects models meta-analyses, and revealed significant cumulative effect sizes: (a) impairment = 0.616 (SE = 0.10) and (b) activity limitations = 0.635 (SE = 0.14). I (2) indicated low and medium amounts of dispersion, whereas fail-safe analyses revealed high N-values for both disablement categories. Moderator variable analyses further confirmed the positive treatment effects from both functional and neuromuscular stimulation. **Conclusions:** The present systematic review and meta-analyses determined medium effect sizes for electrical stimulation on walking impairment and activity limitations of children with cerebral palsy.

PMID: 20685722 [PubMed - as supplied by publisher]

2. Arch Phys Med Rehabil. 2010 Aug;91(8):1283-1290.

Physical Activity Measurement Using MTI (Actigraph) Among Children With Cerebral Palsy.

Capio CM, Sit CH, Abernethy B.

Institute of Human Performance, University of Hong Kong, Hong Kong, China.

OBJECTIVE: To investigate the validity of MTI accelerometer as a physical activity (PA) measurement instrument for children with cerebral palsy (CP). **DESIGN:** Participants were classified within Gross Motor Function Classification System I to III and took part in 2 activity sessions: (1) a structured activity protocol with increasing intensities and (2) a free play session. Concurrent measurements of activity counts, heart rate, and observed physical activity were performed. **SETTING:** Data were collected on normal school days in special schools within the participants' 30-minute break period. **PARTICIPANTS:** Convenience sample of children with CP (N=31; 17 girls, 14 boys) age

between 6 and 14 years (mean \pm SD, 9.71 \pm 2.52y). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: MTI measured activity counts, a monitoring device measured heart rate, and the System for Observing Fitness Instruction Time (SOFIT) was used for direct PA observation. RESULTS: There were strong relationships between MTI and SOFIT ($r=.75$; $R(2)=.56$; $P<.001$) and heart rate monitor (HRM) and SOFIT ($r=.65$; $R(2)=.43$; $P<.001$) data in structured activities, but the difference between these 2 correlation coefficients was not significant ($P=.46$). In free play activities, the association between MTI and SOFIT data ($r=.67$; $R(2)=.45$; $P<.001$) was significantly stronger ($P=.01$) than that between heart rate and SOFIT data ($r=.14$; $R(2)=.02$; $P<.001$). Bland-Altman plots showed better agreement between observed SOFIT and MTI-predicted SOFIT data than observed SOFIT and HRM-predicted SOFIT data from the linear regression analysis. CONCLUSIONS: The findings suggest that the MTI appears to be a valid instrument for measuring raw activity volume among children with CP and is suitable for use in studies attempting to characterize the PA of this population. Copyright © 2010 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 20684912 [PubMed - as supplied by publisher]

3. Arch Phys Med Rehabil. 2010 Aug;91(8):1194-1209.

Measuring Mobility Limitations in Children With Cerebral Palsy: Development, Scalability, Unidimensionality, and Internal Consistency of the Mobility Questionnaire, MobQues47.

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Department of Rehabilitation Medicine and the EMGO Institute for Health and Care Research (EMGO+), VU University Medical Center, Amsterdam, The Netherlands; Department of Rehabilitation Medicine and Psychology, Jan van Breemen Institute, Amsterdam, The Netherlands.

OBJECTIVES: To develop a questionnaire that specifically and comprehensively measures mobility limitations in children with cerebral palsy (CP) and to investigate certain psychometric properties (scalability, unidimensionality, internal consistency) of this questionnaire. DESIGN: Cross-sectional study. SETTING: Private physical therapy practices and outpatient departments of hospitals and rehabilitation centers. PARTICIPANTS: Children with CP undergoing physical therapy or rehabilitation. The Mobility Questionnaire, 47-item (MobQues47), was completed by the mothers of these children ($N=323$; mean age \pm SD, 7.1 \pm 2.9y; 57% boys; Gross Motor Function Classification levels: I [48%], II [26%], III [19%], IV [7%]). INTERVENTIONS: Not applicable. MAIN OUTCOME MEASURES: Mokken scale analysis was used to investigate (1) scalability, indicating that the items form a scale; (2) unidimensionality, indicating that the items measure only 1 concept; and (3) internal consistency, indicating the degree of interrelatedness of the items. RESULTS: The MobQues47, made up of 47 items, was developed on the basis of 3 pilot studies and careful operationalization of the concept (or construct) of mobility limitations. The scalability (coefficient $H=.70$), unidimensionality, and internal consistency (coefficient $\rho=.99$) of the MobQues47 were found to be very good. CONCLUSIONS: The MobQues47 is a unidimensional scale with excellent internal consistency that can be used to measure caregiver-reported mobility limitations in children with CP. Copyright © 2010 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

PMID: 20684900 [PubMed - as supplied by publisher]

4. J Bone Joint Surg Br. 2010 Aug;92(8):1152-9.

The effect of injections of botulinum toxin type A combined with casting on the equinus gait of children with cerebral palsy.

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Our aim was to evaluate the effect of adding inhibitory casting to the treatment of young children with cerebral palsy who received injections of botulinum neurotoxin A (BoNT-A) to gastrocnemius for equinus gait. Of the 20 patients in the series, 11 in group A had inhibitory casts applied on the day of the first set of BoNT-A injections and nine in group B did not have casting. Both groups received another BoNT-A injection four months later. The patients were

followed for eight months and examined at five intervals. Both groups showed significant improvement in gait parameters and function ($p < 0.0001$) and selective motor control ($p = 0.041$, -0.036) throughout the study. Group A had significantly better passive dorsiflexion of the ankle ($p = 0.029$), observational gait score ($p = 0.006$) and selective motor control ($p = 0.036$). We conclude that the addition of inhibitory casting enhances and prolongs the results of treatment and mainly influences the passive range of movement, while BoNT-A mostly influences the dynamic motion. The second injection further improved the results of most parameters. The gross motor function measure, the selective motor control test and the modified Tardieu scale correlated well with the results of treatment. We recommend the use of inhibitory casting whenever augmentation of the effect of treatment with BoNT-A is needed.

PMID: 20675764 [PubMed - in process]

5. Spine (Phila Pa 1976). 2010 Jul 30. [Epub ahead of print]

Risk Factors for Major Complications After Surgery for Neuromuscular Scoliosis.

Master DL, Son-Hing JP, Poe-Kochert C, Armstrong DG, Thompson GH.

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STUDY DESIGN.: Retrospective, case series. **OBJECTIVE.:** To determine the prevalence of major complications and to identify factors that increase the risk of complications in patients undergoing surgery for neuromuscular scoliosis. **SUMMARY OF BACKGROUND DATA.:** Complications after surgery for neuromuscular scoliosis are more prevalent than in idiopathic scoliosis. However, the associated risk factors have not been statistically significant. **METHODS.:** Our computerized Pediatric Orthopedic Spine Database identified 131 consecutive patients with neuromuscular scoliosis, excluding those with myelodysplasia, who underwent surgery and had a minimum of 2 years of follow-up. Preoperative, intraoperative, and postoperative factors were analyzed for any association with major complications and length of stay using stepwise logistic and multiple regression analyses. Odds ratios were calculated for significant dichotomous variables, and receiver operator characteristic curves were created for significant continuous variables. **RESULTS.:** There were 81 male and 50 female patients with a mean age at surgery of 13.4 years (range, 6-21 years). The majority of patients ($n = 75$) had cerebral palsy. Eighty-eight patients (67%) underwent posterior spinal fusion and segmental spinal instrumentation (only), whereas 43 patients (33%) underwent an anterior spinal fusion followed by a posterior spinal fusion with segmental spinal instrumentation. Seventy-seven patients (59%) were fused to the pelvis using the Galveston technique. The mean follow-up was 3.9 years (range, 2-16.9 years). There were 46 major complications in 37 patients (28% prevalence), including 2 deaths. Nonambulatory status ($P < 0.05$) and preoperative curve magnitude ($P < 0.01$) were associated with an increased prevalence of major complications. Nonambulatory patients ($n = 94$) were almost 4 times more likely to have a major complication (odds ratio of 3.8, $P < 0.05$) in comparison with ambulatory patients. A preoperative major curve magnitude of ≥ 60 degrees ($P < 0.01$) was the most accurate indicator for an increased risk for a major complication. **CONCLUSION.:** Nonambulatory status and a preoperative curve magnitude (≥ 60 degrees) are directly associated with an increased risk for major complications and indirectly associated with increased length of stay. As such, we recommend operative intervention in neuromuscular scoliosis before curve progression to ≥ 60 degrees. Level of Evidence. Level III.

PMID: 20683386 [PubMed - as supplied by publisher]

6. Res Dev Disabil. 2010 Jul 29. [Epub ahead of print]

Aerobic capacity in children and adolescents with cerebral palsy.

Verschuren O, Takken T.

Centre of Excellence, Rehabilitation Centre 'De Hoogstraat', Utrecht, The Netherlands; Partner of NetChild, Network for Childhood Disability Research, The Netherlands; University Medical Center, Rudolf Magnus Institute of Neuroscience Department of Rehabilitation, Nursing Science and Sports, Utrecht, The Netherlands.

This study described the aerobic capacity [VO₂peak (ml/kg/min)] in contemporary children and adolescents with cerebral palsy (CP) using a maximal exercise test protocol. Twenty-four children and adolescents with CP classified at Gross Motor Functional Classification Scale (GMFCS) level I or level II and 336 typically developing children

were included. All children performed a progressive exercise test on a treadmill with respiratory gas-exchange analysis. The results are compared with normative values for age and gender-matched controls. Aerobic capacity of children and adolescents with CP, who are classified at GMFCS level I or II was significantly lower than that of typically developing controls. Especially in girls with CP, the aerobic capacity deteriorated with age. The aerobic capacity of contemporary children and adolescents with CP, who are classified at GMFCS level I or II is significantly lower than that of typically developing controls. Copyright © 2010 Elsevier Ltd. All rights reserved.

PMID: 20674266 [PubMed - as supplied by publisher]

7. Res Dev Disabil. 2010 Jul 29. [Epub ahead of print]

Gait patterns in hemiplegic children with Cerebral Palsy: Comparison of right and left hemiplegia.

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Bioengineering Department, Politecnico di Milano, p.zza Leonardo Da Vinci 32, via Golgi 39, 20133 Milano, Italy; IRCCS "San Raffaele Pisana", Tosinvest Sanità, via della Pisana 235, 00163 Roma, Italy.

The aims of this study are to compare quantitatively the gait strategy of the right and left hemiplegic children with Cerebral Palsy (CP) using gait analysis. The gait strategy of 28 right hemiparetic CP (RHG) and 23 left hemiparetic CP (LHG) was compared using gait analysis (spatio-temporal and kinematic parameters) and considering the hemiplegic classification based on four gait strategies. Our results demonstrated that velocity was a significant parameter to differentiate RHG and LHG: all hemiplegic types revealed in fact that RHG walked with higher velocity than LHG. The ankle strategy displayed an increased number of differences between RHG and LHG from hemiplegia of Type I to Type III. In all the comparison, the LHG showed the less physiological gait pattern. As for knee kinematics, differences between right and left hemiplegic gait pattern were evidenced only in children with hemiplegia Type II: the LHG walked with a more flexed knee at initial contact, marked hyperextension in midstance and reduced knee flexion ability in the swing phase. The hip strategy was quite normal in both groups in hemiplegia Type I. In the other two types, LHG showed a limited extension ability in midstance in comparison to RHG. In conclusion, our data revealed that RHG and LHG were in general characterised by different gait patterns, evidencing a general a progression of involvement in the different types of hemiplegia; in particular in all the hemiplegic types the LHG patients revealed a more severe involvement than the RHG individuals and the differences were more evident at the distal joints, especially at the ankle joint. Copyright © 2010 Elsevier Ltd. All rights reserved.

PMID: 20674265 [PubMed - as supplied by publisher]

8. Res Dev Disabil. 2010 Jul 29. [Epub ahead of print]

The relationship between motor abilities and early social development in a preschool cohort of children with cerebral palsy.

Whittingham K, Fahey M, Rawicki B, Boyd R.

Queensland Cerebral Palsy and Rehabilitation Research Centre, School of Medicine, The University of Queensland, Brisbane, Australia; Queensland Children's Medical Research Institute, The University of Queensland, Brisbane, Australia.

AIM: To investigate the relationship between motor ability and early social development in a cohort of preschool children with cerebral palsy (CP). DESIGN: Population-based cohort study. METHODS: Participants were 122 children with CP assessed at 18, 24 and 30 months, corrected age (ca). Motor ability was measured by the Gross Motor Function Classification System (GMFCS) with classification assigned by physiotherapists. The sample was representative of a population-based cohort (I=48, 38.4%, II=19, 15.2%, III=17, 13.6%, IV=22, 17.6% and V=19, 15.2%). Social development was measured by the Paediatric Evaluation of Disability Inventory (PEDI) and included capabilities in social interaction, social communication, interactive play and household/community tasks. RESULTS: Cross-sectional analyses indicated a significant relationship between motor ability and social development at 18 months, $F(4, 56)=11.44$, $p<.0001$, $\eta^2=.45$, at 24 months, $F(4, 79)=15.66$, $p<.0001$, $\eta^2=.44$ and at 30 months, $F(4, 76)=16.06$, $p<.0001$, $\eta^2=.49$. A longitudinal analysis with a subset of children (N=24) indicated a significant interaction between age at assessment and GMFCS, $F(2, 21)=7.02$, $p=.005$, $\eta^2=.40$. Comparison with commu-

nity norms indicated that at 18 months corrected age, 44.3% of the cohort was greater than two standard deviations below the mean ($>2SD$) for social development and a further 27.9% of the cohort was greater than one standard deviation below the mean ($>1SD$). INTERPRETATION: There is a relationship between motor ability and social development in preschool children with CP. Children with CP may require support for social development in addition to physical interventions, from as early as 18 months. Crown Copyright © 2010. Published by Elsevier Ltd. All rights reserved.

PMID: 20674264 [PubMed - as supplied by publisher]

9. Rev Bras Anesthesiol. 2010 May - June;60(3):259-267.

Effect of Isolated Anticonvulsant Drug Use and Associated to Midazolam as Pre-Anesthetic Medication on the Bispectral Index (BIS) in Patients with Cerebral Palsy.

da Costa VV, Saraiva RA, Torres RV, de Oliveira SB.

Anesthesiologist of the Hospital Sarah; Master's degree in Rehabilitation Science.

BACKGROUND AND OBJECTIVES: Patients with cerebral palsy (CP) frequently receive drugs for the treatment of concomitant diseases, such as seizures. Midazolam is a benzodiazepine with hypnotic action most often used as pre-anesthetic medication and its drug interactions in patients with CP are unknown. The objective of the present study was to evaluate the effect of midazolam as pre-anesthetic drug on the BIS of patients with CP undergoing chronic treatment with anticonvulsant agents. **METHOD:** Three groups of patients were assessed: CP without anticonvulsant treatment, CP undergoing treatment with anticonvulsant and a group with no disease and no medication use (control group). On the day before the surgery, with the patients conscious and in dorsal decubitus, the BIS monitor was placed and the basal BIS values were recorded. On the following day, 40 minutes before the surgery, the patients received 0.6 mg.kg(-1) of midazolam orally. Before the start of the anesthetic procedure, the same procedure for BIS recording was carried out after midazolam administration. **RESULTS:** A total of 107 patients were studied - 39 patients from the Control Group (CG) and 68 with a diagnosis of CP. Among these, 17 used anticonvulsant drugs. Regarding the mean BIS value after the midazolam administration, there was no difference between patients from the CG and those in the CP group that did not take anticonvulsant drugs, whereas the ones who took anticonvulsants exhibited a difference ($p = 0.003$). The possibility of decrease in the BIS after midazolam use increases according to the number of anticonvulsant drugs used by the patient. **CONCLUSIONS:** The chronic use of anticonvulsants associated to oral midazolam as pre-anesthetic medication can lead to the decrease in the BIS values, which configures deep level of hypnosis. Copyright © 2010 Elsevier Editora Ltda. All rights reserved.

PMID: 20682158 [PubMed - as supplied by publisher]

10. Rev Med Liege. 2010 May-Jun;65(5-6):381-5.

Inertia or overtreatment in children. When sleeping time is disturbed in infants: how to improve the family's distress [Article in French]

Battisti O, Dominé F.

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Sleeping disorders are frequently encountered in infants and adolescents. They often induce a distress in the family, an individual sadness possibly leaving at time to maltreatment. In the normal infant or the medically fragile infant due to prematurity or an acute episode, complaints from the patient or family sources force the medical team to find an explanation or a treatment, which are not always adequate. In other conditions such as asthma, obesity, anorexia nervosa, autism, cerebral palsy, hyperactivity, the sleeping disorders may be so unnoticed or remain insufficiently investigated. Globally, in this domain, the clinical description is often imprecise and sleep studies underused. A more accurate assessment should lead to a better educative approach and more appropriate therapy.

PMID: 20684423 [PubMed - in process]

11. Pediatr Neurosurg. 2010 Aug 3;46(2):146-150. [Epub ahead of print]**An Unusual Form of Occipitocervical Assimilation Presenting with Spastic Tetraparesis in a Child.**

Lee JA, Wood MJ.

Department of Paediatric Neurosurgery, Mater Children's Hospital, South Brisbane, Qld., Australia.

A diagnosis of 'cerebral palsy' in childhood is relatively common. Abnormalities of the upper cervical spine causing spinal cord compression are rare, but can be a cause of symptoms and signs that may otherwise be attributed to brain injury acquired during development. We present an interesting case of a congenital abnormality of the atlas causing severe cervical spinal cord compression in a 9-year-old child, together with a discussion of the relevant aspects of spinal development and a review of the literature. Copyright © 2010 S. Karger AG, Basel.

PMID: 20689346 [PubMed - as supplied by publisher]

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.

12. Adv Med Sci. 2010 Aug 4:1-6. [Epub ahead of print]**Risk factors for cerebral palsy in term birth infants.**

Kulak W, Okurowska-Zawada B, Sienkiewicz D, Paszko-Patej G, Krajewska-Kulak E.

Department of Pediatric Rehabilitation, Medical University in Białystok, Białystok, Poland.

Purpose: The aim of this study was to identify the antenatal, intrapartum and neonatal risk factors in term birth infants for cerebral palsy (CP) among babies in a hospital-based study. **Materials and methods:** The medical records of children with cerebral palsy referred to our Pediatric Rehabilitation Department in Białystok were reviewed. Antenatal, intrapartum, and neonatal events were compared among 213 children with CP and 280 controls in a retrospective study. We studied live births >36 weeks gestation born between January 1, 1990, and December 31, 2005. **Results:** Fifty-seven percent of the infants with CP were male. Spastic tetraplegia 78 (36.61%) and spastic hemiplegia 65 (30.51%) were the dominant types of CP. Factors associated with an increased risk of CP identified as antenatal and intrapartum risk factors were pre-eclampsia, abruptio placenta, and placenta previa. Birth asphyxia occurred significantly more often ($p < 0.001$) in children with CP compared to controls. In the neonatal period, respiratory distress syndrome, meningitis and neonatal seizures were associated with an increased incidence of CP. **Conclusion:** Our findings confirm that several antenatal, intrapartum and neonatal risk factors for CP in term birth infants contribute to the etiology of CP.

PMID: 20688615 [PubMed - as supplied by publisher]

13. J Pediatr. 2010 Jul 31. [Epub ahead of print]**School Entry Age Outcomes for Infants with Birth Weight \leq 800 Grams.**

Synnes AR, Anson S, Arkesteijn A, Butt A, Grunau RE, Rogers M, Whitfield MF.

Department of Pediatrics, University of British Columbia, Vancouver, British Columbia, Canada; Child and Family Research Institute, Vancouver, British Columbia, Canada; Neonatal Follow-Up Programme, Children's and Women's Health Centre of British Columbia, Vancouver, British Columbia, Canada.

OBJECTIVE: To evaluate the mortality and long-term morbidity rates of extremely low birth weight (ELBW) infants

admitted to neonatal intensive care units (NICUs). **STUDY DESIGN:** This was a longitudinal cohort study of all admissions born between 1983 and 2003 with birth weight ≤ 800 g at a single tertiary NICU. Trends in survival and neurodevelopmental outcome rates at school entry in four 5-year epochs were analyzed. **RESULTS:** Of 917 admissions, 552 survived to NICU discharge, with significantly increasing survival rates from 46% in epoch 1 to 71% in epoch 4 ($P < .0001$). Although the overall impairment rate of 30% did not change, the pattern of impairments did. Cognitive ($P = .017$) and hearing ($P = .014$) impairment rates increased. Visual impairment rates decreased ($P = .042$), with a trend toward decreasing cerebral palsy from 20% to 12% ($P = .061$). **CONCLUSIONS:** Improved survival of low birth weight preterm infants has been associated with different types of neurodevelopmental impairments, including increased cognitive impairment rates. Copyright © 2010 Mosby, Inc. All rights reserved.

PMID: 20674931 [PubMed - as supplied by publisher]

14. **Semin Fetal Neonatal Med. 2010 Jul 27. [Epub ahead of print]**

Does neonatal and infant neurodevelopmental morbidity of multiples and singletons differ?

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The mortality and morbidity of twins may differ from that in singletons because of the greater incidence of intrauterine growth restriction, higher rates of prematurity, zygosity and even from the presence of a same age sibling during childhood. Early outcomes appear poorer for twins, but any differences are lost when corrections for gestation and growth restriction are made. Some studies show poorer cognitive outcomes for twins; larger and more recent studies show small but significant differences even when confounders are taken into account. Cerebral palsy rates are considerably higher in twins, especially with the death of a co-twin. Behavioural outcomes are broadly similar in twins and singletons, with growth and gestation being more important determinants than plurality. Psychiatric symptoms again are broadly similar, although there appears to be a reduced risk of suicide in twins. Copyright © 2010. Published by Elsevier Ltd.

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