

Monday 9 September 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. Exp Brain Res. 2013 Aug 31. [Epub ahead of print]

Motor planning ability is not related to lesion side or functional manual ability in children with hemiplegic cerebral palsy.

Kirkpatrick EV, Pearse JE, Eyre JA, Basu AP.

Institute of Neuroscience, Newcastle University, Newcastle upon Tyne, UK.

Optimal task performance requires anticipatory planning to select the most appropriate movement strategy. There is conflicting evidence for hemispheric specialisation of motor planning, with some suggesting left hemisphere dominance, claiming that children with right hemiplegic cerebral palsy (HCP) are therefore disproportionately affected. An alternative view is that there is a positive relationship between functional ability (rather than side of lesion) and motor planning skill. We aimed to compare children with right and left HCP on motor planning ability and to explore its relationship with functional manual ability. Participants were 76 children with HCP (40 left HCP; 30 female), aged 4-15 years (Mean 9.09, SD 2.94). Motor planning was assessed using a measure of end-state comfort, which involved turning a hexagonal handle 180° without readjusting grasp. This is difficult, or in some cases impossible, to achieve unless an appropriate initial grasp is adopted. Children completed 24 turns (12 clockwise), which were video recorded for offline scoring. Functional manual ability was assessed with the ABILHAND-Kids questionnaire, completed by parents. Contrary to the existing literature, no differences were observed between right and left HCP. However, a significant interaction between direction of turn and side of hemiplegia indicated a preferential bias for turns in the medial direction, consistent with the "medial over lateral advantage". There was no relationship between functional ability and motor planning. Therefore, motor planning may not be a priority for therapeutic intervention to improve functional ability in HCP.

[PMID: 23995565](https://pubmed.ncbi.nlm.nih.gov/23995565/) [PubMed - as supplied by publisher]

2. Neurorehabil Neural Repair. 2013 Sep 5. [Epub ahead of print]

Motor Impairment Factors Related to Brain Injury Timing in Early Hemiparesis, Part I: Expression of Upper-Extremity Weakness.

Sukal-Moulton T, Krosschell KJ, Gaebler-Spira DJ, Dewald JP.

Physical Therapy and Human Movement Sciences, Northwestern University, Chicago, IL, USA.

BACKGROUND: Extensive neuromotor development occurs early in human life, but the time that a brain injury occurs during development has not been rigorously studied when quantifying motor impairments. **OBJECTIVE:** This study investigated the impact of timing of brain injury on the magnitude and distribution of weakness in the paretic arm of individuals with childhood-onset hemiparesis. **METHODS:** A total of 24 individuals with hemiparesis were divided into time periods of injury before birth (PRE-natal, n = 8), around the time of birth (PERI-natal, n = 8), or after 6 months of age (POST-natal, n = 8). They, along with 8 typically developing peers, participated in maximal isometric shoulder, elbow, wrist, and finger torque generation tasks using a multiple-degree-of-freedom load cell to quantify torques in 10 directions. A mixed-model ANOVA was used to determine the effect of group and task on a calculated relative weakness ratio between arms. **RESULTS:** There was a significant effect of both time of injury group ($P < .001$) and joint torque direction ($P < .001$) on the relative weakness of the paretic arm. Distal joints were more affected compared with proximal joints, especially in the POST-natal group. **CONCLUSIONS:** The distribution of weakness provides evidence for the relative preservation of ipsilateral corticospinal motor pathways to the paretic limb in those individuals injured earlier, whereas those who sustained later injury may rely more on indirect ipsilateral corticobulbospinal projections during the generation of torques with the paretic arm.

[PMID: 24009182](#) [PubMed - as supplied by publisher]

3. Res Dev Disabil. 2013 Sep 3;34(11):3654-3659. doi: 10.1016/j.ridd.2013.08.021. [Epub ahead of print]

A Kinect-based upper limb rehabilitation system to assist people with cerebral palsy.

Chang YJ, Han WY, Tsai YC.

Department of Electronic Engineering, Chung Yuan Christian University, Chung-Li 320, Taiwan; Holistic Medical Device Development Center, Chung Yuan Christian University, Chung-Li 320, Taiwan. Electronic address: yjchang@cycu.edu.tw.

This study assessed the possibility of rehabilitating two adolescents with cerebral palsy (CP) using a Kinect-based system in a public school setting. The system provided 3 degrees of freedom for prescribing a rehabilitation program to achieve customized treatment. This study was carried out according to an ABAB reversal replication design in which A represented the baseline and B represented intervention phases. Data showed that the two participants significantly increased their motivation for upper limb rehabilitation, thus improving exercise performance during the intervention phases. Practical and developmental implications of the findings are discussed.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 24012594](#) [PubMed - as supplied by publisher]

4. Disabil Rehabil Assist Technol. 2013 Sep 3. [Epub ahead of print]

Virtual rehabilitation in a school setting: is it feasible for children with cerebral palsy?

Rosie JA, Ruhen S, Hing WA, Lewis GN.

Health and Rehabilitation Research Institute, AUT University, Auckland, New Zealand.

Purpose: To determine the feasibility of a school-based virtual rehabilitation intervention for children with cerebral palsy. **Methods:** A feasibility study was conducted using a mixed method approach. Participants were five children with cerebral palsy who were currently attending a rural school. Each child received an 8-week rehabilitation programme involving an Interactive Virtual Reality Exercise (IREX) system. The IREX was placed in the child's school for the duration of the intervention. Each child's programme was designed by a physiotherapist but supervised by a teacher aide at the school. Feasibility of the intervention was assessed through a questionnaire completed by the child and an interview conducted with the teacher supervisor. **Results:** The children all rated the IREX intervention as fun, easy to use, and beneficial for their arm. Categories from the supervisor interviews centred on resolving technical issues, the enjoyment of taking part due to the child's progress, and the central role of interacting with the child. Input from the research physiotherapist was critical to the success of the intervention. **Conclusions:** The IREX is feasible to implement in a school-based setting supervised by teachers. This provides an

option for delivering physiotherapy to children in isolated areas who do not receive on-going therapy. Implication for Rehabilitation Virtual rehabilitation programmes using the IREX are feasible in a school-based setting. The negative impact of technical difficulties is likely to be overcome by the user's enjoyment and rehabilitation benefits gained. Input from a therapist in designing and monitoring the programme is critical.

[PMID: 24001213](#) [PubMed - as supplied by publisher]

5. NeuroRehabilitation. 2013 Sep 9. [Epub ahead of print]

Kinect Xbox 360 as a therapeutic modality for children with cerebral palsy in a school environment: A preliminary study.

Luna-Oliva L, Ortiz-Gutiérrez RM, Cano-de la Cuerda R, Piédrola RM, Alguacil-Diego IM, Sánchez-Camarero C, Martínez Culebras MD.

Faculty of Health Sciences, Department of Physiotherapy, Occupational Therapy, Rehabilitation and Physical Medicine, Rey Juan Carlos University, Alcorcón, Madrid, Spain.

BACKGROUND: Limited evidence is available about the effectiveness of virtual reality using low cost commercial consoles for children with developmental delay. **OBJECTIVE:** The aim of this preliminary study is to evaluate the usefulness of a videogame system based on non-immersive virtual reality technology (Xbox 360 Kinect™) to support conventional rehabilitation treatment of children with cerebral palsy. Secondly, to objectify changes in psychomotor status of children with cerebral palsy after receiving rehabilitation treatment in addition with this last generation game console. **METHODS:** 11 children with cerebral palsy were included the study. A baseline, a post-treatment and a follow-up assessment were performed related to motor and the process skills, balance, gait speed, running and jumping and fine and manual finger dexterity. All the participants completed 8 weeks of videogame treatment, added to their conventional physiotherapy treatment, with Xbox 360 Kinect™ (Microsoft) game console. **RESULTS:** The Friedman test showed significant differences among the three assessments for each variable: GMFM ($p = 0.001$), AMPS motor ($p = 0.001$), AMPS process ($p = 0.010$), PRT ($p = 0.005$) and 10 MW ($p = 0.029$). Wilcoxon test showed significant statistically differences pre and post-treatment, in all the values. Similarly, results revealed significant differences between basal and follow-up assessment. There were not statistical differences between post-treatment and follow-up evaluation, indicating a long-term maintenance of the improvements achieved after treatment. **CONCLUSIONS:** Low cost video games based on motion capture are potential tools in the rehabilitation context in children with CP. Our Kinect Xbox 360 protocol has showed improvements in balance and ADL in CP participants in a school environment, but further studies are need to validate the potential benefits of these video game systems as a supplement for rehabilitation of children with CP.

[PMID: 24018364](#) [PubMed - as supplied by publisher]

6. Res Dev Disabil. 2013 Sep 3;34(11):3672-3678. doi: 10.1016/j.ridd.2013.07.029. [Epub ahead of print]

Deficit in implicit motor sequence learning among children and adolescents with spastic Cerebral Palsy.

Gofer-Levi M, Silberg T, Brezner A, Vakil E.

The Department of Psychology, Bar Ilan University, Ramat-Gan 52900, Israel. Electronic address: mgoferlevi@gmail.com.

Skill learning (SL) is learning as a result of repeated exposure and practice, which encompasses independent explicit (response to instructions) and implicit (response to hidden regularities) processes. Little is known about the effects of developmental disorders, such as Cerebral Palsy (CP), on the ability to acquire new skills. We compared performance of CP and typically developing (TD) children and adolescents in completing the serial reaction time (SRT) task, which is a motor sequence learning task, and examined the impact of various factors on this performance as indicative of the ability to acquire motor skills. While both groups improved in performance, participants with CP were significantly slower than TD controls and did not learn the implicit sequence. Our results indicate that SL in children and adolescents with CP is qualitatively and quantitatively different than that of their peers. Understanding the unique aspects of SL in children and adolescents with CP might help plan appropriate and efficient interventions.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 24012588](#) [PubMed - as supplied by publisher]

7. Pediatrics. 2013 Sep 9. [Epub ahead of print]

Developmental Trajectories of Daily Activities in Children and Adolescents With Cerebral Palsy.

Vos RC, Becher JG, Ketelaar M, Smits DW, Voorman JM, Tan SS, Reinders-Messelink HA, Dallmeijer AJ; on behalf of the PERRIN+ Study Group.

Department of Rehabilitation Medicine and EMGO Institute for Health and Care Research, VU University Medical Center, Amsterdam, Netherlands;

OBJECTIVES: To describe the developmental trajectories of mobility performance and daily activities in children and young adults with cerebral palsy (CP). To explore the influence of gross motor function and intellectual disability on these trajectories. **METHODS:** Four hundred and twenty-four Dutch participants with CP (aged 1-20 years at study onset) were followed yearly over a period of 2 to 4 years. Developmental trajectories (from ages 1-16 years) were described for mobility performance and performance of daily activities, assessed by using the Vineland Adaptive Behavior Scale for gross motor function (classified by the Gross Motor Function Classification System) and intellectual disability (by IQ or school type). A subanalysis was done for performance of daily activities in a subgroup of participants without intellectual disability (aged 1-24 years). **RESULTS:** The developmental trajectories of mobility performance differed according to levels of gross motor function but not levels of intellectual disability. Intellectual disability affected the performance of daily activities, with lower overall trajectory levels for participants with intellectual disabilities. For participants without intellectual disability, high-level developmental trajectories were found, with values similar to those of typically developing children despite differences in gross motor function level. **CONCLUSIONS:** Mobility performance is determined mainly by levels of gross motor function. For performance of daily activities, intellectual disability was a more important determinant. Participants without intellectual disability showed developmental trajectories approaching values for typically developing participants. These estimated trajectories can guide rehabilitation interventions and future expectations for children and young adults with CP.

[PMID: 24019410](#) [PubMed - as supplied by publisher]

8. Res Dev Disabil. 2013 Sep 3;34(11):3672-3678. doi: 10.1016/j.ridd.2013.07.029. [Epub ahead of print]

Deficit in implicit motor sequence learning among children and adolescents with spastic Cerebral Palsy.

Gofer-Levi M, Silberg T, Brezner A, Vakil E.

The Department of Psychology, Bar Ilan University, Ramat-Gan 52900, Israel. Electronic address: mgoferlevi@gmail.com.

Skill learning (SL) is learning as a result of repeated exposure and practice, which encompasses independent explicit (response to instructions) and implicit (response to hidden regularities) processes. Little is known about the effects of developmental disorders, such as Cerebral Palsy (CP), on the ability to acquire new skills. We compared performance of CP and typically developing (TD) children and adolescents in completing the serial reaction time (SRT) task, which is a motor sequence learning task, and examined the impact of various factors on this performance as indicative of the ability to acquire motor skills. While both groups improved in performance, participants with CP were significantly slower than TD controls and did not learn the implicit sequence. Our results indicate that SL in children and adolescents with CP is qualitatively and quantitatively different than that of their peers. Understanding the unique aspects of SL in children and adolescents with CP might help plan appropriate and efficient interventions.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 24012588](#) [PubMed - as supplied by publisher]

9. Arch Phys Med Rehabil. 2013 Aug 27. pii: S0003-9993(13)00622-9. doi: 10.1016/j.apmr.2013.08.010. [Epub ahead of print]

Is an instrumented spasticity assessment an improvement over clinical spasticity scales in assessing and predicting the response to integrated Botulinum Toxin-A treatment in children with Cerebral Palsy?

Lynn BO, Anja VC, Kaat D, Ing AE, Catherine H, Britt V, Angela N, Guy M.

Clinical Motion Analysis Laboratory, University Hospital Leuven, Belgium; KU Leuven Department of Rehabilitation Sciences, Leuven, Belgium. Electronic address: lynn.1.bar-on@uzleuven.be.

OBJECTIVES: To compare (a) responsiveness and (b) predictive ability of clinical and instrumented spasticity assessments after Botulinum-Toxin-A (BTX) treatment combined with casting in the medial hamstrings (MEH) in children with spastic cerebral palsy (CP). **DESIGN:** Prospective cohort study **SETTING:** University Hospital **PARTICIPANTS:** 31 children (40 MEH muscles) with CP, consecutive sample, requiring BTX injections. **INTERVENTIONS:** Clinical and instrumented and spasticity assessments before and 53±14 days after BTX. **MAIN OUTCOME MEASURES:** Clinical spasticity scales included the Modified Ashworth Scale and the Modified Tardieu Scale. The instrumented spasticity assessment integrated biomechanical (position and torque) and electrophysiological (surface electromyography-sEMG) signals during manually-performed low- and high-velocity passive stretches of the MEH. Signals were compared between both stretch velocities and examined pre- and post-BTX. Responsiveness of clinical and instrumented assessments was compared by percentage exact agreement. Prediction ability was assessed with a logistic regression and the area under the Receiver Operating Characteristic (ROC) curves of the baseline parameters of responders versus non-responders. **RESULTS:** Both clinical and instrumented parameters improved post-BTX ($p \leq 0.005$), though showed a low percentage exact agreement. The baseline Modified Tardieu Scale was the only clinical scale predictive for response (area under ROC curve=0.7). For the instrumented assessment, baseline values of root mean square (RMS) EMG and of torque were better predictors for a positive response (area under ROC curve=0.82). RMS-EMG remained an important predictor in the logistic regression. **CONCLUSIONS:** The instrumented spasticity assessment showed higher responsiveness than the clinical scales. The amount of RMS-EMG is considered a promising parameter to predict treatment response.

Copyright © 2013 American Congress of Rehabilitation Medicine. Published by Elsevier Inc. All rights reserved.

[PMID: 23994052](#) [PubMed - as supplied by publisher]

10. Gait Posture. 2013 Aug 16. pii: S0966-6362(13)00458-X. doi: 10.1016/j.gaitpost.2013.08.003. [Epub ahead of print]

Kinematics and kinetics of normal and planovalgus feet during walking.

Saraswat P, Macwilliams BA, Davis RB, D'Astous JL.

Shriners Hospitals for Children, Salt Lake City, UT, USA.

Planovalgus deformity is prevalent in cerebral palsy patients, but very few studies have quantitatively reported differences between planovalgus and normal foot function. Intersegmental foot kinetics have not been reported in this population. In this study, a three segment (hindfoot, forefoot, hallux) kinematic and kinetic model was applied to typically developing ($n=10$ subjects, 20 feet) and planovalgus ($n=10$ subjects, 18 feet) pediatric subjects by two clinicians for each subject. Intra-clinician and inter-clinician repeatability of kinematic variables have been previously reported. Variability of kinetic outcomes (joint moments and power) is reported and found to be equally repeatable in typically developing and planovalgus groups. Kinematic differences in the planovalgus foot including excessive ankle eversion (valgus) and plantarflexion, reduced ankle flexion range of motion, and increased midfoot joint dorsiflexion and pronation reflected the reported pathology. Contrary to clinical expectations no significant difference was observed in midfoot flexion or ankle eversion ranges of motion. Kinetic differences in planovalgus feet compared to typically developing feet included reduced ankle plantarflexion moment, ankle power and midfoot joint power.

Copyright © 2013 Elsevier B.V. All rights reserved.

[PMID: 24001868](#) [PubMed - as supplied by publisher]

11. Res Dev Disabil. 2013 Sep 4;34(11):3648-3653. doi: 10.1016/j.ridd.2013.08.012. [Epub ahead of print]

Children with cerebral palsy have greater stochastic features present in the variability of their gait kinematics.

Davies BL, Kurz MJ.

Department of Physical Therapy, Munroe-Meyer Institute for Genetics and Rehabilitation, University of Nebraska Medical Center, Omaha, NE, United States.

Children with CP have a more variable gait pattern. However, it is currently unknown if these variations arise from deterministic variations that are a result of a change in the motor command or stochastic features that are present in the nervous system. The aim of this investigation was to use a Langevin equation methodology to evaluate the deterministic and stochastic features that are present in the variability of the gait kinematics of children with cerebral palsy (CP). Ten children with spastic diplegic CP and nine typically developing (TD) children participated in this investigation. All of the children walked on a treadmill for 2min while a three-dimensional motion capture system recorded the step kinematics. Our major findings for this investigation were: (1) children with CP had greater variability in their gait patterns than TD children, (2) the variability of the children with CP and TD children had similar deterministic features, (3) the variability had greater stochastic features for the children with CP, and (4) the increase in the amount of variability was strongly correlated with the increase in stochastic features. These results indicate that the variability seen in the gait patterns of children with CP may be due to the inability to suppress the noise that is present in the neuromuscular system.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 24012593](#) [PubMed - as supplied by publisher]

12. Spine J. 2013 Aug 27. pii: S1529-9430(13)00733-X. doi: 10.1016/j.spinee.2013.06.047. [Epub ahead of print]

Clinical anatomy of vertebrae in scoliosis: global analysis in four different diseases by multiplanar reconstructive computed tomography.

Hong JY, Suh SW, Tr E, Hong SJ, Yoon YC, Kang HJ.

Department of Orthopedics, Korea University Ansan Hospital, Gojan Dong, Danwon Gu, Ansan 425-707, Republic of Korea. Electronic address: osspine@korea.ac.kr.

BACKGROUND CONTEXT: Few accurate analyses of clinically useful vertebral anatomy have been conducted, and most have focused on thoracic idiopathic scoliosis. **PURPOSE:** To evaluate the different anatomic characteristics in scoliosis by disease type and level. **STUDY DESIGN:** Observational cohort study. **PATIENT SAMPLE:** Forty-eight patients with scoliosis were included in this study. **OUTCOME MEASURES:** Subjects underwent computed tomography (CT) of the whole spine. **METHODS:** Forty-eight patients with scoliosis were included in this study: 15 adolescent idiopathic, 11 cerebral palsy (CP), 10 muscular dystrophy (MD), and 12 congenital (CG) scoliosis patients with similar demographics. Subjects underwent CT of the whole spine, preoperatively. Eight anatomic parameters were measured in multiplanar reconstructive CT images, and statistical analysis was performed to investigate differences. **RESULTS:** In general, values in the anatomic parameters were similar for the four diseases. Each parameter showed the unique change pattern according to the spinal level regardless of curvature shape, direction, or magnitude. In particular, chord length (CL) in MD and CG scoliosis was lower than in adolescent idiopathic scoliosis (AIS) and CP, and pedicle rib unit length was lower in CG scoliosis than in the other diseases ($p < .05$). Comparisons of convex and concave anatomies in AIS showed that inner pedicle width (PWI) and outer pedicle width (PWO) were wider for convex side, CL, pedicle width, and transverse pedicle angle were greater for concave side ($p < .05$), and differences were more significant at apices. However, in CP, PWI and PWO were similar between convex and concaves sides ($p > .05$). Although PWI and PWO were wider for convex sides and CL and pedicle length were greater for concave sides in MD ($p < .05$), differences were less significant at apices. Particularly, CG scoliosis showed severely deformed anatomy, with differences of seven parameters at apical vertebrae ($p < .05$). **CONCLUSION:** Clinical anatomies of vertebrae in scoliosis were found to differ significantly at different levels and in terms of convexity and disease type.

Copyright © 2013 Elsevier Inc. All rights reserved.

[PMID: 23992938](#) [PubMed - as supplied by publisher]

13. Res Dev Disabil. 2013 Sep 6;34(11):3746-3753. doi: 10.1016/j.ridd.2013.07.036. [Epub ahead of print]

Discrepancies between mothers and clinicians in assessing functional capabilities and performance of children with cerebral palsy.

Elad D, Barak S, Eisenstein E, Bar O, Givon U, Brezner A.

The Edmond and Lily Safra Children's Hospital, The Chaim Sheba Medical Center, Ramat Gan 52621, Israel.

The current study is a cross-sectional study that aimed to investigate the concordance between health care professionals (HCPs) and mothers in rating capabilities and performance of children with cerebral palsy (CP), and the impact of CP gross motor severity on concordance. Seventy-three children with mild-to-severe CP (mean age 8.8 ± 2.10 years) and their mothers participated in this study. Two modes of Pediatric Evaluation Disability Inventory (PEDI) administration were used: mothers' interview by a social worker and HCPs' actual evaluation. Differences between raters were assessed by paired t-tests and intra-class correlation coefficients (ICCs). Agreement was defined as mean absolute difference of less than or equal to six points. The results indicated that in spite of excellent overall ICCs in PEDI ($ICC > 0.8$), disagreement between raters was observed in all PEDI sub-domains: 38%, 56%, 72% and 59% disagreement in Functional Skills-Mobility, Functional Skills-Self Care, Caregiver Assistance-Mobility (CA-MO) and Caregiver Assistance-Self Care (CA-SC), respectively. In CA-SC and CA-MO disagreement mainly consisted of mothers rating their children lower in performance than HCPs. CP severity effected the agreement mostly in children with moderate CP severity. The implications of these results are that raters perceive child's activity differently, hence revealing hidden disability perceptions, with significant consequences for intended interventions.

Copyright © 2013 Elsevier Ltd. All rights reserved.

[PMID: 24016417](#) [PubMed - as supplied by publisher]

14. Phys Occup Ther Pediatr. 2013 Sep 4. [Epub ahead of print]

Mothers' Experiences with the Pediatric Evaluation of Disability Inventory (PEDI).

Rich D, Rigby P, Wright V.

Bloorview Research Institute , Toronto, Ontario , Canada.

Parents of a child with a disability are often asked about their child's functioning in daily activities. One way to gather this information is through parent-report functional questionnaires such as the Pediatric Evaluation of Disability Inventory (PEDI). The purpose of this study was to explore parental experiences associated with completion of the PEDI before and after a functional therapy intervention. Semi-structured interviews were conducted with 12 mothers of children with cerebral palsy (CP) or developmental delay (DD) who had completed the PEDI within a larger study. A content analysis approach was used to code and organize the data into five themes. PEDI completion was associated with increased parental awareness of developmental patterns, and greater insight into levels of assistance they give to their child. Parents described various challenges and concerns with the PEDI that have implications for test administration processes. The findings have potential to enable more sensitive and focused PEDI use.

[PMID: 24004267](#) [PubMed - as supplied by publisher]

15. Dev Med Child Neurol. 2013 Sep 3. doi: 10.1111/dmcn.12245. [Epub ahead of print]**Practice considerations for the introduction and use of power mobility for children.**

Livingstone R, Paleg G.

Sunny Hill Health Centre for Children, Vancouver, BC, Canada.

AIM: The aim of the study was to support clinicians in recommending and justifying power mobility for children of different ages and abilities, and with different needs. The study comprised three distinct parts: a literature review; a Delphi consensus; and clinical practice considerations. **METHOD:** A scoping review of eight electronic databases and manual searches carried out in February 2011 identified 15 themes or transferable messages among 27 articles meeting initial inclusion criteria and these formed the basis of a draft paper. Informal consensus at two international conference presentations refined and modified the paper to include 10 messages supported by 24 articles. The literature review was updated in May 2012 and a modified Delphi process sought to formalize the consensus process with an international panel of 16 expert clinicians and researchers using a priori criteria of 80% agreement. **RESULTS:** Evidence from studies was classified using the American Academy of Cerebral Palsy and Developmental Medicine guidelines, with evidence from most studies being classified as either level IV or level V, apart from one study each with evidence classified as level II and level III. Expert consensus on the content and wording of nine transferable messages may raise evidence overall to level III. **INTERPRETATION:** This paper suggests that power mobility may reasonably be considered as an effective and appropriate intervention for children lacking efficient, independent mobility from around 12 months of age including children who may never become competent drivers and children lacking independent mobility only in early childhood.

© 2013 Mac Keith Press.

[PMID: 23998510](#) [PubMed - as supplied by publisher]

16. Dev Med Child Neurol. 2013 Sep 4. doi: 10.1111/dmcn.12266. [Epub ahead of print]**The accommodative process in children with cerebral palsy: different strategies to obtain clear vision at short distance.**

Pansell T, Hellgren K, Jacobson L, Brautaset R, Tedroff K.

Department of Clinical Neuroscience, Ophthalmology and Vision, St Erik Eye Hospital, Karolinska Institutet, Stockholm, Sweden.

AIM: Accommodation is the ability of the eye to change focus in order to maintain a sharp image of objects at various distances. The accommodative process is largely unknown in children and requires new assessment techniques. The aim of the study was to investigate this process in children with and without cerebral palsy (CP). **METHOD:** In a descriptive case-control study, children with CP (n=15; nine females, six males; median age 14y) and 21 typically developing children (11 females, 10 males; median age 12y) underwent standard ophthalmological examination and examination by the PowerRefractor. Six of the children had spastic bilateral CP, five had spastic unilateral CP, and four had dyskinetic CP. The children's Gross Motor Function Classification System (GMFCS) levels were as follows: level I, seven children; level II, two children; level III, three children; and level IV, three children. The PowerRefractor measures accommodation in response to minus lens stimuli. Continuous measurements of refraction/accommodation, eye position, and pupil size are obtained. The Kruskal-Wallis analysis of variance (ANOVA) and Mann-Whitney U test were used for between-group analysis ($\alpha=0.05$), and Friedman ANOVA was used for within-group analysis. **RESULTS:** The stimuli-response gain (input/output) was approximately 80% in typical children inducing a focusing error (0.2-0.5D) increasing with minus lens power. Children with CP accommodated significantly less (gain: ~30%; $p<0.001$), inducing a larger focusing error (1.1-1.7D) increasing with minus lens power. The accommodative response was slower and more variable in children with CP. The pupil response did not mirror the accommodative response. **INTERPRETATION:** Children with CP exhibit problems in generating an appropriate accommodative response. This can affect everyday living and reading skills.

© 2013 Mac Keith Press.

[PMID: 24000971](#) [PubMed - as supplied by publisher]

17. Pediatrics. 2013 Sep 9. [Epub ahead of print]**Cerebral Palsy and Growth Failure at 6 to 7 Years.**

Vohr BR, Stephens BE, McDonald SA, Ehrenkranz RA, Lupton AR, Pappas A, Hintz SR, Shankaran S, Higgins RD, Das A; on behalf of the Extended Hypothermia Follow-up Subcommittee of the NICHD Neonatal Research Network.

Alpert Medical School of Brown University, Providence, Rhode Island;

OBJECTIVE: To evaluate the association between severity of cerebral palsy (CP) and growth to 6 to 7 years of age among children with moderate to severe (Mod/Sev) hypoxic ischemic encephalopathy (HIE). It was hypothesized that children with Mod/Sev CP would have poorer growth, lower cognitive scores, and increased rehospitalization rates compared with children with no CP (No CP). **METHODS:** Among 115 of 122 surviving children followed in the hypothermia trial for neonatal HIE, growth parameters and neurodevelopmental status at 18 to 22 months and 6 to 7 years were available. Group comparisons (Mod/Sev CP and No CP) with unadjusted and adjusted analyses for growth <10th percentile and z scores by using Fisher's exact tests and regression modeling were conducted. **RESULTS:** Children with Mod/Sev CP had high rates of slow growth and cognitive and motor impairment and rehospitalizations at 18 to 22 months and 6 to 7 years. At 6 to 7 years of age, children with Mod/Sev CP had increased rates of growth parameters <10th percentile compared with those with No CP (weight, 57% vs 3%; height, 70% vs 2%; and head circumference, 82% vs 13%; $P < .0001$). Increasing severity of slow growth was associated with increasing age ($P < .04$ for weight, $P < .001$ for length, and $P < .0001$ for head circumference). Gastrostomy feeds were associated with better growth. **CONCLUSIONS:** Term children with HIE who develop Mod/Sev CP have high and increasing rates of growth <10th percentile by 6 to 7 years of age. These findings support the need for close medical and nutrition management of children with HIE who develop CP.

[PMID: 24019415](#) [PubMed - as supplied by publisher]

18. Pediatr Gastroenterol Hepatol Nutr. 2013 Jun;16(2):131-4. doi: 10.5223/pghn.2013.16.2.131. Epub 2013 Jun 30.**A case of cecal volvulus presenting with chronic constipation in lissencephaly.**

Lee EK, Kim JE, Lee YY, Kim S, Choi KH.

Department of Pediatrics, Yeungnam University Medical Center, Daegu, Korea.

Cecal volvulus is uncommon in pediatric patients and there are few reports of cecal volvulus with cerebral palsy. Here, we report the case of a 19-year-old male patient who presented with abdominal distension, a history of cerebral palsy, refractory epilepsy due to lissencephaly, and chronic constipation. An abdominal x-ray and computed tomography without contrast enhancement showed fixed dilated bowel intensity in the right lower abdomen. Despite decompression with gastric and rectal tube insertion, symptoms did not improve. The patient underwent an exploratory laparotomy that revealed cecal volvulus. Cecal volvulus usually occurs following intestinal malrotation or previous surgery. In this patient, however, intestinal distension accompanying mental disability and chronic constipation resulted in the development of cecal volvulus. We suggest that cecal and proximal large bowel volvulus should be considered in patients presenting with progressive abdominal distension combined with a history of neuro-developmental delay and constipation.

[PMID: 24010118](#) [PubMed] [PMCID: PMC3760704](#) Free PMC Article

19. Dev Med Child Neurol. 2013 Oct;55(10):877-8. doi: 10.1111/dmcn.12271.**Promoting function and participation to improve living a life with cerebral palsy.**

Msall ME.

University of Chicago Comer Children's Hospital, Chicago, IL, USA.

[PMID: 24016331](#) [PubMed - in process]

20. Dev Med Child Neurol. 2013 Oct;55(10):876. doi: 10.1111/dmcn.12267.

Research and practice in childhood disability: what comes next?

Stevenson RD.

American Academy for Cerebral Palsy and Developmental Medicine, University of Virginia (UVA) School of Medicine, Kluge Children's Rehabilitation Center and Research Institute, UVA Children's Hospital, Charlottesville, VA, USA.

[PMID: 24016330](#) [PubMed - in process]

12. Lijec Vjesn. 2013 Jul-Aug;135(7-8):213-8.

Chronic disease and health condition prevention in childhood: emphases from the 13th Symposium of Preventive Pediatrics [Article in Croatian]

Batinica M, Grgurić J, Jadrijević-Cvrlje F.

Kardiološki odjel, Klinika za pedijatriju, Klinika za dječje bolesti Zagreb. mbatini2@gmail.com

Chronic diseases in childhood have become an important priority, especially in developed countries, because of higher prevalence, relatively and absolutely. Besides that, inappropriate procedures a chronically ill child can result in child's growth and development disorder. According to literature data, 15-20% of children have chronic disease with the impact on their physical, mental and emotional status. Disease prevention strategies are described at the primary, secondary and tertiary level: how to avoid occurrence of disease, how to diagnose and treat existent disease in early stages, before it causes significant morbidity, and finally how to reduce negative impact of existent disease by restoring function and reducing disease-related complications - how to improve quality of life of children with chronic diseases. The new term of quaternary prevention describes methods to mitigate or avoid results of unnecessary or excessive interventions in the health system. In this paper the authors present recent attitudes about chronic diseases prevention modalities in childhood, which, at the beginning of the 21st century, have become more intriguing and represent a new challenge for pediatric health care. Thus, from preventive standpoint, the following chronic illnesses are discussed: asthma, malignant diseases, autism, epilepsy, cerebral palsy, tuberculosis, diabetes type 1, congenital heart diseases, arterial hypertension, celiac disease, and eating disorders. These emphases are from the 13th Preventive Pediatrics Symposium, which took place in Skrad, June 2nd, 2012. Further activities are planned with the aim of continuation of health care furtherance for children with other chronic illnesses.

[PMID: 23991491](#) [PubMed - in process]

Prevention and Cure

21. Early Hum Dev. 2013 Aug 31. pii: S0378-3782(13)00197-7. doi: 10.1016/j.earlhumdev.2013.08.008. [Epub ahead of print]

Prognostic value of the qualitative assessments of general movements in late-preterm infants.

Brogna C, Romeo DM, Cervesi C, Scrofani L, Romeo MG, Mercuri E, Guzzetta A.

Paediatric Neurology Unit, Catholic University, Rome, Italy.

BACKGROUND: The quality of general movements (GMs) and its predictive value have never been evaluated in late-preterm (LP) infants. **AIMS:**

To determine the characteristics of GMs and their predictive value for neurodevelopmental outcome in a cohort of infants born between 34 and 36 weeks' gestation. **STUDY DESIGN AND SUBJECTS:** 574 LP infants were examined using the standard methodological principles of Prechtl's method for assessing GMs both during writhing and fidgety periods. **OUTCOME MEASURES:** Infants were assessed at 2 years of age with neuromotor and developmental scales. **RESULTS:** A significant correlation was found between GMs and outcome both at writhing (r_s 0.68; $p < 0.001$) and at fidgety age (r_s 0.78; $p < 0.001$). The assessment at 1 month showed 100% sensitivity and 86% specificity of predicting the development of cerebral palsy (CP), that at 3 months was 100% sensitivity and 97% specificity. **CONCLUSIONS:** During the fidgety age GMs predict CP with very high sensitivity and specificity. The qualitative assessment of GMs should be employed to help identify LP infants who require early intervention for neurological abnormalities.

© 2013.

[PMID: 24001477](#) [PubMed - as supplied by publisher]

22. J Pediatr. 2013 Aug 27. pii: S0022-3476(13)00935-9. doi: 10.1016/j.jpeds.2013.07.027. [Epub ahead of print]

Death or Neurodevelopmental Impairment at 18 to 22 Months Corrected Age in a Randomized Trial of Early Dexamethasone to Prevent Death or Chronic Lung Disease in Extremely Low Birth Weight Infants.

Stark AR, Carlo WA, Vohr BR, Papile LA, Saha S, Bauer CR, Oh W, Shankaran S, Tyson JE, Wright LL, Poole WK, Das A, Stoll BJ, Fanaroff AA, Korones SB, Ehrenkranz RA, Stevenson DK, Peralta-Carcelen M, Wilson-Costello DE, Bada HS, Heyne RJ, Johnson YR, Lee KG, Steichen JJ; Eunice Kennedy Shriver National Institute of Child Health and Human Development Neonatal Research Network.

Division of Neonatology, Vanderbilt University School of Medicine, Nashville, TN. Electronic address: ann.r.stark@vanderbilt.edu.

OBJECTIVE: To evaluate the incidence of death or neurodevelopmental impairment (NDI) at 18-22 months corrected age in subjects enrolled in a trial of early dexamethasone treatment to prevent death or chronic lung disease in extremely low birth weight infants. **STUDY DESIGN:** Evaluation of infants at 18-22 months corrected age included anthropomorphic measurements, a standard neurological examination, and the Bayley Scales of Infant Development-II, including the Mental Developmental Index and the Psychomotor Developmental Index. NDI was defined as moderate or severe cerebral palsy, Mental Developmental Index or Psychomotor Developmental Index < 70 , blindness, or hearing impairment. **RESULTS:** Death or NDI at 18-22 months corrected age was similar in the dexamethasone and placebo groups (65% vs 66%, $P = .99$ among those with known outcome). The proportion of survivors with NDI was also similar, as were mean values for weight, length, and head circumference and the proportion of infants with poor growth (50% vs 41%, $P = .42$ for weight less than 10th percentile); 49% of infants in the placebo group received treatment with corticosteroid compared with 32% in the dexamethasone group ($P = .02$). **CONCLUSION:** The risk of death or NDI and rate of poor growth were high but similar in the dexamethasone and placebo groups. The lack of a discernible effect of early dexamethasone on neurodevelopmental outcome may be due to frequent clinical corticosteroid use in the placebo group.

Copyright © 2013 Mosby, Inc. All rights reserved.

[PMID: 23992673](#) [PubMed - as supplied by publisher]

23. J Perinat Med. 2013 Sep 4:1-5. doi: 10.1515/jpm-2013-0151. [Epub ahead of print]

Neonatal serum magnesium concentrations are determined by total maternal dose of magnesium sulfate administered for neuroprotection.

Borja-Del-Rosario P, Basu SK, Haberman S, Bhutada A, Rastogi S.

Background: Antenatal magnesium in preterm labor for neuroprotection decreases the incidence of cerebral palsy. However, there are no guidelines on the dose and duration of magnesium infusion for neuroprotection. As increased neonatal serum magnesium concentrations may be related to higher risk of morbidity and mortality, the

role of total amount of magnesium and maternal serum magnesium concentrations associated with safe neonatal serum magnesium concentrations is not known. Methods: A retrospective study was conducted on 289 mothers who received antenatal magnesium for neuroprotection as a loading dose of 4-6 g infused over 30 min, followed by a maintenance infusion of 1-2 g/h. Total magnesium dose infused to the mother and maternal serum magnesium concentrations were correlated with neonatal serum magnesium concentrations. Results: Of the 289 mothers, 192 mother/baby dyads had all three measurements (maternal total magnesium dose, and maternal and neonatal serum magnesium concentrations). Magnesium infusion was continued beyond 24 h in 60 mothers. Total maternal magnesium dose at 24 and 48 h of infusion correlated with neonatal serum magnesium concentrations ($r=0.55$, $P<0.0001$ and $r=0.35$, $P<0.0001$, respectively), but not with maternal serum magnesium concentrations ($r=0.004$, $P=0.98$ and $r=0.14$, $P=0.21$). However, there was no correlation between the maternal and neonatal serum magnesium concentrations ($r=0.10$, $P=0.15$). Conclusion: Total dose of magnesium infused to the mother correlates with neonatal serum magnesium concentrations. To keep neonatal serum magnesium concentrations within a range that is effective for neuroprotection and safe for the neonates, the total dose received by the mother needs to be monitored and limited.

[PMID: 24006314](#) [PubMed - as supplied by publisher]

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.