

Monday 15 August 2011

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

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Interventions and Management

1. *Pediatr Phys Ther.* 2011 Fall;23(3):221-31.

Outcome measures of activity for children with cerebral palsy: a systematic review.

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Division of Allied Health, Northumbria University, Newcastle upon Tyne, Tyne and Wear, United Kingdom.

PURPOSE: The purpose of this systematic review was to identify valid, reliable, and clinically practical measures of function/activity for children with cerebral palsy. **METHOD:** Cochrane, MEDLINE, CINAHL, AMED, PEDro, and ScienceDirect were searched to identify relevant studies. Reference lists were hand-searched, and databases were searched specifically for outcome measures (OMs) identified. Studies were examined for bias based on published recommendations. **RESULTS:** Seven studies on 6 OMs were included, which were of moderate or good methodological quality. **CONCLUSIONS:** Most measures require further research to fully establish their psychometric properties. Only the Gross Motor Function Measure versions 88 and 66 and the Pediatric Evaluation of Disability Inventory were identified as potentially appropriate for this client group, but not all are valid for children of all ages and Gross Motor Function Classification System levels. The clinical application of these OMs is discussed in relation to capacity, capability, or performance; new developments are highlighted.

PMID: 21829113 [PubMed - in process]

2. *Am J Occup Ther.* 2011 Jul-Aug;65(4):378-83.

Interrater reliability of the Melbourne Assessment of Unilateral Upper Limb Function for children with hemiplegic cerebral palsy.

Spirtos M, O'Mahony P, Malone J.

Discipline of Occupational Therapy, Trinity Centre for Health Sciences, St. James Hospital, Dublin 8, Ireland. sirtosa@tcd.ie

OBJECTIVE: We examined the interrater reliability of the Melbourne Assessment of Unilateral Upper Limb Function. **METHOD:** Three occupational therapists independently scored 34 videotaped assessments of children with hemiplegic cerebral palsy aged 6 yr, 1 mo, to 14 yr, 5 mo. Intraclass correlation coefficients (ICCs) at a 95% confidence interval were calculated for total scores, category scores, and item scores. **RESULTS:** The correlation

between raters' total scores was high (ICC = .961). The highest correlation for test components between raters was found for fluency (ICC = .902), followed by range of movement (ICC = .866), and the lowest correlation was found for quality of movement (ICC = .683). The ICCs for individual test item scores varied and ranged from .368 to .899. CONCLUSION: This study demonstrated high interrater reliability for total scores, with scoring of some individual components and items requiring further consideration from both a clinical and a research perspective.

PMID: 21834452 [PubMed - in process]

3. Res Dev Disabil. 2011 Aug 5. [Epub ahead of print]

Effect of upper limb deformities on gross motor and upper limb functions in children with spastic cerebral palsy.

Park ES, Sim EG, Rha DW.

Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, 50 Yonsei-ro, Seodaemun-gu, Seoul 120-752, Republic of Korea.

The aims of this study were to investigate the nature and extent of upper limb deformities via the use of various classifications, and to analyze the relationship between upper limb deformities and gross motor or upper limb functionality levels. Upper extremity data were collected from 234 children with spastic cerebral palsy (CP) who were admitted to the university hospital for intensive rehabilitation. Upper limb deformities were classified according to the Zancolli classification for finger and wrist extension ability, the Gshwind and Tonkin classification for supination ability, and the House classification for thumb-in-palm deformity. Digital deformity was also classified. Upper limb function was assessed using the Upper Extremity Rating Scale (UERS) and the Upper Limb Physician's Rating Scale (ULPRS). Gross motor function was assessed using the Gross Motor Functional Classification System (GMFCS). Among the 234 children observed, 70.5% had a limitation in forearm supination, and 62.8% had problems with wrist and finger extension in at least one limb. Thumb-in-palm deformity of at least one hand was found in 47.0% of patients. Swan neck deformity was the most common finger deformity. Upper limb functional measures, the ULPRS and the UERS, significantly correlated with the degree of upper limb deformity, as assessed by the Gschwind and Tonkin, Zancolli, and House classifications. Further, the degree of upper limb deformity was significantly related to the GMFCS level in children with bilateral CP, but not in children with unilateral CP. Limitation of forearm supination was the most common upper limb deformity in children with spastic CP. The degree of upper limb deformity significantly affected upper limb function in these children.

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PMID: 21821392 [PubMed - as supplied by publisher]

4. Res Dev Disabil. 2011 Aug 4. [Epub ahead of print]

A neurocognitive perspective on developmental disregard in children with hemiplegic cerebral palsy.

Houwink A, Aarts PB, Geurts AC, Steenbergen B.

Radboud University Nijmegen Medical Centre, Nijmegen Centre for Evidence Based Practice, Department of Rehabilitation, Nijmegen, The Netherlands.

A common problem in children with hemiplegic cerebral palsy (CP) is the asymmetrical development of arm and hand capacity caused by the lack of use of the affected upper limb, or developmental disregard. In this paper, we provide a neuropsychological model that relates developmental disregard to attentional processes and motor learning. From this model, we hypothesize that high attentional demands associated with the use of the affected upper limb might hinder its use in daily life, and therefore may be a factor in developmental disregard. This can be assessed with a dual-task paradigm. However, until now, this has not been applied to children with CP. We provide recommendations for using a dual-task paradigm in children with CP based on empirical studies in typically developing children and children with developmental coordination disorder. Ultimately, these dual-task studies may be used to improve interventions aimed at reducing developmental disregard.

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PMID: 21820859 [PubMed - as supplied by publisher]

5. J Intellect Dev Disabil. 2011 Aug 10. [Epub ahead of print]

Intrathecal baclofen therapy: Benefits and complications.

Zdolsek HA, Olesch C, Antolovich G, Reddihough D.

Royal Children's Hospital, Melbourne, Australia.

Background: Spasticity and dystonia in children with cerebral palsy has been treated with intrathecal baclofen therapy (ITB) at the Royal Children's Hospital, Melbourne, Australia (RCH) since 1999. Methods: The records of children having received or still receiving ITB during the period September 1999 until August 2005 were studied to evaluate complications and side effects. Parents answered a questionnaire focused on the health and functional impact in the children. Results: There were 18 first insertions of pumps, 6 removals, and 4 reinsertions. The longest treatment was 5 years and 11 months and was still ongoing. Seventeen complications occurred in 14 out of 18 children. Despite the high complication rate and the lack of significant functional improvement, 11 out of 12 parents agreed that ITB was beneficial. Conclusion: ITB treatment at RCH over the years has resulted in some complications, mostly occurring shortly after pump insertion. For the majority of children there are substantial benefits.

PMID: 21830852 [PubMed - as supplied by publisher]

6. Child Care Health Dev. 2011 Aug 9. doi: 10.1111/j.1365-2214.2011.01292.x. [Epub ahead of print]

A pilot study of scoliosis assessment using radiation free surface topography in children with GMFCS IV and V cerebral palsy.

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Department of Community Paediatrics, Yorkshire and the Humber Deanery & Leeds Teaching Hospitals NHS trust, St James University Hospital School of Mechanical Engineering, University of Leeds Department of Community Paediatrics, NHS Leeds Community Healthcare Academic Department of Rehabilitation Medicine, Faculty of Medicine and Health, University of Leeds & Leeds Teaching Hospitals NHS trust, Leeds, UK.

Background: Prevalence of scoliosis in cerebral palsy (CP) parallels the extent of neurological impairment and causes significant morbidity. Monitoring is important but requires regular radiological investigation. Surface topography provides a non-radiological approach to scoliosis monitoring. Aim: To evaluate validity, reproducibility and feasibility of Quantec® scans to monitor scoliosis in children with severe CP. Methods: Twenty non-ambulant children with CP, Gross Motor Function Classification System (GMFCS) grade IV/V had clinical, radiological and Quantec spinal assessment. The children were supported during scans using a seating system specifically designed for this study. Validity was assessed by comparing Quantec (Q) angle with gold standard (Cobb angle), reproducibility analysed using Bland-Altman plots and feasibility assessed using a questionnaire. Results: Prevalence of scoliosis on radiological examination was 65%. Of these children, 85% had curves with Cobb angle less than 28°. Quantec scanning was feasible with appropriate postural support. Mean (and standard deviation) for differences between Cobb and Quantec (Q) angle were 0.02° (6.2°) and for Quantec inter-observer variability were 0.5° (5.8°). Conclusions: Quantec scanning was feasible, reproducible and had good validity when compared with Cobb angle in a supportive seating system. To consolidate these findings a further study needs to be undertaken with larger number of children with Cobb angles between 25° and 45°.

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PMID: 21827528 [PubMed - as supplied by publisher]

7. Pediatr Phys Ther. 2011 Fall;23(3):258-66.**An intensive virtual reality program improves functional balance and mobility of adolescents with cerebral palsy.**

Brien M, Sveistrup H.

Ottawa Children's Treatment Centre (Ms Brien) and School of Rehabilitation Sciences, Faculty of Health Sciences, University of Ottawa (Dr Sveistrup), Ottawa, Ontario, Canada.

PURPOSE: To examine functional balance and mobility in adolescents with cerebral palsy classified at Gross Motor Function Classification System (GMFCS) level I following an intensive short-duration virtual reality (VR) intervention. **METHODS:** Single-subject, multiple-baseline design with 4 adolescents. Outcomes included the Community Balance and Mobility Scale (CB&M), the 6-Minute Walk Test (6MWT), the Timed Up and Down Stairs, and the Gross Motor Function Measure Dimension E. Assessments were recorded 3 to 6 times at baseline, 5 times during intervention, and 4 times at follow-up. Daily 90-minute VR intervention was completed for 5 consecutive days. Visual, statistical, and clinical significance analyses were used. **RESULTS:** Statistically significant improvements were shown in all adolescents on CB&M and 6MWT. True change was recorded in all for the CB&M and in 3 for the 6MWT. **CONCLUSIONS:** Functional balance and mobility in adolescents with cerebral palsy classified at GMFCS level I improve with intense, short duration VR intervention, and changes are maintained at 1-month posttraining.

PMID: 21829120 [PubMed - in process]

8. Pediatr Phys Ther. 2011 Fall;23(3):232-9.**Evaluation of lower body positive pressure supported treadmill training for children with cerebral palsy.**

Kurz MJ, Corr B, Stuberg W, Volkman KG, Smith N.

Physical Therapy Department, Munroe-Meyer Institute for Genetics and Rehabilitation (Drs Kurz, Corr, Stuberg, and Smith), and Division of Physical Therapy Education, School of Allied Health Programs (Ms Volkman), University of Nebraska Medical Center, Omaha, Nebraska.

PURPOSE: To examine the feasibility of using lower body positive pressure supported (LBPPS) treadmill training to improve the walking abilities, balance and lower extremity strength of children with cerebral palsy (CP). **METHODS:** Nine children with CP (GMFCS II-IV) participated in LBPPS treadmill training 2 days per week for 6 weeks. Pre and post training measures of preferred walking speed, spatiotemporal kinematics, lower extremity strength, and the BESTest were used to assess potential improvements from LBPPS treadmill training. **RESULTS:** LBPPS treadmill training resulted in significantly faster walking speed, less time in double support, improved overall balance, and strength of the lower extremity antigravity musculature. **CONCLUSIONS:** It is feasible to use LBPPS treadmill training to improve the walking performance, balance, and strength of children with CP.

PMID: 21829114 [PubMed - in process]

9. Pediatr Phys Ther. 2011 Fall;23(3):240.**Commentary on "evaluation of lower body positive pressure supported treadmill training for children with cerebral palsy".**

Levinson M, Bush J.

Thomas Jefferson University, Philadelphia, Pennsylvania Cadence Physical Therapy, Chester Springs, Pennsylvania.

PMID: 21829115 [PubMed - in process]

10. Pediatr Phys Ther. 2011 Fall;23(3):267.**Commentary on "an intensive virtual reality program improves functional balance and mobility of adolescents with cerebral palsy".**

Yu S, Fetters L.

California Children's Services, Long Beach, Los Angeles, California University of Southern California, Los Angeles, California.

PMID: 21829121 [PubMed - in process]

11. Case Report Med. 2011;2011:359126. Epub 2011 Apr 5.**Quantitative effects of repeated muscle vibrations on gait pattern in a 5-year-old child with cerebral palsy.**

Camerota F, Galli M, Celletti C, Vimercati S, Cimolin V, Tenore N, Filippi GM, Albertini G.

Physical Medicine and Rehabilitation Division, Umberto I Hospital, Sapienza University of Rome, 00185 Rome, Italy.

Objective. To investigate quantitatively and objectively the effects of repeated muscle vibration (rMV) of triceps surae on the gait pattern in a 5-year-old patient with Cerebral Palsy with equinus foot deformity due to calf spasticity. **Methods.** The patient was assessed before and one month after the rMV treatment using Gait Analysis. **Results.** rMV had positive effects on the patient's gait pattern, as for spatio-temporal parameters (the stance duration and the step length increased their values after the treatment) and kinematics. The pelvic tilt reduced its anteversion and the hip reduced the high flexion evidenced at baseline; the knee and the ankle gained a more physiological pattern bilaterally. The Gillette Gait Index showed a significant reduction of its value bilaterally, representing a global improvement of the child's gait pattern. **Conclusions.** The rMV technique seems to be an effective option for the gait pattern improvement in CP, which can be used also in very young patient. Significant improvements were displayed in terms of kinematics at all lower limb joints, not only at the joint directly involved by the treatment (i.e., ankle and knee joints) but also at proximal joints (i.e., pelvis and hip joint).

PMID: 21826147 [PubMed - in process] PMCID: PMC3150156

12. Clin Rehabil. 2011 Aug 10. [Epub ahead of print]**Effective home programme intervention for adults: a systematic review.**

Novak I.

Cerebral Palsy Alliance Research Institute, University of Notre Dame, School of Medicine, Darlinghurst NSW, Australia.

Objective: To summarize evidence on effective home programme intervention for adults and describe characteristics of successful home programmes. **Data sources:** A search was conducted of MEDLINE, CINAHL, PsycINFO, EMBASE, DARE, The Physiotherapy Evidence Database, Cochrane Database of Systematic Reviews, OTSeeker and Google Scholar and references in manuscripts retrieved. **Review methods:** Two independent reviewers determined whether retrieved study abstracts met inclusion criteria: human subjects; adults; home programme intervention; systematic reviews, randomized controlled trials or controlled trials. Included papers were appraised for study design, participants, type and intensity of intervention, and outcomes. Methodological quality of trials was rated using the PEDro scale (1-10 highest). **Results:** Thirty-two papers were retrieved (6 systematic reviews, 26 trials). The 23 randomized controlled trials and 3 controlled trials were appraised. All the retrieved papers were level 1a, 1b or 2b evidence. Major findings were: (a) home programme intervention was more effective than no intervention at all; (b) home programme intervention was equally effective to expert-provided therapy, except when therapeutic modalities were used; and (c) different instruction formats produced similar outcomes. Home programmes with favourable outcomes were more likely to: involve the patients in establishing the programme; intervene on the person, task and environment; and provide feedback about progress. Dose did not

appear to be related to outcome. Conclusion: There is grade 1A evidence supporting the effectiveness of home programmes for adults. Home programmes are as effective as expert-provided therapy.

PMID: 21831927 [PubMed - as supplied by publisher]

13. *Acta Paediatr.* 2011 Aug 8. doi: 10.1111/j.1651-2227.2011.02437.x. [Epub ahead of print]

Incidence and Pattern of Hearing Impairment in Children with \leq 800 Gram Birth Weight in British Columbia, Canada.

Synnes AR, Anson S, Baum J, Usher L.

Department of Pediatrics, University of British Columbia, Vancouver, BC, Canada Child and Family Research Institute, Vancouver, BC, Canada Neonatal Follow-Up Program, Children's & Women's Health Centre of British Columbia, Vancouver, BC, Canada Audiology and Speech Sciences, University of British Columbia, Vancouver, BC, Canada.

Aim: Evaluate changes over time in the characteristics of permanent hearing impairment (HI) in extremely low birth weight (ELBW < 800 grams) children. **Methods:** Data from sequential visits up to 5 years of age assessing hearing and other neurodevelopmental outcomes was extracted from a cohort of ELBW subjects born 1983-2006 at a single Canadian site. Trends in HI incidence, severity, and association with other impairments were analyzed in three 8 year epochs. **Results:** Fifty of 586 ELBW children had a HI. HI rates increased from 5% in epoch 1 to 7% in epoch 2 to 13% in epoch 3 ($p = 0.01$). Mild HI decreased from 78% in epoch 1 to 35% in epoch 3 ($p = 0.03$). Median age at diagnosis decreased from 13 to 8 months. Comorbidities were more common in HI children than non HI children: cerebral palsy (40% vs 14%, $p < 0.0001$), cognitive (38% vs 12%, $p < 0.0001$) and visual impairments (16% vs 6%, $p = 0.009$). **Conclusion:** The incidence and severity of hearing impairment in a cohort of extremely low birth weight children increased significantly from 5% to 13% ($p = 0.01$) over a 24 year period. Comorbidities were common. Potentially modifiable causes are explored.

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PMID: 21824192 [PubMed - as supplied by publisher]

14. *Clin Nutr.* 2011 Aug 10. [Epub ahead of print]

The effect of protein composition in liquid meals on gastric emptying rate in children with cerebral palsy.

Brun AC, Størdal K, Johannesdottir GB, Bentsen BS, Medhus AW.

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BACKGROUND & AIM: Dysmotility, nausea and vomiting are common among children with cerebral palsy. This study aimed to evaluate influence of protein composition on rate of gastric emptying and study the relation between gastric emptying and postprandial gastrointestinal symptoms. **METHODS:** 15 children with cerebral palsy, using gastrostomy, received four liquid test meals on separate days in random order. The meals contained a standard carbohydrate and fat base plus one of four protein modules (100% casein (A), hydrolysed whey (B), amino acids (C) and 40% casein/60% whey (D)) with a total energy of 1 kcal/ml. The (13 C) octanoic acid breath test was applied to assess gastric emptying. **RESULTS:** When comparing half emptying time ($T(1/2)$) of the fast emptying meals (meal B, C and D) with the slowest emptying meal (meal A), more rapid emptying was demonstrated for meal D ($p < 0.001$). For meal D, emptying was significantly faster in children with postprandial symptoms than in those without ($p < 0.01$). **CONCLUSION:** In children with cerebral palsy using gastrostomy, gastric emptying is influenced by type of protein in the meal. The present results also suggest that there is a relation between rapid gastric emptying and postprandial gastrointestinal symptoms.

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PMID: 21835514 [PubMed - as supplied by publisher]

15. J Child Health Care. 2011 Aug 9. [Epub ahead of print]**Special needs require special attention: A pilot project implementing the paediatric pain profile for children with profound neurological impairment in an in-patient setting following surgery.**

Hunt KA, Franck LS.

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There is a lack of knowledge regarding the implementation of pain assessment tools for children with profound neurological impairment (PNI) in in-patient settings. This article describes a pilot project to evaluate the Paediatric Pain Profile (PPP) for children with PNI undergoing surgery. Five families of children 5 to 16 years of age with a primary diagnosis of cerebral palsy and admitted for surgical procedures were interviewed. Nineteen nurses completed questionnaires and children's pain management documentation was audited. The project identified issues in three areas of pain management: implementation process, individualised pain management and partnership. The PPP required pre-admission assessment and parental involvement, and was considered time-consuming by nurses. Individualised pain assessment and intervention was difficult to achieve, as was shared assessment and documentation among parents and nurses. Despite initial resistance to change, with greater use there was growing appreciation of the value of components of the PPP. Further exploration of the PPP tool in practice is required before its use can be widely recommended for children with PNI in in-patient settings. Future studies are required to determine which of the available pain assessment tools has the greatest accuracy and utility for assessment of post-operative pain in children with PNI.

PMID: 21828163 [PubMed - as supplied by publisher]

16. Pediatr Neurol. 2011 Sep;45(3):163-8.**Quality of life in children and adolescents with cerebral palsy and myelomeningocele.**

Okurowska-Zawada B, Kułak W, Otapowicz D, Sienkiewicz D, Paszko-Patej G, Wojtkowski J.

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

The aim of this study was to compare health-related quality of life in children with cerebral palsy and with myelomeningocele. Fifty-seven children with spastic cerebral palsy and 34 patients with myelomeningocele aged 5-16 years were included in the study. Their mothers completed standardized measures on the Revidierter Kinder Lebensqualitätsfragebogen (KINDL-R) parent questionnaire. The 2 groups were demographically comparable. The children with cerebral palsy were classified more frequently into levels II (n = 24) and III (n = 18) of the Gross Motor Function Classification System. Other patients were classified into levels IV (n = 5) and V (n = 10). Three patients with myelomeningocele were community walkers, 10 could walk with assistive devices, and 21 used a wheelchair. Lesion level was thoracic in 13 patients, lumbar in 17, and sacral in 4. Twenty-nine patients (85.3%) with myelomeningocele had hydrocephalus, and 27 had a shunt. Parents in the both studied groups reported similar overall quality of life of their children in the dimensions of physical and emotional well-being, self-esteem, family, friends, and school. No significant correlations between the quality-of-life scores and age, walking ability, and mental development of the studied groups were found.

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PMID: 21824563 [PubMed - in process]

17. Pediatr Phys Ther. 2011 Fall;23(3):301-8.**Effect of Hippotherapy on Perceived Self-competence and Participation in a Child With Cerebral Palsy.**

Frank A, McCloskey S, Dole RL.

Quest Therapeutic Services, Inc. (Dr Frank and Ms McCloskey), West Chester, Pennsylvania; Institute for Physical Therapy Education, Widener University (Dr Dole), Chester, Pennsylvania.

This case report highlights changes in self-competence and social acceptance, along with changes in functional skills, after an 8-week program of hippotherapy. A 6-year-old girl with mild ataxic cerebral palsy, level I Gross Motor Functional Classification System, exhibited typical impairments in body systems and functions that affected her participation in age-appropriate functional and leisure activities. The child's performance on the Gross Motor Function Measure-66, the Pediatric Outcomes Data Collection Instrument, and the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children were examined at baseline, after the 8-week intervention, and at a 2-month follow-up session. Data at 8 weeks demonstrated positive changes in all areas, with improvements continuing for 2 months after the program's completion. Hippotherapy not only may be an effective intervention to improve functional gross motor development but also may affect perceived self-competence and social acceptance, which may lead to increases in participation for children with mild cerebral palsy.

PMID: 21829130 [PubMed - in process]

18. Indian J Pediatr. 2011 Aug 10. [Epub ahead of print]

Neurofacilitation of Developmental Reaction (NFDR) Approach: A Practice Framework for Integration / Modification of Early Motor Behavior (Primitive Reflexes) in Cerebral Palsy.

Batra M, Sharma VP, Batra V, Malik GK, Pandey RM.

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A Randomized Controlled trial was done on 30 (CP) children of age range 6 mon to 2 y with an objective to see the efficacy of Neurofacilitation of Developmental Reaction (NFDR) approach over Neurodevelopmental Therapy (NDT) for integration / modification of early motor behavior (Primitive Reflexes) in Cerebral Palsy (CP). The baseline evaluation was done for tone, postural reactions and GMFM. The subjects were randomly allocated to two groups. With group A, NFDR and group B, conventional approach (NDT) was used for 3 mon followed by re-evaluation. Between groups analysis was done and p value was found to be significant. It was concluded that NFDR approach is more effective than NDT for integration / modification of early motor behavior in children with CP.

PMID: 21830022 [PubMed - as supplied by publisher]

Prevention and Cure

19. Early Hum Dev. 2011 Aug 9. [Epub ahead of print]

Long-term neurological outcome of term-born children treated with two or more anti-epileptic drugs during the neonatal period.

van der Heide MJ, Roze E, van der Veere CN, Ter Horst HJ, Brouwer OF, Bos AF.

Division of Neonatology, Beatrix Children's Hospital, University Medical Center Groningen, University of Groningen, Groningen, The Netherlands.

BACKGROUND: Neonatal seizures may persist despite treatment with multiple anti-epileptic drugs (AEDs). **OBJECTIVE:** To determine in term-born infants with seizures that required two or more AEDs, whether treatment efficacy and/or the underlying disorder were related to neurological outcome. **DESIGN/METHODS:** We included 82 children (born 1998-2006) treated for neonatal seizures. We recorded mortality, aetiology of seizures, the number of AEDs required, achievement of seizure control, and amplitude-integrated-EEG (aEEG) background patterns. Follow-up consisted of an age-adequate neurological examination. Surviving children were classified as normal, having mild neurological abnormalities, or cerebral palsy (CP). **RESULTS:** Forty-seven infants (57%) had status epilepticus. The number of AEDs was not related to neurological outcome. Treatment with three or four AEDs as opposed to two showed a trend towards an increased risk of a poor outcome, i.e., death or CP, odds ratio (OR) 2.74; 95% confidence interval (CI) 0.98-7.69; $P=.055$. Failure to achieve seizure control increased the risk of poor outcome, OR 6.77; 95%-CI 1.42-32.82, $P=.016$. Persistently severely abnormal aEEG background patterns also increased this risk, OR 3.19; 95%-CI 1.90-5.36; $P<.001$. In a multivariate model including abnormal aEEG background patterns, failure to achieve seizure control nearly reached significance towards an increased risk of poor outcome, OR 5.72, 95%-CI 0.99-32.97, $P=.051$. We found no association between seizure aetiology and outcome. **CONCLUSIONS:** In term-born infants with seizures that required two or more AEDs outcome was poorer if seizure control failed. The number of AEDs required to reach seizure control and seizure aetiology had limited prognostic value.

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PMID: 21835564 [PubMed - as supplied by publisher]

20. Early Hum Dev. 2011 Aug 8. [Epub ahead of print]

Long-term neurodevelopmental outcome in monozygotic twins after fetal therapy.

van Klink JM, Koopman HM, Oepkes D, Walther FJ, Lopriore E.

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Monozygotic (MC) twins are at risk for several disorders, including twin-twin transfusion syndrome (TTTS), Twin Reverse Arterial Perfusion (TRAP) and selective intrauterine growth restriction (sIUGR). Several fetal interventions, such as serial amnioreduction (AR), fetoscopic laser coagulation of placental anastomoses (FLC) and selective feticide have lead to improved perinatal morbidity and mortality rates. Nevertheless, the rate of cerebral lesions in MC twins after fetal therapy appears to be high. Follow-up studies show a high incidence of cerebral palsy (CP) and neurodevelopmental impairment (NDI). We performed a systematic review on the long-term neurodevelopmental outcome in MC twins with TTTS following AR and FLC and MC twins following selective feticide of the co-twin due to TTTS, TRAP, sIUGR and congenital anomalies.

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PMID: 21831543 [PubMed - as supplied by publisher]

21. Eur J Paediatr Neurol. 2011 Aug 9. [Epub ahead of print]**Movement disorder emergencies in childhood.**

Kirkham FJ, Haywood P, Kaypashe P, Borbone J, Lording A, Pryde K, Cox M, Keslake J, Smith M, Cuthbertson L, Murugan V, Mackie S, Thomas NH, Whitney A, Forrest KM, Parker A, Forsyth R, Kipps CM.

Southampton University Hospitals NHS Trust, UK; Clinical Neurosciences, University of Southampton, UK; UCL Institute of Child Health, London, UK.

The literature on paediatric acute-onset movement disorders is scattered. In a prospective cohort of 52 children (21 male; age range 2mo-15y), the commonest were chorea, dystonia, tremor, myoclonus, and Parkinsonism in descending order of frequency. In this series of mainly previously well children with cryptogenic acute movement disorders, three groups were recognised: (1) Psychogenic disorders (n = 12), typically >10 years of age, more likely to be female and to have tremor and myoclonus (2) Inflammatory or autoimmune disorders (n = 22), including N-methyl-d-aspartate receptor encephalitis, opsoclonus-myoclonus, Sydenham chorea, systemic lupus erythematosus, acute necrotizing encephalopathy (which may be autosomal dominant), and other encephalitides and (3) Non-inflammatory disorders (n = 18), including drug-induced movement disorder, post-pump chorea, metabolic, e.g. glutaric aciduria, and vascular disease, e.g. moyamoya. Other important non-inflammatory movement disorders, typically seen in symptomatic children with underlying aetiologies such as trauma, severe cerebral palsy, epileptic encephalopathy, Down syndrome and Rett syndrome, include dystonic posturing secondary to gastro-oesophageal reflux (Sandifer syndrome) and Paroxysmal Autonomic Instability with Dystonia (PAID) or autonomic 'storming'. Status dystonicus may present in children with known extrapyramidal disorders, such as cerebral palsy or during changes in management e.g. introduction or withdrawal of neuroleptic drugs or failure of intrathecal baclofen infusion; the main risk in terms of mortality is renal failure from rhabdomyolysis. Although the evidence base is weak, as many of the inflammatory/autoimmune conditions are treatable with steroids, immunoglobulin, plasmapheresis, or cyclophosphamide, it is important to make an early diagnosis where possible. Outcome in survivors is variable. Using illustrative case histories, this review draws attention to the practical difficulties in diagnosis and management of this important group of patients.

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22. J Perinat Med. 2011 Aug 11. [Epub ahead of print]**Immediate clinical outcomes in preterm neonates receiving antenatal magnesium for neuroprotection.**

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Background: Antenatal magnesium sulfate can potentially reduce the risk of cerebral palsy in neonates delivered between 24 and 32 weeks of gestational age. Some studies using high-dose magnesium sulfate for neuroprotection have reported increased perinatal mortality. Methods: A retrospective study was conducted on 475 neonates born between 24 and 32 weeks of gestational age. Serum magnesium level in the first 24 h of life was used to stratify the neonates treated with antenatal magnesium into four subgroups: A (<2.5 mEq/L), B (\geq 2.5 to <3.5 mEq/L), C (\geq 3.5 to <4.5 mEq/L), and D (\geq 4.5 mEq/L). Primary outcome of survival without intraventricular hemorrhage (IVH) and/or periventricular leukomalacia (PVL) along with secondary outcomes, such as Apgar scores, resuscitation, intubation, broncho-pulmonary dysplasia, retinopathy of prematurity (ROP), patent ductus arteriosus (PDA), time to reach full feeds, length of stay (LOS), and mortality during immediate neonatal period were studied. Results: Of the 475 neonates included in the study, 289 (61%) received antenatal magnesium sulfate. Primary outcome of survival without IVH and/or PVL among the preterm neonates was 70.9% in those receiving and 74.2% in those not receiving antenatal magnesium (P=0.25). There were higher incidences of ROP (P=0.02), PDA (P=0.01), greater time to reach full feeds (P=0.03), and increased LOS (P=0.01) in neonates who had received antenatal magnesium. These findings were not statistically significant when the data were corrected for gestational age and birth weight. Among the subgroups, there was a significantly increased mortality rate (P<0.05) with increasing magnesium levels (5% vs. 16.9%, P<0.05 in groups A vs. D) and a trend toward higher intubation rate (P=0.1) and PDA (P=0.14). Conclusion: Antenatal magnesium is safe in the immediate postnatal period; however, in the subset of preterm

neonates with serum magnesium levels >4.5 mEq/L, there is increased mortality independent of birth weight and gestational age. Identification of these neonates and appropriate dosing for their antenatal neuroprotection needs to be studied.

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23. Lab Anim Res. 2011 Jun;27(2):77-84. Epub 2011 Jun 22.

Animal models of periventricular leukomalacia.

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Periventricular leukomalacia, specifically characterized as white matter injury, in neonates is strongly associated with the damage of pre-myelinating oligodendrocytes. Clinical data suggest that hypoxia-ischemia during delivery and intrauterine or neonatal infection-inflammation are important factors in the etiology of periventricular leukomalacia including cerebral palsy, a serious case exhibiting neurobehavioral deficits of periventricular leukomalacia. In order to explore the pathophysiological mechanisms of white matter injury and to better understand how infectious agents may affect the vulnerability of the immature brain to injury, novel animal models have been developed using hypoperfusion, microbes or bacterial products (lipopolysaccharide) and excitotoxins. Such efforts have developed rat models that produce predominantly white matter lesions by adopting combined hypoxia-ischemia technique on postnatal days 1-7, in which unilateral or bilateral carotid arteries of animals are occluded (ischemia) followed by 1-2 hour exposure to 6-8% oxygen environment (hypoxia). Furthermore, low doses of lipopolysaccharide that by themselves have no adverse-effects in 7-day-old rats, dramatically increase brain injury to hypoxic-ischemic challenge, implying that inflammation sensitizes the immature central nervous system. Therefore, among numerous models of periventricular leukomalacia, combination of hypoxia-ischemia-lipopolysaccharide might be one of the most-acceptable rodent models to induce extensive white matter injury and ensuing neurobehavioral deficits for the evaluation of candidate therapeutics.

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24. Neurology. 2011 Aug 10. [Epub ahead of print]

Diffusion MRI in corticofugal fibers correlates with hand function in unilateral cerebral palsy.

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Diffusion MRI improves detection of abnormalities in white matter tracts in cerebral palsy (CP). Relationships between diffusion measurements and hand function are largely unexplored. We aimed first to assess microstructure of corticofugal fibers, and second to explore associations between tract injury as assessed by quantitative analysis of diffusion MRI and hand function in children with unilateral CP. **METHODS:** In this cross-sectional study, 15 children with unilateral CP (6 boys, median age 12.4 years, min 7.2, max 17) and 24 controls were included (9 boys, median age 12.7 years, min 8.8, max 17.3). Hand function was assessed with the Box and Blocks (B&B) test. Magnetic resonance diffusion data (b value = 1,000 s/mm², 45 directions) were collected on a 1.5-T scanner. Fractional anisotropy (FA), mean diffusivity (MD), and tensor eigenvalues were measured bilaterally in the cerebral peduncle (ROI1), the posterior limb of the internal capsule (PLIC, ROI2), and corticofugal fibers connecting these regions. **RESULTS:** In children with CP, FA in both ROIs and the partial tract corresponding to the affected hand was significantly lower compared to controls. This was caused by an increase in diffusivity perpendicular to the tract. After controlling for age, mean FA contralateral to the affected hand correlated with B&B scores, which was independent of lesion type or number of voxels in the partial tract, cerebral peduncle, or PLIC. **CONCLUSIONS:** FA

in corticofugal fibers is a sensitive marker of damage to the motor system and correlates with hand function in CP. Using FA may improve early prediction of outcome.

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25. Radiology. 2011 Aug 9. [Epub ahead of print]

MR Imaging and Outcome of Term Neonates with Perinatal Asphyxia: Value of Diffusion-weighted MR Imaging and 1H MR Spectroscopy.

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Purpose: To compare the association between neurodevelopmental outcome in neonates with hypoxic-ischemic encephalopathy following perinatal asphyxia and (a) apparent diffusion coefficients (ADCs) in the thalamus and basal ganglia at diffusion-weighted (DW) magnetic resonance (MR) imaging and (b) hydrogen 1 ((1)H) MR spectroscopic measurements in the basal ganglia. **Materials and Methods:** This retrospective study was approved by the local ethics committee, and the requirement to obtain informed consent was waived. Eighty-one term neonates with perinatal asphyxia underwent conventional and DW cranial MR imaging (median age, 4 days; age range, 1-14 days); 51 neonates also underwent (1)H MR spectroscopy. Neurodevelopment was assessed from 18 to 46 months. Patients with favorable and adverse outcomes were compared. Receiver operating characteristics analysis was performed in all patients, and uni- and multivariate logistic regression analyses were performed in 44 patients examined within 7 days of birth by using MR imaging scores, ADCs in the basal ganglia and thalamus, and (1)H MR spectroscopic measurements in the basal ganglia. **Results:** An adverse outcome was seen in 28 of all 81 neonates (20 died, seven developed cerebral palsy, and one had severe mental retardation) and 22 of the 44 neonates examined within 7 days of birth with both ADC and (1)H MR spectroscopy. Poor outcome was associated with (a) lower ADCs in the basal ganglia ($P < .001$) and thalamus ($P = .001$) of neonates examined within 7 days of birth and (b) a higher lactate (Lac)-N-acetylaspartate (NAA) ratio in the basal ganglia ($P < .001$). Multivariate analysis showed that MR imaging score combined with Lac/NAA ratios or ADCs in the basal ganglia within the 1st week of life had a better association with outcome than did MR imaging alone ($P = .006$, area under the receiver operating characteristic curve [AUC] = 0.85 with Lac/NAA ratio; $P < .0001$, AUC = 0.93 with ADCs in basal ganglia). **Conclusion:** The combination of MR imaging score with ADCs or Lac/NAA ratios in the basal ganglia has a better association with outcome of asphyxiated term neonates than does MR imaging alone. © RSNA, 2011

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26. Pediatr Neurosurg. 2011 Aug 4. [Epub ahead of print]

Unusual Case of 'Trapped Fourth Ventricle' in a Child with Posthemorrhagic Hydrocephalus - Lessons Learnt.

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In most of the children with posthemorrhagic hydrocephalus (PHH), multidisciplinary follow-up is performed, with the focus on consequences of prematurity, cerebral palsy (CP) and hydrocephalus. A large fourth ventricle is common in these children but imaging performed in order to document ventricles and tissue damage is not oriented to exclude coexisting rare pathologies. We report a 3-year-old child with spastic CP, secondary to prematurity and PHH. A ventriculoperitoneal shunt was inserted at the age of 2 months. On follow-up imaging the child demonstrated well-drained supratentorial ventricles with a persistent large fourth ventricle. Because of a neurological change in spasticity and new-onset torticollis, a repeat MRI was performed, suggesting a cystic, nonenhancing lesion of the fourth ventricle. The surgical exploration revealed a large dermoid of the fourth

ventricle. We analyze the differential diagnosis of a clinically significant large fourth ventricle in a shunted child with PHH and CP. This includes conditions without pressure in the posterior fossa such as tissue loss due to cerebellar atrophy, or pathologies causing a true increase in pressure of the fourth ventricle (isolated fourth ventricle, cystic lesions and neoplasms of the fourth ventricle). Neurologically compromised children pose additional challenges in reaching a definitive diagnosis and hence require a careful regular assessment of their clinical status with additional well-timed imaging with appropriate protocols to allow appropriate treatment when indicated and to avoid morbidity due to delayed diagnosis. We present a rare coexistence of a dermoid tumor within the fourth ventricle in a CP child with PHH and express the dilemmas associated with its management.

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