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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. Aust Occup Ther J. 2010 Dec;57(6):444-5. doi: 10.1111/j.1440-1630.2010.00907.x.

Eight weeks of occupational therapy home programme, compared to no programme, resulted in improved achievement of child and family-selected goals by children with cerebral palsy.

Imms C, Cowan R, Ertekin E, Klein GL, Galvin J.

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PMID: 21091712 [PubMed - in process]

2. Aust Occup Ther J. 2010 Dec;57(6):386-93. doi: 10.1111/j.1440-1630.2010.00861.x.

The effect of Education with workplace supports on practitioners' evidence-based practice knowledge and implementation behaviours.

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Background/aim: Individual and workplace barriers affect uptake of evidence-based practice (EBP). This study evaluated the effects of a 1-day workshop with workplace supports on allied health professionals' EBP knowledge and behaviour. Methods: A prospective longitudinal pre-post design was used. A total of 88 allied health professionals participated. Knowledge was measured using the Adapted Fresno Test (AFT), behaviour was measured using frequency counts of presentations using EBP methodologies and critically appraised topics (CATs) were produced. Mean differences were analysed using paired t-tests. Results: EBP knowledge significantly improved immediately after education on the AFT (from 36.67 to 46.84/156) a mean change of 10.17 points (95% confidence interval (CI): 7.19-13.50) ($P < 0.001$). Behaviour also changed over 18 months. EBP content in presentations increased from 3 to 100% ($t = 24.39$, $P < 0.001$, 95%CI: 0.86-1.03). CATs produced significantly increased by 0.26 per head ($t = 5.55$, $P < 0.001$, 95% CI: 0.17-0.35). Conclusions: Education with workplace supports (supervision, incentives, resource allocation and working groups) may lead to improvements in EBP knowledge and implementation.

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PMID: 21091704 [PubMed - in process]

3. Implement Sci. 2010 Nov 23;5(1):92. [Epub ahead of print]

Using knowledge brokers to facilitate the uptake of pediatric measurement tools into clinical practice: A before-after intervention study.

Russell DJ, Rivard LM, Walter SD, Rosenbaum PL, Roxborough L, Cameron D, Darrah J, Bartlett DJ, Hanna SE, Avery LM.

BACKGROUND: The use of measurement tools is an essential part of good evidence-based practice; however, physiotherapists (PTs) are not always confident when selecting, administering, and interpreting these tools. The purpose of this study was to evaluate the impact of a multifaceted knowledge translation intervention, using PTs as Knowledge Brokers (KBs) to facilitate the use in clinical practice of four evidence-based measurement tools designed to evaluate and understand motor function in children with cerebral palsy (CP). The KB model evaluated in this study was designed to overcome many of the barriers to research transfer identified in the literature.

METHODS: A mixed methods before-after study design was used to evaluate the impact of a 6-month KB intervention by 25 KBs on 122 practicing PTs' self-reported knowledge and use of the measurement tools in 28 children's rehabilitation organizations in two regions of Canada. The model was that of PT KBs situated in clinical sites supported by a network of KBs and the research team through a Broker to the KBs. Modest financial remuneration to the organizations for the KB time (2 hours/week for 6 months), ongoing resource materials, and personal and internet support was provided to the KBs. Survey data were collected by questionnaire prior to, immediately following the intervention (6 months), and at 12 and 18 months. A mixed effects multinomial logistic regression was used to examine the impact of the intervention over time and by region. The impact of organizational factors was also explored. **RESULTS:** PTs' self-reported knowledge of all four measurement tools increased significantly over the 6 month intervention, and reported use of three of the four measurement tools also increased. Changes were sustained 12 months later. Organizational culture for research and supervisor expectations were significantly associated with uptake of only one of the four measurement tools. **CONCLUSIONS:** KBs positively influenced PTs' self-reported knowledge and self-reported use of the targeted measurement tools. Further research is warranted to investigate whether this is a feasible, cost-effective model that could be used more broadly in a rehabilitation setting to facilitate the uptake of other measurement tools or evidence-based intervention approaches.

PMID: 21092283 [PubMed - as supplied by publisher]Free Article

4. Comput Inform Nurs. 2011 Jan-Feb;29(1):34-5.

Computer-mediated support for adolescents with cerebral palsy or spina bifida.

[No authors listed]

PMID: 21099542 [PubMed - in process]

5. Comput Inform Nurs. 2011 Jan-Feb;29(1):24-33.

Computer-mediated support for adolescents with cerebral palsy or spina bifida.

Barnfather A, Stewart M, Magill-Evans J, Ray L, Letourneau N.

Author Affiliations: Social Support Research Program (Ms Barnfather), Faculty of Nursing (Drs Stewart and Ray), and Department of Occupational Therapy (Dr Magill-Evans), University of Alberta, Edmonton; and Faculty of Nursing, University of New Brunswick, Fredericton (Dr Letourneau), Canada.

Social support plays a key role in improving health outcomes for children with chronic conditions. Internet connections are an important component of adolescents' social networks and may overcome geographic and environmental barriers for those with disabilities. This article focuses on the processes associated with a 6-month online support intervention for adolescents with cerebral palsy or spina bifida. Specifically, the purpose was to determine the extent to which adolescents used an online peer support intervention, the processes used, and the perceived benefits and satisfaction with the intervention. Five peer mentors with the same disabilities provided information, affirmation, and emotional support. The online environment created a safe space to foster reciprocal interpersonal connections and appropriate social comparison. Two-thirds of the participants viewed the computer-mediated sup-

port intervention as fun. Factors influencing the perceived utility of the intervention included typing speed, cognitive skills, and perceived need for additional support. Girls were significantly more likely to contribute messages than were boys. Peer mentors wished that this type of support program had been available when they were teens, appreciated the supportive elements, and reported learning from the teen participants. Health professionals wanting to implement online support need to consider the age and ability levels of participants and the optimal length and format of the support program.

PMID: 21099541 [PubMed - in process]

6. Conf Proc IEEE Eng Med Biol Soc. 2010;1:3962-5.

Bi-planar postural stability model: Fitting model parameters to patient data automatically.

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Postural control can be a challenging task for many people, including those with cerebral palsy or idiopathic scoliosis. Assessment of postural stability can be used as one element of a comprehensive strategy to identify more efficient treatments and can provide a better understanding of postural control deficits. Several models and techniques have been developed to assess and understand postural imbalance. This study presents an improvement for an existing model that incorporates two algorithms designed to minimize a cost function.

PMID: 21097269 [PubMed - in process]

7. Conf Proc IEEE Eng Med Biol Soc. 2010;1:3410-3.

Abnormal adaptation in children affected by cerebral palsy to robot generated dynamic environment.

Masia L, Frascairelli F, Morasso P, Di Rosa G, Petrarca M, Castelli E, Cappa P.

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This paper aims to investigate how robotic devices can be used to understand the mechanism of sensorimotor adaptation in pediatric subjects affected by hemiparetic cerebral palsy. Previous studies showed how healthy adults, after training in presence of a systematic structured disturbing force field, show an "after effect" and therefore they highly adapt and compensate the external disturbance. An open issue is whether this adaptive capability is preserved or disrupted in pediatric impaired subjects when they experience a robot generated dynamic environment. Fourteen pediatric Cerebral Palsy subjects (CP group), and age-matched control group were exposed to a robot generated speed-dependant force field; during familiarization (no forces generated by the robot) the movement of the CP subjects were more curved, displaying greater and variable directional error; in the force field phase both the groups showed an after-effect, but the CP group had a non significant adaptation rate. This outcome suggests the CP subjects have reduced ability to learn external force and they make greater aiming error because of an inefficient anticipatory strategy during visuomotor task.

PMID: 21097248 [PubMed - in process]

8. Conf Proc IEEE Eng Med Biol Soc. 2010;1:3946-9.

Angle estimation of human femora in a three-dimensional virtual environment.

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The estimation of human femur morphology and angulation provide useful information for assisted surgery, follow-up evaluation and prosthesis design, cerebral palsy management, congenital dislocation of the hip and fractures of

the femur. Conventional methods that estimate femoral neck anteversion employ planar projections because accurate 3D estimations require complex reconstruction routines. In a recent work, we proposed a cylinder fitting method to estimate bifurcation angles in coronary arteries and we thought to test it in the estimation of femoral neck anteversion, valgus and shaft-neck angles. Femora from 10 patients were scanned using multisliced computed tomography. Virtual cylinders were fitted to 3 regions of the bone painted by the user to automatically estimate the femoral angles. Comparisons were made with a conventional manual method. Inter- and intra-reading measurements were evaluated for each method. We found femoral angles from both methods strongly correlated. Average anteversion, neck-shaft and valgus angles were 17.5°, 139.5°, 99.1°, respectively. The repeatability and reproducibility of the automated method showed a 5-fold reduction in inter- and intra-reading variability. Accordingly, the coefficients of variation for the manual method were below 25% whereas for the automated method were below 6%. The valgus angle assessment was globally the most accurate with differences below 1°. Maximum distances from true surface bone points and fitting cylinders attained 6 mm. The employment of virtual cylinders fitted to different regions of human femora consistently helped to assess true 3D angulations.

PMID: 21097090 [PubMed - in process]

9. Conf Proc IEEE Eng Med Biol Soc. 2010;1:2271-4.

Enhancing robotic gait training via augmented feedback.

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Recent work has examined the feasibility of robotic-assisted gait training in pediatric patients, including children with cerebral palsy (CP). Herein we present a case series describing clinical outcomes in four children with CP who underwent gait training using a robotic driven gait orthosis (DGO) (Pediatric Lokomat®). Children had a diagnosis of spastic diplegia due to CP. They were paired based on functional abilities and observed gait characteristics. Two children had a GMFCS of III and showed excessive ankle plantarflexion during stance. The other two children had a GMFCS of II and displayed a crouch gait pattern. Each subject participated in a 6-week intervention of robotic-assisted gait training that involved three 30-minute sessions per week. Pre-and post-training evaluations were performed including clinical tests of standing and walking function, walking speed, and walking endurance. Clinical gait analysis was also performed using a motion capture system to assess changes in gait mechanics. All subjects showed an improvement in locomotor function. For lower functioning children, this may be mediated by improved trunk control. The use of augmented feedback was associated with larger. However, these results have to be considered with caution because of the limited sample size of the study.

PMID: 21097013 [PubMed - in process]

10. Conf Proc IEEE Eng Med Biol Soc. 2010;1:5895-8.

Vision based interface: an alternative tool for children with cerebral palsy.

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In this paper a new vision based interface (VBI) for children with cerebral palsy is presented. The VBI is implemented for the interaction between children and computer. The VBI detects and tracks the movement of the hand, foot or head of the user. These movements are translated into movements of the cursor on the screen of the computer. The evaluation of system user-VBI is based on HAAT model. The experimental results show four case studies of children, when they carried out different tasks with the computer.

PMID: 21096933 [PubMed - in process]

11. Conf Proc IEEE Eng Med Biol Soc. 2010;1:4221-5.**BCI control using 4 direction spatial visual attention and real-time fMRI at 7T.**

Andersson P, Ramsey NF, Pluim JP, Viergever MA.

Image Sciences Institute, University Medical Center Utrecht, The Netherlands.

The goal of Brain-Computer-Interface (BCI) technologies is to "outsource" the muscular control to a computer and create new communication channels, e.g. to people with severe paralysis, by measuring cortical activation changes and linking these changes to commands. Using real-time fMRI at 7T we show that visuospatial attention can be used to reliably regulate cortical activity and that it is possible to separate the cortical responses to multiple attention target regions in real time. The activated regions were first located on the fly using an incremental statistical analysis and the subjects were then given feedback based on the activity in these regions. Visuospatial attention is an attractive addition to the existing BCI control strategies, and the fact that it leaves the motor system still available makes it suitable also for applications aimed for healthy people.

PMID: 21096898 [PubMed - in process]

12. Conf Proc IEEE Eng Med Biol Soc. 2010;1:4176-80.**Towards a brain controlled assistive technology for powered mobility.**

Kaneswaran K, Arshak K, Burke E, Condron J.

Engineering from the University of Limerick, Ireland.

For individuals with mobility limitations, powered wheelchair systems provide improved functionality, increased access to healthcare, education and social activities. Input devices such as joystick and switches can provide the necessary input required for efficient control of the powered wheelchair. For persons with limited dexterity, or fine control of the fingers, access to mechanical hardware such as buttons and joysticks can be quite difficult and sometimes painful. For individuals with conditions such as Traumatic Brain Injury (TBI), Multiple Sclerosis (MS) or Amyotrophic lateral sclerosis (ALS) voluntary control of limb movement maybe substantially limited or completely absent. Brain Computer Interfaces (BCI) are emerging as a possible method to replace the brains normal output pathways of peripheral nerves and muscles, allowing individuals with paralysis a method of communication and computer control. This study involves the analysis of non-invasive electroencephalograms (EEG) arising from the use of a newly developed Human Machine Interface (HMI) for powered wheelchair control. Using a delayed response task, binary classification of left and right movement intentions were classified with a best classification rate of 81.63% from single trial EEG. Results suggest that this method may be used to enhance control of HMI's for individuals with severe mobility limitations.

PMID: 21096887 [PubMed - in process]

13. Conf Proc IEEE Eng Med Biol Soc. 2010;1:5030-3.**A miniature, wearable activity/fall monitor to assess the efficacy of mobility therapy for children with cerebral palsy during everyday living.**

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Children with cerebral palsy may have difficulty walking and may fall frequently, resulting in a decrease in their participation in school and community activities. It is desirable to assess the effectiveness of mobility therapies for these children on their functioning during everyday living. Over 50 hours of tri-axial accelerometer and digital video recordings from 35 children with cerebral palsy and 51 typically-developing children were analyzed to develop algorithms for automatic real-time processing of the accelerometer signals to monitor a child's level of activity and to

detect falls. The present fall-detection algorithm has 100% specificity and a sensitivity of 100% for falls involving trunk rotation. Sensitivities for drops to the knees and to the bottom are 72% and 78%, respectively. The activity and fall-detection algorithms were implemented in a miniature, battery-powered microcontroller-based activity/fall monitor that the child wears in a small fanny pack during everyday living. The monitor continuously logs 1-min. activity levels and the occurrence and characteristics of each fall for two-week recording sessions. Pre-therapy and post-therapy recordings from these monitors will be used to assess the efficacies of alternative treatments for gait abnormalities.

PMID: 21096464 [PubMed - in process]

14. Conf Proc IEEE Eng Med Biol Soc. 2010;1:1751-4.

Upper extremity rehabilitation of children with cerebral palsy using accelerometer feedback on a multi-touch display.

Dunne A, Do-Lenh S, O' Laighin G, Shen C, Bonato P.

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Cerebral palsy is a non-progressive neurological disorder caused by disturbances to the developing brain. Physical and occupational therapy, if started at a young age, can help minimizing complications such as joint contractures, and can improve limb range of motion and coordination. While current forms of therapy for children with cerebral palsy are effective in minimizing symptoms, many children find them boring or repetitive. We have designed a system for use in upper-extremity rehabilitation sessions, making use of a multitouch display. The system allows children to be engaged in interactive gaming scenarios, while intensively performing desired exercises. It supports games which require completion of specific stretching or coordination exercises using one or both hands, as well as games which use physical, or "tangible" input mechanisms. To encourage correct posture during therapeutic exercises, we use a wireless kinematic sensor, worn on the patient's trunk, as a feedback channel for the games. The system went through several phases of design, incorporating input from observations of therapy and clinical sessions, as well as feedback from medical professionals. This paper describes the hardware platform, presents the design objectives derived from our iterative design phases and meetings with clinical personnel, discusses our current game designs and identifies areas of future work.

PMID: 21096413 [PubMed - in process]

15. Conf Proc IEEE Eng Med Biol Soc. 2010;1:491-4.

Algorithms for target prediction for computer users with athetosis.

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Athetosis is a movement disorder that afflicts numerous persons with cerebral palsy, resulting in significant problems in their control of computer interfaces. As a step toward increasing the efficiency of icon selection by computer users with athetosis, we have implemented three techniques to reduce the time of target acquisition: transition assistance via directional gain variation based on target prediction during initial movement toward the target, settling assistance via gain reduction when in the vicinity of a predicted target, and expansion of the predicted target as the cursor approaches it. The paper describes each method, and presents results from evaluation of each method using a closed-loop model of a human subject with athetosis, trained using recorded data, at three different severity levels.

PMID: 21096307 [PubMed - in process]

16. Conf Proc IEEE Eng Med Biol Soc. 2010;1:5456-9.**Model to estimate hamstrings behavior in cerebral palsy patients: As a pre-surgical clinical diagnosis tool.**

Ravera EP, Crespo MJ, Catalfamo PA, Braidot AA.

Biomechanics Laboratory of Faculty of Engineering, National University of Entre Ríos, Oro Verde, 3101, Entre Ríos Argentina.

Crouch gait is the most common motion abnormality in children with cerebral palsy (CP). This paper presents a new biomechanical model based on a simple rescaling and adjustment to CP patients who develop crouch gait by subject-specific anthropometric data. The model estimates the length of hamstrings, as the distance between the origin and insertion of the muscle, and the velocity of shortening of hamstrings by the first derivative of the length with respect to time. This model has the potential to increase the benefits of three-dimensional biomechanical models as it can discriminate between short, spastic or normal hamstrings. The main advantage of this model in clinical use is that it does not require costly magnetic resonance imaging.

PMID: 21096283 [PubMed - in process]

17. Conf Proc IEEE Eng Med Biol Soc. 2010;1:5310-3.**Measurement of tendon velocities using vector Tissue Doppler Imaging: A feasibility study.**

Eranksi A, Bellini L, Prosser L, Stanley C, Bland D, Alter K, Damiano D, Sikdar S.

Department of Electrical and Computer Engineering, George Mason University, Fairfax, VA, USA 22030.

We have developed a vector Doppler ultrasound imaging method to directly quantify the magnitude and direction of muscle and tendon velocities during movement. The goal of this study was to evaluate the feasibility of using vector Tissue Doppler Imaging (vTDI) for estimating the tibialis anterior tendon velocities during dorsiflexion in children with cerebral palsy who have foot drop. Our preliminary results from this study show that tendon velocities estimated using vTDI have a strong linear correlation with the joint angular velocity estimated using a conventional 3D motion capture system. We observed a peak tendon velocity of 5.66 ± 1.45 cm/s during dorsiflexion and a peak velocity of 8.83 ± 2.13 cm/s during the passive relaxation phase of movement. We also obtained repeatable results from the same subject 3 weeks apart. Direct measurements of muscle and tendon velocities may be used as clinical outcome measures and for studying efficiency of movement control.

PMID: 21096066 [PubMed - in process]

18. Conf Proc IEEE Eng Med Biol Soc. 2010;1:4481-4.**Efficacy of robotic rehabilitation of ankle impairments in children with cerebral palsy.**

Wu YN, Ren Y, Hwang M, Gaebler-Spira DJ, Zhang LQ.

Rehabilitation Institute of Chicago, IL 60611, USA.

The current study introduces a novel rehabilitation robot for treatment of impaired ankle in children with cerebral palsy (CP). The treatment consisted of passive stretching under intelligent control and active movement training with motivating game-playing using the portable robot. After 18 sessions of training (3 sessions/week for 6 weeks), we found significant improvement in 12 children with CP in terms of improved passive and active ranges of motion, selective motor control and mobility functions. The positive outcomes of this study along with the improvements in motor control and functional activities suggest that robotic rehabilitation provides a useful and convenient option of treatment in clinic or patient home for more accessible and frequent rehabilitation.

PMID: 21095776 [PubMed - in process]

19. Disabil Rehabil. 2010 Nov 20. [Epub ahead of print]**Incidence and risk factors of hip joint pain in children with severe cerebral palsy.**

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Purpose. Pain is a serious complication associated with hip dislocation in cerebral palsy (CP), limiting patient independence and quality of life. This study aimed to determine the frequency of pain in severe CP patients with hip dislocation and to reveal factors associated with the hip pain. **Methods.** Seventy-three consecutive new-intervention CP patients admitted to authors' institution with spastic quadriplegia, mean age 10.8 years (range 4.0-18.0 years) were enrolled: 31 females and 42 males, totally 99 dislocated hips. All patients were assessed level IV or V according to the Gross Motor Function Classification Scale (GMFCS) and had poor communication skills. Pain severity was evaluated according to the Numeric Rating Scale (NRS-11). Data concerning previously applied physiotherapy was collected to divide the patients into subgroups: A - no abduction therapy (n = 24), B - abduction therapy (n = 35) and C - abduction therapy and horse-back riding (n = 13). On the pelvic antero-posterior radiographs head migration percentage was measured to reveal hip dislocation. Femoral head cartilage degenerative lesions were evaluated for size and location in 45 hips undergoing surgical treatment. **Results.** Overall pain prevalence was 56%. The appearance of pain was associated with the patient age (p = 0.048), previous abduction physiotherapy (p < 0.00001), previous horse-back riding therapy (p < 0.00001) and anterior location of degenerative changes of the femoral head (p = 0.03). Pain intensity was related to the size of the degenerative cartilage lesions (p = 0.004) and to the degree of femoral anteversion (p < 0.0001). **Conclusions.** Extensive abduction exercises, hippotherapy and presence of degenerative cartilage lesions on the anterior part of femoral head may be considered risk factors for hip pain appearance in the dislocated hip of a child with severe spastic CP. Other associated factors are abduction exercise intensity, age, excessive femoral anteversion and size of degenerative cartilage lesions.

PMID: 21091045 [PubMed - as supplied by publisher]

20. J Pediatr. 2010 Nov 19. [Epub ahead of print]**Hyperglycemia and Diabetes Mellitus in Children with Pancreatitis.**

Raman VS, Loar RW, Renukuntla VS, Hassan KV, Fishman DS, Gilger MA, Heptulla RA.

Department of Pediatrics, Section of Endocrinology and Metabolism, Baylor College of Medicine, Houston, TX.

OBJECTIVE: To assess the risk factors for developing hyperglycemia and diabetes mellitus (DM) in children with pancreatitis. **STUDY DESIGN:** Patients (from infants to age 21 years) hospitalized with acute pancreatitis (AP), acute recurrent pancreatitis (ARP), and chronic pancreatitis were studied retrospectively. Subjects with known DM or cystic fibrosis before presentation with pancreatitis were excluded. **RESULTS:** A total of 176 patients met the study criteria. Of these, 140 had AP, 29 had ARP, and 7 had chronic pancreatitis. Severe pancreatitis was associated with hyperglycemia; 41% of the patients with hyperglycemia required insulin, and 8 patients (4.5%) developed DM requiring insulin by the time of discharge. These 8 patients with postpancreatitis DM were more likely to be overweight. Five of the 8 patients had a seizure disorder, and 4 had another comorbidity, such as mental retardation or cerebral palsy. Seven of the 8 patients who developed DM had a single episode of AP, and one patient had ARP. **CONCLUSIONS:** Our findings indicate that hyperglycemia and DM can occur with pancreatitis. In some cases, postpancreatitis DM was associated with mental retardation, seizure disorder, and use of antiseizure medication. As opposed to adults who develop DM after chronic pancreatitis, children can develop DM due to a single episode of AP.

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PMID: 21093873 [PubMed - as supplied by publisher]

21. J Pediatr Orthop. 2010 Dec;30(8):851-7.**Operative and clinical markers of deep wound infection after spine fusion in children with cerebral palsy.**

Mohamed Ali MH, Koutharawu DN, Miller F, Dabney K, Gabos P, Shah S, Holmes L Jr.

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BACKGROUND: Infection after spine fusion for neuromuscular scoliosis has been shown to range from 4.2% to 20.0% prevalence. Although there are studies, which have examined deep wound infection and spine fusion surgery as well as risk factors for deep wound infection, there are limited studies evaluating clinical and radiographic factors associated with this complication. We aimed to determine the clinical and operative factors associated with deep wound infection after spine fusion in pediatric patients with cerebral palsy (CP). **METHODS:** Medical records of 236 pediatric patients, aged between 5.6 and 21 years (mean=13.8±3.4), with CP who underwent spine fusion from 1995 to 2006 were reviewed. Of these, 22 patients had deep wound infection. To assess the differences in clinical, radiographic, and other predisposing factors, we used χ statistic and Fisher exact, and to determine the predisposing factors of deep wound infection, we used binomial regression model. **RESULTS:** The period prevalence of deep wound infection was 9.3%. In the unadjusted model, body weight, residual postoperative Cobb angle, length of hospitalization, packed red blood cells, and skin breakdown were the factors significantly associated with deep wound infection ($P<0.05$). After controlling for confounding, skin breakdown due to the instrumentation and residual postoperative Cobb angle were the 2 most potent markers of deep wound infection. There was a significant 4% increased risk of deep wound infection for 1-degree increase in the residual Cobb angle from the noncase mean residual Cobb angle of 23.69 degrees (adjusted risk ratio=1.04; 95% confidence interval, 1.01-1.08). Likewise, compared with those without skin breakdown, those with skin breakdown were 12 times as likely to develop deep wound infection (risk ratio=12.92; 95% confidence interval, 1.00-172.00). **CONCLUSIONS:** Residual postoperative Cobb angle and skin breakdown due to unit rod instrumentation were the 2 most significant predisposing factors to deep wound infection. Other factors included body weight, packed red blood cells, and length of hospitalization. As the overall prevalence of deep wound infection is relatively high in CP patients after spine fusion, and considering the cost of hospitalization and other related comorbidities, surgeons should recognize these predisposing parameters to prevent deep wound infection in CP patients while correcting curve deformities.

LEVEL OF EVIDENCE: Level III retrospective study.

PMID: 21102212 [PubMed - in process]

22. J Pediatr Orthop. 2010 Dec;30(8):846-50.**Leg length discrepancy in spastic hemiplegic cerebral palsy: a magnetic resonance imaging study.**

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BACKGROUND: In patients with spastic hemiplegic cerebral palsy (CP) it can be difficult to clearly define whether deviations in gait pattern result from impaired motor control, leg length discrepancy (LLD), or are a consequence of secondary compensatory mechanisms. LLD is common and treatment can be considered. The goal was to investigate the degree of LLD in the lower limb including the pelvis, femur, tibia, talus, and calcaneus using magnetic resonance imaging (MRI).

METHODS: Forty-four patients with spastic hemiplegic CP and a mean age of 17.6 years (range, 13.0 to 23.0 y) participated in the study; of these 20 were female and 24 were male. All were classified as 1 on the gross motor classification scale and as Winters' type 1 or 2. On the basis of sagittal T1-weighted MRI images of the lower extremity, the length of the pelvis, femur, tibia, talus, and calcaneus was measured separately by 2 experienced observers and remeasured independently after a 2-week interval. **RESULTS:** Eleven of the 44 patients had a hemiplegic lower limb that was more than 15 mm shorter. The mean difference was in the calcaneus (0.9 mm; $P=0.003$), talus (1.3 mm; $P=0.006$), and tibia (8.1 mm; $P=0.000$). Intraobserver comparison showed high reproducibility with intraclass correlation for the calcaneus (0.91), talus (0.84), tibia (0.99), femur (0.99), and pelvis (0.98). In the interobserver comparison, the corresponding inter class correlations were 0.95, 0.84, 0.99, 0.99, and 0.98. **CONCLU-**

SIONS: This MRI study showed LLD in teenagers and young adults with hemiplegic CP. The main difference between the hemiplegic and noninvolved side was found in the tibia, but the calcaneus and talus also showed significant differences. The method proved to be reliable and the measurement of LLD should be considered in the management of hemiplegic CP. To be able to develop rational treatment plans, it is of importance to know the degree and location of LLD. LEVEL OF EVIDENCE: Prospective cross-sectional diagnostic level 1 study.

PMID: 21102211 [PubMed - in process]

23. J Pediatr Orthop. 2010 Dec;30(8):840-5.

Effectiveness of an anesthetic continuous-infusion device in children with cerebral palsy undergoing orthopaedic surgery.

Muthusamy K, Recktenwall SM, Friesen RM, Zuk J, Gralla J, Miller NH, Galinkin JL, Chang FM.

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BACKGROUND: Effective postoperative pain management is a vital component of orthopaedic surgical care in the pediatric population. In children with cognitive impairments pain management can be difficult, making these children vulnerable to ineffectively managed postoperative pain. This prospective, randomised study evaluated the use of a local anesthetic continuous infusion device (pain pump) to manage postoperative pain in children with cerebral palsy (CP) undergoing lower extremity orthopaedic surgical procedures. **METHODS:** Children with a diagnosis of CP who were undergoing select orthopaedic outpatient procedures were enrolled in this study. Postoperatively, patients were randomised to receive either a pain pump in addition to oral analgesics or oral analgesics only. Patient's parents were asked to record the amount of medication administered and assess pain intensity with the use of a modified visual analogue scale for 3 days postoperatively. Parents also completed an overall pain management satisfaction questionnaire at the end of the study participation period. **RESULTS:** Fifty-four patients were enrolled in this study and data were analyzed on 37 patients. The mean daily pain intensity in the pain pump group was significantly lower for the day of surgery and for 2 days postoperatively, and there was an overall significant difference between the groups ($P < 0.0001$). The amount of analgesic medication administered was significantly lower for the first 2 postoperative days, but there was not a significant difference between the 2 groups overall ($P = 0.29$). Parent satisfaction with both pain management techniques was high and responses were similar between the 2 groups. **CONCLUSIONS:** Children with CP present unique postoperative pain management concerns that can be effectively addressed through the use of multimodal analgesic techniques. This study found that the pain pump is an effective pain management technique that significantly reduces pain intensity in children with CP after lower extremity orthopaedic procedures.

LEVEL OF EVIDENCE: Therapeutic Level II.

PMID: 21102210 [PubMed - in process]

24. J Pediatr Orthop. 2010 Dec;30(8):832-9.

Management of severe crouch gait in children and adolescents with cerebral palsy.

Joseph B, Reddy K, Varghese RA, Shah H, Doddabasappa SN.

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BACKGROUND: Crouch gait in cerebral palsy is associated with spasticity and contracture of the hamstrings and weakness of the extensors of the hip and knee and ankle plantar flexors. Different treatment options have been described in the literature to deal with this difficult problem. We devised a different protocol of treatment aimed at correction of the flexion deformity of the knee, weakening of the hamstrings, and augmenting the power of the knee and hip extension, which we used on 17 children with severe crouch. **METHODS:** This surgery, performed in 2 stages, entailed shortening of the femur, plication of the patellar tendon, transfer of the semitendinosus to the back of the femur, and fractional lengthening of the other hamstrings. The degree of fixed deformity, the popliteal angle, quadriceps power, range of knee motion, ambulatory status and the efficiency of gait, and the position of the patella

were evaluated before surgery and again after a minimum 2-year follow-up. **RESULTS:** The gait improved and the power of the quadriceps and the range of knee motion increased. The flexion deformity and popliteal angle decreased significantly. Patella alta was corrected and all fragmentation of the tibial tuberosity and fractures of the patella healed. The Functional Mobility Scores and the ambulatory capacity increased in all the children. There was no evidence of damage to the sciatic nerve in any patient. **CONCLUSIONS:** The method of treatment of severe crouch gait outlined in this study seems to be an effective and safe method of dealing with this difficult problem.

STUDY DESIGN: Level of evidence: IV.

PMID: 21102209 [PubMed - in process]

25. Nutr Rev. 2010 Dec;68(12):739-48. doi: 10.1111/j.1753-4887.2010.00342.x.

Micronutrient adequacy and morbidity: paucity of information in children with cerebral palsy.

Schoendorfer N, Boyd R, Davies PS.

Children's Nutrition Research Centre, The University of Queensland School of Medicine, Herston, Australia Queensland Cerebral Palsy and Rehabilitation Research Centre; The University of Queensland School of Medicine, Herston, Australia.

A literature review was conducted to investigate the status of vitamins and minerals in children with cerebral palsy and the implications of various deficiencies on health outcomes. Children with cerebral palsy commonly have feeding difficulties, which significantly impact their growth, general health, and life expectancy. Current nutritional literature focuses on energy expenditure, with little information available on other parameters, such as micronutrient status. Due to the paucity of micronutrient research in these children, the impacts of deficiencies and benefits in other populations have been considered. The role of micronutrients in maintaining cellular homeostasis throughout all body systems highlights a need for future research and monitoring of their levels, particularly in vulnerable populations with well-documented incidence of undernutrition.

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PMID: 21091917 [PubMed - in process]

26. Qual Life Res. 2010 Nov 26. [Epub ahead of print]

Erratum to: The PedsQL in pediatric cerebral palsy: reliability and validity of the Chinese version pediatric quality of life inventory 4.0 generic core scales and 3.0 cerebral palsy module.

Yang X, Xiao N, Yan J.

Rehabilitation Centre, Children's Hospital, Chongqing Medical University, No.136 Zhongshan ErRoad, Yuzhong District, Chongqing, China.

PMID: 21110122 [PubMed - as supplied by publisher]

27. Vopr Kurortol Fizioter Lech Fiz Kult. 2010 Jul-Aug;(4):9-12.

Restoration of voluntary movements in adolescents presenting with the hyperkinetic form of childrens' cerebral paralysis by means of special physical exercises [Article in Russian]

[No authors listed]

Results of a study involving 12 adolescents presenting with the hyperkinetic form of childrens' cerebral paralysis are reported. The principal manifestation of the disease in these patients was the inability to perform coordinated movements because of muscular dystonia and hyperkinesia. The long-term course of special physical exercises and two courses of training with a Heyvus training apparatus resulted in the improvement of statodynamic functions com-

pared with control patients.

PMID: 21089205 [PubMed - in process]

28. Zhonghua Yi Xue Za Zhi. 2010 Sep;90(33):2324-2327.

Treatment of flatfoot deformity with concurrent spinal disease in children. [Article in Chinese]

Song WD, Li D, Liu SL, Huang JR, Shen HY, Huang DS, Ma RF.

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OBJECTIVE: To study the curative effect of operation to flatfoot deformity with concurrent spinal disease in children. **METHODS:** A retrospective survey was performed in 8 flatfoot patients with concurrent spinal disease from January 2004 to January 2008. Every case received special operative treatment. After casting, achilles tendon prolongation, reefing or tendon transfer, rehabilitation therapy was performed sequentially. Radiographs and clinical outcomes were evaluated during the follow-up. **RESULTS:** Six patients were followed up. There were 2 feet in 1 female and 7 feet in 5 males. The complications included tethered cord syndrome (n = 1), T12-S1 vertebral canal arachnoid cyst (n = 1), cerebral palsy and scoliosis (n = 1) and scoliosis and spinal bifida occulta (n = 3). The average age was 8.4 (4 - 14) years old and the average follow-up time 22 (14 - 64) months. All cases were satisfied with the appearance and function according to Maryland foot score. Five were excellent, 2 good and 2 fair postoperatively versus 2 fair and 7 failed preoperatively. The total excellent and good rate was 77.8%. In the early stage after tendon transfer in 4 patients, the lateral view of height arch, talus-first metatarsal angle, calcaneus-navicular-first metatarsal angle and talonavicular coverage angle improved. Yet it lost the improved angle and reverted to the pre-operative state. No degenerative change was detected in tarsus joints during the long follow-up. **CONCLUSION:** The special and sequential surgical procedure may be an effective regimen in the treatment of flatfoot deformity with concurrent spinal disease in children.

PMID: 21092490 [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.

29. Arch Dis Child Fetal Neonatal Ed. 2010 Nov 20. [Epub ahead of print]

Two-year outcomes from very low birthweight infants in a geographically defined population across 10 years, 1993-2002: comparing 1993-1997 with 1998-2002.

D'Amore A, Broster S, Le Fort W, Curley A; on behalf of the East Anglian Very Low Birthweight Project.

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Aim To determine the prevalence and nature of disability at 2 years of age in infants born from 1993 to 2002 with a birth weight of <1500 g. **Methods** A prospective cohort analysis of all eight neonatal units in East Anglia, UK using a single database. Local paediatricians assessed children at 2 years of age using the Health Status Questionnaire. Data were analysed using SPSS v 9 and MSAccess 97. **Results** 97% of the 1850 survivors were assessed at 2 years. 21% had mild disability, 10.8% moderate and 8.6% severe. There was no evidence of an increased rate of disability despite survival rates increasing from 75% in 1993 to 89% in 2002. There was an increased trend in survival of infants of <28 weeks' gestation from 17% to 21% (p=0.08), and the overall rate of moderate to severe disability decreased significantly from 35% to 28% (p<0.01). There was a decreasing trend in the number of infants with cerebral palsy (6% vs 4%). There was also a decrease in the numbers of infants with blindness, hydrocephalus

or a hearing impairment. Follow-up rates decreased from 99% to 94.5%. Analysis of those lost to follow-up revealed they were of higher gestation and birth weight. Conclusion There was no evidence of an increased rate of disability despite improved survival rates over the two time periods. The rate of blindness decreased, probably reflecting earlier treatment of retinopathy of prematurity. This study demonstrates that although follow-up remains a challenge, rates of over 90% are achievable.

PMID: 21097840 [PubMed - as supplied by publisher]

30. J Paediatr Child Health. 2010 Nov 21. doi: 10.1111/j.1440-1754.2010.01896.x. [Epub ahead of print]

The Australian cerebral palsy research study - Protocol for a national collaborative study investigating genomic and clinical associations with cerebral palsy.

O'Callaghan ME, Maclennan AH, Gibson CS, McMichael GL, Haan EA, Broadbent J, Priest K, Goldwater PN, Dekker GA.

Discipline of Obstetrics and Gynaecology, School of Paediatrics and Reproductive Health, Robinson Institute, The University of Adelaide SA Clinical Genetics Service, SA Pathology at Women's and Children's Hospital and Discipline of Paediatrics, The University of Adelaide Epidemiology Branch, SA Health Departments of Microbiology and Infectious Diseases, SA Pathology at Women's and Children's Hospital, Adelaide, South Australia, Australia.

Aim: Previous studies have proposed a link between the presence of specific single nucleotide polymorphisms (SNPs) and cerebral palsy and the majority of these associations remain to be confirmed or rejected by prospective studies with sufficient statistical power. Prior studies have also given little attention to the interaction of genomic characteristics and clinical risk factors. **Methods:** This paper describes the design of a prospective case-control study to test these genetic associations in conjunction with more stringent data collection in respect to clinical features associated with pregnancy, particularly maternal infection. Here we consider the ethical requirements, our hypothesis that genetic susceptibility modifies the risk of cerebral palsy in the presence of perinatal environmental triggers, a priori primary and secondary aims, power calculations, participant recruitment strategies, data linkage, sampling methods of genetic material and subsequent SNP analysis, collection of clinical data and the proposed final statistical analysis.

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PMID: 21091581 [PubMed - as supplied by publisher]

31. Minerva Pediatr. 2010 Jun;62(3 Suppl 1):155-6.

[In Process Citation]. [Article in Italian]

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Preterm births occurs in 6-12% of all pregnancies, accounts for 75% of neonatal death and causes significant neonatal morbidity. A large number of preterm birth is associated with infection (30%), because of the release of many cytokines. In fact acute chorioamnionitis represents the inflammatory response to extracellular microorganisms that gain access to the gestational sac. Clinical signs of infection compare in the 12% of cases, while the prevalence of positive amniotic fluid cultures is approximately 50% in patients with preterm PROM. Despite the recent studies about the dosage of inflammatory biomarkers in the amniotic fluid or in fetal and maternal blood, placenta histology remains the gold standard for the diagnosis of chorioamnionitis. Histological chorioamnionitis describes the progression of the inflammatory process. Organisms first colonise the chorioamnionic surface. Then, the neutrophils migrates to the chorion (chorionitis) and to the amnion (chorioamnionitis) and, in the last stage, amniotic epithelial cells undergo necrosis (necrotising chorioamnionitis). It represents the mother inflammatory response and it differs from the fetal inflammatory response (funisitis). Funisitis first appears in vessels of the chorionic plate (chorionic vasculitis) or in the umbilical vein (umbilical phlebitis), then in the umbilical artery (umbilical arteritis), and in the Wharton's jelly (umbilical perivasculitis). The fetal inflammatory response has been associated with inflammatory

diseases of preterm infants, increasing the risk of neonatal sepsis and meningitis, bronchopulmonary dysplasia and cerebral palsy. We present our experience on the relationship between histological chorioamnionitis, preterm birth and inflammatory diseases of VLBW infants.

PMID: 21090086 [PubMed - in process]

32. Obstet Gynecol. 2010 Dec;116(6):1454.

Chorioamnionitis and cerebral palsy: a meta-analysis.

Zanardo V, Trevisanuto D, Cosmi E, Chiarelli S.

Department of Pediatrics, Institute of Gynecology and Reproductive Sciences, and Department of Oncological and Surgical Sciences, Padua University, Padua, Italy.

PMID: 21099620 [PubMed - in process]

33. Obstet Gynecol. 2010 Dec;116(6):1454.

Chorioamnionitis and cerebral palsy: a meta-analysis.

Mendz GL, Quinlivan JA.

School of Medicine, The University of Notre Dame Australia, Sydney, NSW, Australia.

PMID: 21099619 [PubMed - in process]

34. Obstet Gynecol. 2010 Dec;116(6):1397-400.

Electronic fetal monitoring as a public health screening program: the arithmetic of failure.

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Electronic fetal monitoring has failed as a public health screening program. Nevertheless, most of the four million low-risk women giving birth in the United States each year continue to undergo this screening. The failure of this program should have been anticipated and thus avoided had the accepted principles of screening been considered before its introduction. All screening tests have poor positive predictive value when searching for rare conditions such as fetal death in labor or cerebral palsy. This problem is aggravated when the screening test does not have good validity as is the case with electronic fetal monitoring. Because of low-prevalence target conditions and mediocre validity, the positive predictive value of electronic fetal monitoring for fetal death in labor or cerebral palsy is near zero. Stated alternatively, almost every positive test result is wrong. To avoid such costly errors in the future, the prerequisites for any screening program must be fulfilled before the program is begun.

PMID: 21099609 [PubMed - in process]

35. Zhonghua Er Ke Za Zhi. 2010 Sep;48(9):680-684.

Maple syrup urine disease of neonates: report of two cases and review of literature. [Article in Chinese]

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Hangzhou 310003, China.

OBJECTIVE: To analyze and summarize clinical manifestation of maple syrup urine disease (MSUD) of neonates. **METHODS:** Data of two cases with neonatal MSUD and the reports of 15 cases seen in the past 15 years in China were reviewed and analyzed. **RESULTS:** There was an increasing number of reports of cases with neonatal MSUD. All the 17 cases had the symptom of poor feeding between 3 h and 8 d after birth; 7 cases had family history; 14 cases showed progressive neurologic signs. Odor of maple syrup occurred in 8 cases. Blood levels of branched-chain amino acids (BCAA) significantly increased in 13 cases and 6 neonates were diagnosed using tandem mass spectrometry. Urinary levels of BCAA and metabolite elevated in 12 cases and 5 neonates were diagnosed using gas chromatography-mass spectrometry. MRI/CT demonstrated abnormal signal in 10 cases. Twelve cases died or their parents gave up treatment and one case had cerebral palsy; 4 cases were treated with BCAA-free formula milk and showed improved outcome. **CONCLUSION:** Newborns with MSUD often had early appeared non-specific symptoms with poor feeding and lethargy, most cases later showed an odor resembling maple syrup and neurologic signs. For patients who were suspected of having MSUD, blood and urine concentrations of BCAA should be tested for early diagnosis. Specific MRI edema signal from brain suggests the possibility of MSUD. Early intervention and treatment after diagnosis, with compliance of parents, would improve the patient's outcome.

PMID: 21092528 [PubMed - as supplied by publisher]