Cerebral Palsy ALLIANCE

NEWS
Cerebral Palsy Research

Monday 18 November 2013

Cerebral Palsy Alliance is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy.

Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. This free weekly bulletin is just one of our activities. Please find out more at www.cpresearch.org.au

Professor Nadia Badawi
Macquarie Group Foundation Chair of Cerebral Palsy
PO Box 560, Darlinghurst, New South Wales 2010 Australia

Interventions and Management

1. Phys Ther. 2013 Nov 14. [Epub ahead of print]

A Path Model for Evaluating Dosing Parameters for Children With Cerebral Palsy.

Gannotti ME, Christy JB, Heathcock JC, Kolobe TH.

M.E. Gannotti, PT, PhD, Department of Rehabilitation Sciences, University of Hartford, 200 Bloomfield Ave, West Hartford, CT 06117 (USA).

Dosing of pediatric rehabilitation services for children with cerebral palsy (CP) has been identified as a national priority. Establishing dosing parameters for pediatric physical therapy (PT) interventions is critical for informing clinical decision-making, health policy, and guidelines for reimbursement. The purpose of this paper is to describe a path model for evaluating dosing parameters of interventions for children with CP. The model is intended for dose-related and effectiveness studies of pediatric PT interventions. The premise of the model is: Intervention type (focus on body structures, activity, or the environment) acts on a child first through the family, then through the dose (frequency, intensity, time), to yield structural and behavioral changes. As a result, these changes are linked to improvements in functional independence. Community factors impact dose as well as functional independence (performance and capacity), influencing the relationships between type of intervention and intervention responses. The constructs of family characteristics, child characteristics (e.g. age, level of severity, comorbidities, readiness to change, and preferences), plastic changes in bone, muscle, and brain, motor skill acquisition, and community access warrant consideration from researchers who are designing intervention studies. Multiple knowledge gaps are identified, and a framework is provided for conceptualizing dosing parameters for children with CP.

PMID: 24231231 [PubMed - as supplied by publisher]

2. Ann Rehabil Med. 2013 Oct;37(5):649-57. doi: 10.5535/arm.2013.37.5.649. Epub 2013 Oct 29.

Contributing factors analysis for the changes of the gross motor function in children with spastic cerebral palsy after physical therapy.

Yi TI, Jin JR, Kim SH, Han KH.

Department of Rehabilitation Medicine, Bundang Jesaeng General Hospital, Seongnam, Korea.

OBJECTIVE: To investigate the factors which contribute to the improvements of the gross motor function in

children with spastic cerebral palsy after physical therapy. METHODS: The subjects were 45 children with spastic cerebral palsy with no previous botulinum toxin injection or operation history within 6 months. They consisted of 24 males (53.3%) and 21 females (46.7%), and the age of the subjects ranged from 2 to 6 years, with the mean age being 41±18 months. The gross motor function was evaluated by Gross Motor Function Measure (GMFM)-88 at the time of admission and discharge, and then, the subtractions were correlated with associated factors. RESULTS: The GMFM-88 was increased by 7.17±3.10 through 52±16 days of physical therapy. The more days of admission, the more improvements of GMFM-88 were attained. The children with initial GMFM-88 values in the middle range showed more improvements in GMFM-88 ($p<0.05$). The children without dysphagia and children with less spasticity of lower extremities also showed more improvements in GMFM-88 ($p<0.05$). CONCLUSION: We can predict the improvements of the gross motor function after physical therapy according to the days of admission, initial GMFM-88, dysphagia, and spasticity of lower extremities. Further controlled studies including larger group are necessary.

PMID: 24236252 [PubMed] Free PMC Article

3. Arch Phys Med Rehabil. 2013 Nov 11. pii: S0003-9993(13)01119-2. doi: 10.1016/j.apmr.2013.10.022. [Epub ahead of print]

Relationship of stride activity and participation in mobility-based life habits among children with cerebral palsy.

Bjornson KF, Zhou C, Stevenson RD, Christakis D.

Seattle Children's Research Institute, University of Washington, Seattle, Washington. Electronic address: kristie.bjornson@seattlechildrens.org.

OBJECTIVE: To date walking outcomes in cerebral palsy CP have been capacity-based what a child does in structured setting. Physical activity performance what a child really does in daily life has been documented to influence the relationship of capacity-based gross motor measures to participation.1 This study examines the relationship between walking performance and participation in mobility-related habits of daily life in children with CP. DESIGN: Cross-sectional prospective cohort study. SETTING: Regional pediatric specialty care centers PARTICIPANTS: A cohort of 128 ambulatory children with CP ages 2-9 yrs, 41% female, and 49% having hemiplegia participated. INTERVENTIONS: Not Applicable. MAIN OUTCOME MEASURES: Walking performance was quantified from a 5-day sample of StepWatch accelerometry data. Stride activity was summarized through the outcomes of average total strides/day independent of intensity and average number of strides/day at > 30 strides/minute marker of intensity. Mobility-based participation was assessed by the Life Habits Life-H categories of Personal Care, Housing, Mobility, and Recreation. Regression models were developed controlling for gender, age, cognition, communication, pain, and body composition. RESULTS: Average total strides/day was positively associated with the Personal Care, Housing, Mobility, and Recreation Life-H categories ß = .34 to.41, $p <.001$. Average number of strides > 30 stride/min/day was associated with all categories ß = .54 to.60, $p < .001$. CONCLUSIONS: Accelerometry-based walking activity performance is significantly associated with levels of participation in mobility-based life habits for ambulatory children with CP. Evaluation of other factors and the direction of relationships within the ICF is warranted to inform rehabilitation strategies.

PMID: 24231402 [PubMed - as supplied by publisher]

4. Clin Biomech (Bristol, Avon). 2013 Oct 10. pii: S0268-0033(13)00220-9. doi: 10.1016/j.clinbiomech.2013.10.001. [Epub ahead of print]

Does acute passive stretching increase muscle length in children with cerebral palsy?

Theis N, Korff T, Kairon H, Mohagheghi AA.

Centre for Sports Medicine and Human Performance, Brunel University, Kingston Lane, Uxbridge, Middlesex UB8 3PH, UK.

BACKGROUND: Children with spastic cerebral palsy experience increased muscle stiffness and reduced muscle

length, which may prevent elongation of the muscle during stretch. Stretching performed either by the clinician, or children themselves is used as a treatment modality to increase/maintain joint range of motion. It is not clear whether the associated increases in muscle-tendon unit length are due to increases in muscle or tendon length. The purpose was to determine whether alterations in ankle range of motion in response to acute stretching were accompanied by increases in muscle length, and whether any effects would be dependent upon stretch technique. METHODS: Eight children (6-14y) with cerebral palsy received a passive dorsiflexion stretch for 5×20 s to each leg, which was applied by a physiotherapist or the children themselves. Maximum dorsiflexion angle, medial gastrocnemius muscle and fascicle lengths, and Achilles tendon length were calculated at a reference angle of 10° plantarflexion, and at maximum dorsiflexion in the pre- and post-stretch trials. FINDINGS: All variables were significantly greater during pre- and post-stretch trials compared to the resting angle, and were independent of stretch technique. There was an approximate 10° increase in maximum dorsiflexion post-stretch, and this was accounted for by elongation of both muscle (0.8cm) and tendon (1.0cm). Muscle fascicle length increased significantly (0.6cm) from pre- to post-stretch. INTERPRETATION: The results provide evidence that commonly used stretching techniques can increase overall muscle, and fascicle lengths immediately post-stretch in children with cerebral palsy.

PMID: 24210836 [PubMed - as supplied by publisher]

5. J Biomech. 2013 Oct 23. pii: S0021-9290(13)00478-8. doi: 10.1016/j.jbiomech.2013.10.024. [Epub ahead of print]

The influence of estimated body segment parameters on predicted joint kinetics during diplegic cerebral palsy gait.

Kiernan D, Walsh M, O'Sullivan R, O'Brien T, Simms CK.

Gait Laboratory, Central Remedial Clinic, Clontarf, Dublin 3, Ireland; Trinity Centre for Bioengineering, Parsons Building, Trinity College Dublin, Dublin 2, Ireland. Electronic address: dkiernan@crc.ie.

Inverse Dynamic calculations are routinely used in joint moment and power estimates during gait with anthropometric data often taken from published sources. Many biomechanical analyses have highlighted the need to obtain subject-specific anthropometric data (e.g. Mass, Centre of Mass, Moments of Inertia) yet the types of imaging techniques required to achieve this are not always available in the clinical setting. Differences in anthropometric sets have been shown to affect the reactive force and moment calculations in normal subjects but the effect on a paediatric diplegic cerebral palsy group has not been investigated. The aim of this study was to investigate the effect of using different anthropometric sets on predicted sagittal plane moments during normal and diplegic cerebral palsy gait. Three published anthropometric sets were applied to the reactive force and moment calculations of 14 Cerebral Palsy and 14 Control subjects. Statistically significant differences were found when comparing the different anthropometric sets but variability in the resulting sagittal plane moment calculations between sets was low (0.01-0.07Nm/kg). In addition, the GDI-Kinetic, used as an outcome variable to assess whether differences were clinically meaningful, indicated no clinically meaningful difference between sets. The results suggest that the effects of using different anthropometric sets on the kinetic profiles of normal and diplegic cerebral palsy subjects are clinically insignificant.

PMID: 24200337 [PubMed - as supplied by publisher]

6. J Neurophysiol. 2013 Nov 13. [Epub ahead of print]

Sensory feedback to ankle plantar flexors is not exaggerated during gait in spastic children with cerebral palsy.

Willerslev-Olsen M, Andersen JB, Sinkjaer T, Nielsen JB.

University of Copenhagen.

It is commonly assumed that exaggerated stretch reflex activity and the resulting increased muscle tone in ankle plantar flexors contribute to reduced ankle joint movement during gait in children with cerebral palsy (CP). We investigated the contribution of sensory feedback mechanisms to ankle plantar flexor muscle activity during treadmill walking in 20 children with CP and 41 control children. Stretch responses in plantar flexor muscles evoked in stance by dorsiflexion perturbations showed an age-related decline in control children but not in children with CP. In swing responses were abolished in control children, but not in children with CP. Removal of sensory feedback to the soleus muscle in stance by shortening the plantar flexors produced a drop in soleus EMG activity of a similar size and latency in control children and children with CP. Soleus EMG activity was observed in swing in a similar proportion in both groups. Shortening of the plantar flexors in swing caused a larger drop in Soleus EMG in control children than in children with CP. The lack of age related decline in stretch reflexes in the stance phase and the inability to suppress the reflex in the swing phase is likely related to lack of maturation of corticospinal control in children with CP. However, since they did not show soleus EMG activity to a larger extent than control children in swing and since sensory afferent feedback did not contribute more to their muscle activity, spasticity is unlikely to contribute to foot drop and toe walking.

PMID: 24225545 [PubMed - as supplied by publisher]

7. J Rehabil Med. 2013 Nov 6. doi: 10.2340/16501977-1237. [Epub ahead of print]

Daily stride rate activity and heart rate response in children with cerebral palsy.

Balemans AC, van Wely L, Middelweerd A, van den Noort JJ, Becher JG, Dallmeijer AJ.

Department of Rehabilitation Medicine, MOVE Research Institute Amsterdam, EMGO Institute for Health and Care Research, Amsterdam, VU University Medical Center, Amsterdam, 1007 MB Amsterdam, The Netherlands. a.balemans@vumc.nl.

Objective: To compare daily stride rate activity, daily exercise intensity, and heart rate intensity of stride rate in children with cerebral palsy with that of typically developing children. Methods: Forty-three children with cerebral palsy, walking without (Gross Motor Function Classification System (GMFCS) I and II) or with (GMFCS III) an aid and 27 typically developing children (age range 7-14 years) wore a StepWatchTM activity monitor and a heart rate monitor. Time spent and mean heart rate reserve at each stride rate activity level and time spent in each mean heart rate reserve zone was compared. Results: Daily stride rate activity was lower in children with cerebral palsy (39%, 49% and 79% in GMFCS I, II and III, respectively) compared with typically developing children ($p < 0.05$), while there were no differences in time spent at different mean heart rate reserve zones. Mean heart rate reserve at all stride rate activity levels was not different between typically developing children, GMFCS I and II, while mean heart rate reserve was higher for GFMCS III at stride rates < 30 strides/min ($p < 0.05$). Conclusion: Stride rate activity levels reflect the effort of walking, in children with cerebral palsy who are walking without aids, similar to that of typically developing, whereas children with cerebral palsy using walking aids show higher effort of walking. Despite a lower stride rate activity in cerebral palsy, daily exercise intensity seems comparable, indicating that the StepWatchTM monitor and the heart rate monitor measure different aspects of physical activity.

PMID: 24202082 [PubMed - as supplied by publisher]

8. Ann Rehabil Med. 2013 Oct;37(5):756-757.

Correction: Relationship Between Gross Motor Function and Daily Functional Skill in Children With Cerebral Palsy.

Kwon TG, Yi SH, Kim TW, Chang HJ, Kwon JY.

Department of Physical and Rehabilitation Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea.

[This corrects the article on p. 41 in vol. 37, PMID: 23525125.].

PMID: 24236270 [PubMed - as supplied by publisher] Free PMC Article

9. J Neurophysiol. 2013 Nov 13. [Epub ahead of print]

Aberrant Synchrony in the Somatosensory Cortices Predicts Motor Performance Errors in Children with Cerebral Palsy.

Kurz MJ, Heinrichs-Graham E, Arpin DJ, Becker KM, Wilson TW.

University of Nebraska Medical Center.

Cerebral palsy (CP) results from a perinatal brain injury that often results in sensory impairments and greater errors in motor performance. Although these impairments have been well catalogued, the relationship between sensory processing networks and errors in motor performance has not been well explored. Children with CP and typically developing age-matched controls participated in this investigation. We used high-density magnetoencephalography (MEG) to measure event-related oscillatory changes in the somatosensory cortices following tactile stimulation to the bottom of the foot. In addition, we quantified the amount of variability or errors in the isometric ankle joint torques as these children attempted to match a target. Our results showed that neural populations in the somatosensory cortices of children with CP were desynchronized by the tactile stimulus, while those of typically developing children were clearly synchronized. Such desynchronization suggests that children with CP were unable to fully integrate the external stimulus into ongoing sensorimotor computations. Our results also indicated that children with CP had a greater amount of errors in their motor output when they attempted to match the target force, and this amount of error was negatively correlated with the degree of synchronization present in the somatosensory cortices. These results are the first to show that the motor performance errors of children with CP are linked with neural synchronization within the somatosensory cortices.

PMID: 24225536 [PubMed - as supplied by publisher]

10. PM R. 2013 Nov 7. pii: S1934-1482(13)01147-7. doi: 10.1016/j.pmrj.2013.11.001. [Epub ahead of print]

The effect of neural lesion type on botulinum toxin dosage: A retrospective chart review.

Phadke CP, Davidson C, Ismail F, Boulias C.

Upper Motorneuron Spasticity Research Program, West Park Healthcare Centre, Toronto, Canada; Department of Physical Therapy, University of Toronto, Toronto, Canada; Faculty of Health, York University, Toronto, Canada. Electronic address: chetan.phadke@westpark.org.

BACKGROUND: It is difficult to compare botulinum toxin dosage between different neurological conditions because of different dosage reporting methods. Botulinum toxin is used to manage spasticity in variety of neurological conditions and it is important for clinicians to know if there are differences in the dosage injected based on etiology of spasticity. OBJECTIVE: Primary objective was to determine if the type of neural lesion influences the amount of botulinum toxin dosage required to manage spasticity. DESIGN: Retrospective chart review. SETTING: Review of patients who visited an outpatient spasticity clinic. PARTICIPANTS: We assessed medical charts from 99 patients with stroke, multiple sclerosis (MS) and cerebral palsy (CP) (n=33 for each etiology). We collected information such as age, sex, weight, time of lesion, total dosage (per person, per limb, per muscle), injection location, and injections cycles. INTERVENTIONS: none. MAIN OUTCOME MEASUREMENTS: OnabotulinumtoxinA dose - total dose in one leg was calculated as a sum of the units of the toxin injected in all the leg muscles. RESULTS: Total dose of toxin injected was 161 + 19 (mean + standard error of mean) in stroke, 175 + 13 in CP, and 225 + 18 in MS. The total dose in the legs (normalized to body weight; units/kg) was significantly different between the three groups (stroke, CP, MS; p=.001). Subsequent post-hoc tests revealed that, total dose in legs in MS was significantly higher (88%) than stroke (p=.001). Hip adductors and hamstrings were most commonly injected in MS and CP, but toe muscles were commonly injected in stroke patients; whereas plantar flexors were evenly injected all three patients groups. CONCLUSION: In our practice, we found that treating spasticity in people with MS required the highest dose of botulinum toxin followed by CP and then stroke.

PMID: 24211697 [PubMed - as supplied by publisher]

11. World J Pediatr. 2013 Nov;9(4):342-5. doi: 10.1007/s12519-013-0442-0. Epub 2013 Nov 14.

Efficacy and safety of serial injections of botulinum toxin A in children with spastic cerebral palsy.

Wang YJ, Gao BQ.

Department of Pediatrics, Beijing Tiantan Hospital, Capital Medical University, Beijing, 100050, China, yajienet@yahoo.com.cn.

BACKGROUND: Botulinum toxin A (BTX-A) has been successfully used as a treatment for children with spastic cerebral palsy; however, the effect of BTX-A on reducing spasticity only lasts a few months, thus serial injections are required. The present study was to evaluate the efficacy and safety of serial injections of BTX-A in children with spastic cerebral palsy. METHODS: Fifty-two pediatric patients with spastic cerebral palsy, 2-12 years of age (mean age, 4.79±2.70), were retrospectively analyzed. Muscle tone was assessed with the Modified Ashworth Scale, and gait was assessed with the Physician Rating Scale. Assessments were undertaken at baseline, 3 months, and 6 months after serial injections of BTX-A. RESULTS: The beneficial effects of BTX-A occurred 1 week after the injection, whereas the adverse side-effects appeared within 1 week and lasted <2 weeks. BTX-A significantly improved muscle tone and gait 3 and 6 months after its serial injections compared to baseline (P <0.05). CONCLUSIONS: Serial injections of BTX-A are effective and safe for children with spastic cerebral palsy. The sideeffects of serial injections of BTX-A are mild and self limited.

PMID: 24235067 [PubMed - in process]

12. Biomed Res Int. 2013;2013:462094. doi: 10.1155/2013/462094. Epub 2013 Oct 9.

Body Posture Asymmetry Differences between Children with Mild Scoliosis and Children with Unilateral Cerebral Palsy.

Domagalska-Szopa M, Szopa A.

School of Health Sciences, Medical University of Silesia, 12, 40-752 Katowice, Poland.

Patients with unilateral cerebral palsy (CP) often have impaired movement coordination, reduced between-limb synchronization, and less weight bearing on the affected side, which can affect the maintenance of an upright weight-bearing position and gait. This study evaluated whether the different postural patterns of children with unilateral CP could be statistically recognized using cluster analysis. Forty-five outpatients with unilateral CP (mean age, 9 years and 5 months) and 51 able-bodied children with mild scoliosis (mean age, 9 years and 2 months) were included. One observer performed moiré topography (MT) examinations using a CQ Electronic System (Poland) device. A weight distribution analysis on the base of support (BOS) between the body sides was performed simultaneously. A force plate dynamographic platform (PDM), ZEBRIS (Germany), with FootPrint software was used for these measurements. Cluster analysis revealed three groups: Cluster 1 (n = 71, 73.96%), Cluster 2 (n = 8, 8.33%), and Cluster 3 (n = 17, 17.71%). Based on the MT parameters (extracted using a data reduction technique), three typical asymmetrical postural patterns were described: (1) the postural pattern of children with mild scoliosis (SCOL), (2) the progravitational postural pattern (PGPP), and (3) the antigravitational pattern. Patterns two and three were identified in children with unilateral CP.

PMID: 24224163 [PubMed - in process] PMCID: PMC3810063 Free PMC Article

13. Augment Altern Commun. 2013 Dec;29(4):334-46. doi: 10.3109/07434618.2013.848933.

Support for AAC Use in Preschool, and Growth in Language Skills, for Young Children with Developmental Disabilities.

Barker RM, Akaba S, Brady NC, Thiemann-Bourque K.

Schiefelbusch Institute for Life Span Studies, University of Kansas.

Little is known about how AAC use in preschool may impact language development for children with complex

communication needs (e.g., children with autism, cerebral palsy, Down syndrome, and other developmental disabilities). We developed two surveys (a) to describe children's use of AAC in preschool classrooms, as well as the use of prompts and question asking, and augmented input by their communication partners; and (b) to describe teachers' experience, training, and perceived support in providing AAC. We then examined the relationship between children's experience of AAC, including the use of prompts, question asking, and augmented input by their partners, and the growth of receptive and expressive language for 71 children with developmental disabilities over a two-year period. The use of AAC by peers to provide augmented input was associated with stronger language growth; the use of prompting and question asking by teachers was associated with weaker language growth. Teachers reported that they received little training regarding ways to support a child's use of AAC. Results suggest the need for further research on promoting AAC use at the preschool level, including research to promote peer interactions for AAC users.

PMID: 24229337 [PubMed - in process]

14. Comput Math Methods Med. 2013;2013:297860. doi: 10.1155/2013/297860. Epub 2013 Oct 8.

Estimation of Phoneme-Specific HMM Topologies for the Automatic Recognition of Dysarthric Speech.

Caballero-Morales SO.

Technological University of the Mixteca, Road to Acatlima K.m. 2.5, Huajuapan de León, 69000 Oaxaca, OAX, Mexico.

Dysarthria is a frequently occurring motor speech disorder which can be caused by neurological trauma, cerebral palsy, or degenerative neurological diseases. Because dysarthria affects phonation, articulation, and prosody, spoken communication of dysarthric speakers gets seriously restricted, affecting their quality of life and confidence. Assistive technology has led to the development of speech applications to improve the spoken communication of dysarthric speakers. In this field, this paper presents an approach to improve the accuracy of HMM-based speech recognition systems. Because phonatory dysfunction is a main characteristic of dysarthric speech, the phonemes of a dysarthric speaker are affected at different levels. Thus, the approach consists in finding the most suitable type of HMM topology (Bakis, Ergodic) for each phoneme in the speaker's phonetic repertoire. The topology is further refined with a suitable number of states and Gaussian mixture components for acoustic modelling. This represents a difference when compared with studies where a single topology is assumed for all phonemes. Finding the suitable parameters (topology and mixtures components) is performed with a Genetic Algorithm (GA). Experiments with a well-known dysarthric speech database showed statistically significant improvements of the proposed approach when compared with the single topology approach, even for speakers with severe dysarthria.

PMID: 24222784 [PubMed - in process] PMCID: PMC3816031 Free PMC Article

15. Dev Neurorehabil. 2013 Dec;16(6):363-74. doi: 10.3109/17518423.2012.758187.

Parents and children with cerebral palsy discuss communication needs in hospital.

Hemsley B, Kuek M, Bastock K, Scarinci N, Davidson B.

Faculty of Education and the Arts, School of Humanities and Social Science, The University of Newcastle , Callaghan, Newcastle , Australia.

Objective: The aim of this study was to understand the communication needs and experiences of parents and children with cerebral palsy (CP) and complex communication needs (CCN) in hospital. Methods: Focus groups with 10 parents and interviews with seven children with CP and CCN were analysed for content themes. Results: Results demonstrated that children often want to communicate directly with hospital staff to: gain attention, answer yes/no, convey basic physical needs, give and receive information, control their environment and participate in preferred activities. Barriers to communication included lack of access to augmentative and alternative communication (AAC), staff preferring to communicate with parents and lack of time to communicate. Conclusions: Results highlight strategies for successful communication, the role of the parents in supporting communication and provision of AAC systems for children in hospital. Policy and practice implications in the preparation of children with CP and CCN for communication in hospital are discussed.

PMID: 24228709 [PubMed - in process]

16. Implement Sci. 2013 Nov 13;8(1):132. [Epub ahead of print]

A KT intervention including the evidence alert system to improve clinician's evidence-based practice behavior---a cluster randomized controlled trial.

Campbell LB, Novak I, McIntyre S, Lord SJ.

BACKGROUND: It is difficult to foster research utilization among allied health professionals (AHPs). Tailored, multifaceted knowledge translation (KT) strategies are now recommended but are resource intensive to implement. Employers need effective KT solutions but little is known about; the impact and viability of multifaceted KT strategies using an online KT tool, their effectiveness with AHPs and their effect on evidence-based practice (EBP) decision-making behavior. The study aim was to measure the effectiveness of a multifaceted KT intervention including a customized KT tool, to change EBP behavior, knowledge, and attitudes of AHPs. METHODS: This is an evaluator-blinded, cluster randomized controlled trial conducted in an Australian community-based cerebral palsy service. 135 AHPs (physiotherapists, occupational therapists, speech pathologists, psychologists and social workers) from four regions were cluster randomized (n = 4), to either the KT intervention group (n = 73 AHPs) or the control group (n = 62 AHPs), using computer-generated random numbers, concealed in opaque envelopes, by an independent officer. The KT intervention included three-day skills training workshop and multifaceted workplace supports to redress barriers (paid EBP time, mentoring, system changes and access to an online research synthesis tool). Primary outcome (self- and peer-rated EBP behavior) was measured using the Goal Attainment Scale (individual level). Secondary outcomes (knowledge and attitudes) were measured using exams and the Evidence Based Practice Attitude Scale. RESULTS: The intervention group's primary outcome scores improved relative to the control group, however when clustering was taken into account, the findings were non-significant: self -rated EBP behavior [effect size 4.97 (95% CI -10.47, 20.41)(p = 0.52)]; peer-rated EBP behavior [effect size 5.86 (95% CI -17.77, 29.50)(p = 0.62)]. Statistically significant improvements in EBP knowledge were detected [effect size 2.97 (95% CI 1.97, 3.97(p < 0.0001)]. Change in EBP attitudes was not statistically significant. CONCLUSIONS: Improvement in EBP behavior was not statistically significant after adjusting for cluster effect, however similar improvements from peer-ratings suggest behaviorally meaningful gains. The large variability in behavior observed between clusters suggests barrier assessments and subsequent KT interventions may need to target subgroups within an organization.

Trial registration: Registered on the Australian New Zealand Clinical Trials Registry (ACTRN12611000529943).

PMID: 24220660 [PubMed - as supplied by publisher] Free full text

17. J Altern Complement Med. 2013 Nov 9. [Epub ahead of print]

Parents' Attitudes Toward the Use of Complementary Therapy by Their Children with Moderate or Severe Cerebral Palsy.

Wray J, Edwards V, Wyatt K, Maddick A, Logan S, Franck L.

Centre for Nursing and Allied Health Research, Great Ormond Street Hospital for Children, NHS Trust, London, United Kingdom.

Objective: To describe the use of, and attitudes toward, complementary therapy (CT) by parents of children with moderate to severe cerebral palsy. Methods: Parents of 32 children with cerebral palsy (age 5-12 years) enrolled in a randomized trial of cranial osteopathy prospectively participated in semi-structured interviews in the home to explore the use of CT and views regarding access to and expectations of these therapies. Interview transcripts were analyzed thematically, and content analysis was used to determine the frequency of use of different therapies. Results: Sixteen children (50%) had received one or more types of CT, although only three were currently receiving any CT. The primary reasons for trying CT were to reduce children's pain and improve physical function. Parents had limited knowledge of the range of, and possible indications for, CT and expressed concerns about CT safety and effectiveness. Practical considerations of time and cost were also identified. Some parents had strong beliefs about the benefits, and, overall, parents indicated a high level of commitment to finding any treatments,

conventional or CT, to help their children. Conclusion: Parents of children with cerebral palsy want to help their child, but they need information, guidance, and practical support to facilitate their decision-making regarding the use of CT. A clearer understanding of factors predictive of optimal outcomes will enable resources to be targeted effectively.

PMID: 24205786 [PubMed - as supplied by publisher]

18. J Soc Work Disabil Rehabil. 2013;12(4):256-71. doi: 10.1080/1536710X.2013.834783.

Experiences of participation in a Swedish society among adults with cerebral palsy or spina bifida: involvement and challenges.

Törnbom K, Törnbom M, Sunnerhagen KS.

Research Group for Rehabilitation Medicine, Institute of Neuroscience and Physiology, Sahlgrenska Academy, Department of Social Work, University of Gothenburg, Gothenburg, Sweden.

Participation in society is vital to mental health and is beneficial to individuals and society. The goal of this study was to provide insight into how people with cerebral palsy and spina bifida view their experiences of participation and to examine factors that might influence this issue. The results show that participants emphasized the importance of being accepted and treated equally. Living independently and being able to play an active and leading role in their lives was also essential. Participation was described as a process of interaction between a person and society, with mutual responsibility in respect to integration.

PMID: 24224972 [PubMed - in process]

19. Scand J Caring Sci. 2013 Nov 11. doi: 10.1111/scs.12095. [Epub ahead of print]

Psychometric properties and validation of the Polish CP QOL-Child questionnaire: a pilot study.

Dmitruk E, Mirska A, Kulak W, Kalinowska AK, Okulczyk K, Wojtkowski J.

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

AIM: Translate, determine the psychometric properties and validate the Polish CP QOL-Child questionnaire. MATERIALS AND METHODS: A double translation of the questionnaire from English into Polish and back was executed. The questionnaire was distributed to 55 parents/legal guardians of children with cerebral palsy aged 4-12 years. The psychometric properties of the questionnaire were determined on the basis of its internal consistency and the internal consistency of each of the investigated aspects, as well as on the assessment of the relationship between quality of life and such data as child's age, parent's age, place of residence and GMFCS level. RESULTS: The results showed high levels of internal consistency of the Polish version of the CP QOL-Child questionnaire - Cronbach's a was between 0.77 and 0.82, which is comparable to the original scale, where it was 0.74-0.92. In addition, we found no relationship between child's age and parent's age and the child's quality of life. Whereas we determined dependencies between the child's GMFCS level and quality of life in areas such as emotional state ($p = 0.025$), pain and the effects of disability ($p = 0.033$), and to a lesser extent participation in social life ($p = 0.045$). However, Spearman test presented that only domain pain and impact of disability reported positive correlation $r = 0.43$. CONCLUSION: Studies showed that English language the CP QOL-Child questionnaire was successful translated into Polish which is confirmed by the results of the assessment of the psychometric properties and validation of the Polish language questionnaire. The results of our study indicate that the Polish language version of the CP QOL-Child questionnaire is an appropriate tool to assess the quality of life of Polish-speaking children with cerebral palsy aged 4-12 years.

PMID: 24215571 [PubMed - as supplied by publisher]

Prevention and Cure

20. Obstet Gynecol. 2013 Nov 6. [Epub ahead of print]

Cesarean Delivery and Cerebral Palsy: A Systematic Review and Meta-analysis.

O'Callaghan M, Maclennan A.

Discipline of Obstetrics and Gynaecology, School of Paediatrics and Reproductive Health, Robinson Institute, University of Adelaide, Adelaide, South Australia, Australia.

OBJECTIVE: To examine the association of cesarean delivery and cerebral palsy using a systematic literature review and meta-analysis. DATA SOURCES: MEDLINE, Embase, and ClinicalTrials.gov were systematically searched for articles relating to cerebral palsy and cesarean delivery from inception until December 2012. Only articles reporting confirmed cases of cerebral palsy were included. Meta-analysis was used to assess combined results and also the following subgroups: emergency cesarean; elective cesarean; term delivery; preterm delivery; and delivery of breech-presenting newborns. METHODS OF STUDY SELECTION: Literature searches returned 1,874 articles with 58 considered in full. Studies were selected if they reported an endpoint of cerebral palsy, an intervention or risk of cesarean delivery, were in English, and gave sufficient details to perform meta-analysis. TABULATION, INTEGRATION, AND RESULTS: Nine case-control and four cohort studies were included in the overall analysis. Meta-analysis showed no overall association of cesarean delivery with cerebral palsy (odds ratio [OR] 1.29; 95% confidence interval [CI] 0.92-1.79; 3,810 case group participants and 1,692,580 control group participants). Emergency cesarean delivery was associated with increased risk of cerebral palsy (OR 2.17; 95% CI 1.58-2.98), whereas there was no significant association between elective cesarean delivery and cerebral palsy (OR 0.81; 95% CI 0.41-1.58). Any type of cesarean delivery (elective or emergency) for term newborns was associated with cerebral palsy (OR 1.6; 95% CI 1.05-2.44), whereas there was no association between any type of cesarean delivery and cerebral palsy in preterm newborns (OR 0.81; 95% CI 0.47-1.40). Cesarean delivery did not significantly modify cerebral palsy risk for breech-presenting newborns (OR 0.51; 95% CI 0.13-2.05). CONCLUSION: A review of the literature does not support the use of elective or emergency cesarean delivery to prevent cerebral palsy.

PMID: 24201683 [PubMed - as supplied by publisher]

21. Georgian Med News. 2013 Oct;(223):56-60.

The role of parvovirus in the etiology of somatic pathology.

Topuria T, Barnabishvili N, Chubinishvili O, Topuria M, Guledani N, Maisuradze E.

Tbilisi State Medical University, Institute of Medical Biotechnology; Medical Firm "EUROLAB" Ltd, Tbilisi, Georgia.

The scope of the present research was to study parvovirus circulation in Tbilisi population and its role in etiology of somatic pathologies. Parvovirus circulation in persons with autism and disorder of the nervous system was examined. Blood of 110 patients was examined. Among them 35 were children (up to 15 years old) and 75 adults, mainly with different somatic pathologies such as mineral metabolism disorder, allergic reactions, cystic fibrosis, cerebral palsy and autism. Almost all the children came from the so called frequently ill category and suffered from disbacteriosis. Among adults, 16 were parents of the ill children, while the rest came with hepatitis, mineral metabolism disorder of different type and psoriasis. Blood serum of 30 adults was taken as an adult control group. Their age varied from 18 to 25 years. 10 children aged 2-15 constituted a children control group. Preventive examination was made and there were practically, absolutely healthy persons. A total of 150 persons were involved in the research. Frequency of parvoviral antibody detection in the ill children and adults is much higher than in healthy individuals. Consequently, positive results for the presence of M and G immunoglobulins in children equals to 54% and 85% respectively. In adults these indicator stand at 24% and 60% respectively. At the same time in 25% and 70% of parents of positive children were found to be positive for M immunoglobulin and G immunoglobulin respectively. Thus our investigation made it clear that parvoviral infection actively circulates in Georgia. The present research did not study manifested parvoviral infection, i.e. 5th disease. If it had than the number of positive results probably would have been much higher. In autistic children presence of parvoviral infection is consistent with the

literature data.

PMID: 24214594 [PubMed - in process]

22. Int J Nanomedicine. 2013;8:4183-4195. Epub 2013 Nov 1.

Nanomedicine in cerebral palsy.

Balakrishnan B, Nance E, Johnston MV, Kannan R, Kannan S.

Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University; Baltimore, MD, USA.

Cerebral palsy is a chronic childhood disorder that can have diverse etiologies. Injury to the developing brain that occurs either in utero or soon after birth can result in the motor, sensory, and cognitive deficits seen in cerebral palsy. Although the etiologies for cerebral palsy are variable, neuroinflammation plays a key role in the pathophysiology of the brain injury irrespective of the etiology. Currently, there is no effective cure for cerebral palsy. Nanomedicine offers a new frontier in the development of therapies for prevention and treatment of brain injury resulting in cerebral palsy. Nanomaterials such as dendrimers provide opportunities for the targeted delivery of multiple drugs that can mitigate several pathways involved in injury and can be delivered specifically to the cells that are responsible for neuroinflammation and injury. These materials also offer the opportunity to deliver agents that would promote repair and regeneration in the brain, resulting not only in attenuation of injury, but also enabling normal growth. In this review, the current advances in nanotechnology for treatment of brain injury are discussed with specific relevance to cerebral palsy. Future directions that would facilitate clinical translation in neonates and children are also addressed.

PMID: 24204146 [PubMed - as supplied by publisher] PMCID: PMC3818020

23. PLoS One. 2013 Oct 28;8(10):e77154. doi: 10.1371/journal.pone.0077154.

Prediction of Preterm Deliveries from EHG Signals Using Machine Learning.

Fergus P, Cheung P, Hussain A, Al-Jumeily D, Dobbins C, Iram S.

Applied Computing Research Group, Liverpool John Moores University, Liverpool, Merseyside, United Kingdom.

There has been some improvement in the treatment of preterm infants, which has helped to increase their chance of survival. However, the rate of premature births is still globally increasing. As a result, this group of infants are most at risk of developing severe medical conditions that can affect the respiratory, gastrointestinal, immune, central nervous, auditory and visual systems. In extreme cases, this can also lead to long-term conditions, such as cerebral palsy, mental retardation, learning difficulties, including poor health and growth. In the US alone, the societal and economic cost of preterm births, in 2005, was estimated to be $26.2 billion, per annum. In the UK, this value was close to £2.95 billion, in 2009. Many believe that a better understanding of why preterm births occur, and a strategic focus on prevention, will help to improve the health of children and reduce healthcare costs. At present, most methods of preterm birth prediction are subjective. However, a strong body of evidence suggests the analysis of uterine electrical signals (Electrohysterography), could provide a viable way of diagnosing true labour and predict preterm deliveries. Most Electrohysterography studies focus on true labour detection during the final seven days, before labour. The challenge is to utilise Electrohysterography techniques to predict preterm delivery earlier in the pregnancy. This paper explores this idea further and presents a supervised machine learning approach that classifies term and preterm records, using an open source dataset containing 300 records (38 preterm and 262 term). The synthetic minority oversampling technique is used to oversample the minority preterm class, and cross validation techniques, are used to evaluate the dataset against other similar studies. Our approach shows an improvement on existing studies with 96% sensitivity, 90% specificity, and a 95% area under the curve value with 8% global error using the polynomial classifier.

PMID: 24204760 [PubMed - in process] PMCID: PMC3810473 Free PMC Article

24. PLoS One. 2013 Nov 1;8(11):e79071. doi: 10.1371/journal.pone.0079071.

Congenital cerebral palsy, child sex and parent cardiovascular risk.

Streja E, Wu C, Uldall P, Grove J, Arah O, Olsen J.

Department of Epidemiology, School of Public Health, University of California Los Angeles, Los Angeles, California, United States of America.

OBJECTIVE: Genes associated with cardiovascular disease may also be risk factors for congenital cerebral palsy (CP) and these associations may be modified by sex, since there is an increased risk of CP in male children. We investigated the association between CP of the child with cardiovascular disease in parents, taking sex of the child into consideration. METHODS: All parents of non-adopted singletons born in Denmark between 1973 and 2003 were included. Parents of a child with CP, confirmed by the Danish National CP registry, were considered exposed. Cox proportional hazards regressions were used to model risk of cardiovascular outcomes for exposed parents compared to all other parents beginning at the child's 10(th) birthday. RESULTS: We identified 733,730 mothers and 666,652 fathers among whom 1,592 and 1,484, respectively, had a child with CP. The mean age for mothers at end of follow up was 50±8 years. After adjustment for maternal age, parental education, child's sex, child's residence, child being small for gestational age and maternal hypertensive disorder during pregnancy, mothers of CP male children had an excess risk of cardiovascular disease (HR: 1.52, 95% CI: 1.16-2.00), attributable mostly to an increased incidence of hypertension and cerebrovascular disease. After additional adjustment for preterm birth, the association was markedly attenuated for cardiovascular disease (1.34, 95%CI: 1.02 - 1.76), became nonsignificant for hypertension, but remained significant for cerebrovascular disease (HR: 2.73, 95% CI: 1.45-5.12). There was no increased risk of cardiovascular events in mothers of female CP children, or fathers of CP children of any sex. CONCLUSIONS: Women that have a male child with CP are at increased risk for premature cardiovascular disease. Part of this association may be related to risk factors for preterm births.

PMID: 24223882 [PubMed - in process] PMCID: PMC3815096 Free PMC Article

25. Tsitol Genet. 2013 Sep-Oct;47(5):22-7.

The association between GAD1 gene polymorphisms and cerebral palsy in Chinese infants.

Lin S, Li T, Zhu D, Ma C, Wang Y, He L, Zhu C, Xing Q.

Children's Hospital of Fudan University, Shanghai, China. linsheyu@yeah.net

Studies suggest that GAD1 gene was a functional candidate susceptibility gene for cerebral palsy (CP). In order to investigate the contribution of GAD1 gene to the etiology of CP in Chinese infants, we carried out a case-control association study between GAD1 gene and CP. In this study, 374 health controls and 392 infants with CP were recruited. Genomic DNA was extracted from venous blood and all three single nucleotide polymorphisms in GAD1 (rs3791874, rs3791862 and rs16858977) were genotyped by Sequenom's MassARRAY system. There were no significant differences in allele or genotype frequencies between CP or mixed CP patients and controls at any of the three genetic polymorphisms. Through haplotype analysis we found that haplotype GG (rs3791862, rs16858977) frequency demonstrated significantly statistical difference between mixed CP patients and controls (p = 0.0371). Our positive findings of haplotype GG suggested that variation of GAD1 gene was an important risk factor for mixed CP.

PMID: 24228494 [PubMed - in process]

Subscribe to CP Research News

To subscribe to this research bulletin, please complete the online form at www.cpresearch.org/subscribe/researchnews You can bookmark this form on the home screen of your smart phone and also email the link to a friend.

To unsubscribe, please email researchnews@cerebralpalsy.org.au with 'Unsubscribe' in the subject line, and your name and email address in the body of the email.